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ANALYSIS OF HEART RATE IN DIFFERENT TYPES OF CLASSES OF PHYSICAL EDUCATION

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Abstract

Several studies claim that the physical effort of students during Physical Education classes (PE) is low. There is a lack of desire to change or improve physical fitness levels. ***Purpose:*** *In this study, we intend to analyse the average values of heart rate (HR) during different phases of the PE class, trying to identify possible differences between collective and individual sports (basketball and apparatus gymnastics). The sample consisted of a group of 15 students, 5 female and 10 male (15.2 ± 12:56 years) and the study was conducted over 10 sessions (5 of each type), registering values of HR (bpm) using HR monitors (Polar Electronic, FT1 model).* ***Results:*** *After exploratory data analysis there were significant differences in the transition phase (basketball: 146 ± 27.2 bpm, p = 0.001; apparatus gymnastics: 138.4 ± 25.8 bpm, p = 0.001) and the drilling stage (basketball: 151.2 ± 26.1 bpm, p = 0.000; gymnastics apparatus: 143.0 ± 27.0 bpm, p = 0.000). In the process of organizing, the differences were not significant (basketball: 136.8 ± 26.2 bpm, p = 0526; apparatus gymnastics: 132.3 ± 23.9 bpm, p = 0526).* ***Conclusions:*** *Having these results, we believe that PE teachers should plan sessions that provide increased uptime and higher levels of intensity for students, especially in periods of drilling, regardless of the class.*

Key words: *Physical Education, Heart Rate, Intensity, Basketball, Gymnastics*

Introduction

We have witnessed a worrying increase in sedentary lifestyles worldwide. In Portugal, according to the European Commission's Web Site [17], only 8% of the population surveyed, between 15 and 55 years old, play sports regularly, and 64% never practiced any sport. The number of people without a regular habit of engagement in sports is high, whether in schools, in their own free time, at weekends or even during classes of Physical Education (PE). According to a study held in Portugal in 2007 of 319 teenagers 33.5% are inactive and 22% are either overweight or obese [8].

The school is undoubtedly a place with an environment that provides several opportunities and activities for children to be active whether through PE classes, Sports in School, or simply playing and informal games in school breaks. The school and teachers should be performing daily physical activities with their students, conveying the importance of regular practice, either for children's health, or to increase the level of motor development, and encouraging a healthy life style [18]. Indeed, the PE classes should contribute approximately to the level of recommended exercise for young people: currently 60 minutes a day of aerobic and endurance activities, from moderate to vigorous intensity, including activities that involve the skeletal-muscle system three or more times a week [11, 14]. PE lessons, in addition to contributing to the levels recommended above, should promote the development of the student, their socialization, healthy living, team spirit, their relaxation and sports should also be exciting and motivating.

PE programs are directed towards physical activity for health, but these must have a better control of the physical exercise that students are subjected to in classes, to achieve a significant influence on learning healthy habits by practicing these ones [9].

Several studies on young people [1, 6, 9, 10, 13, 18, 21], describe in fact the level of physical effort in PE classes and the respective heart rate (HR) responses in relation to the intensity of exercises performed in class. In a general context, these authors report that during PE classes young people spend very little class time performing moderate to vigorous physical activity, and spend too much time in organization, changing clothes and hygiene tasks [9, 13, 18, 21].

Regarding the different types of activities in PE classes, Sarradel et al. [18] states that activity and intensity can vary depending on the content. So, activities such as team games and tennis, require longer periods of moderate to vigorous physical activity (50% -80% maximum heart rate) in both sexes, compared to activities like fitness and dancing. While Wang, Pereira & Mota [21] report that the activities in which students reach higher HR values are their favourite programs such as football and volleyball and that they are considered less active in gymnastic classes. Also related to this variable, Gao, Hannon & Carson [6] assume that in dancing, students remain at a significantly lower HR when compared to activities such as "catch ball" football and walking/running.

In the literature researched, we found studies analysing the HR comparing a collective sport with an individual sport, considering the different stages that make up a 90 minutes class, and the different behaviours that these induce in students.

This study was conducted with the objective of contributing to a better understanding in this field, trying to analyse the differences between sports (basketball and apparatus gymnastics) concerning the intensity of physical activities proposed in PE classes. We have reference to the HR records among the PE classes of two different types (collective and individual sport).

Methods

Sample

The sample consisted of 15 students (10 male and 5 female) aged between 15 and 17 years (15.2 ± 0:56 years), belonging to a 10th grade class of a school in the interior region of Portugal, located in an urban centre of that district.

The sample was selected for the researchers' convenience, and it is a class with a high level of attendance and punctuality. It is also homogeneous in terms of age and was identified by school teachers as very committed and motivated during PE practice.

The following sample exclusion criteria were considered: students with special educational needs; practice of sport or physical activity outside the school; students with injuries and medical limitations, as well as students from classes with 3 sessions of 45 minutes per week.

To ensure ethical clearance, we requested authorization from the school board and asked a teacher to cooperate with the study as an advisor so that the research could be performed. In addition to this, information was provided to parents regarding the study procedures, along with a request for the necessary signed informed consent authorizing the participation of their children in this study. For the implementation of the research, students were warned about the type of study that would be conducted and that classes would take place normally, so their behaviour should not be different from usual.

The study was conducted over 10 random PE classes, comparing five classes of gymnastics apparatus with 5 classes of basketball.

During each lesson of the study, HR measurements were recorded, and controlled depending on the type of activity that the students had to perform. These phases were adapted from Guedes and Guedes [10] and divided into three categories, according to the activity, to understand where there would be more discrepancies in students' HR:

Phase 1 - Organization of classes: situations where students receive a teacher's

instructions regarding the provision, organization and implementation of activities to be performed;

Phase 2 – Activities Transition: situations where students are waiting to participate in the next activity or transition period thereof;

Phase 3 – Drilling (exercise): situations in which students must participate in activities proposed for Basketball: Situations in which students must participate in the activities proposed for gymnastics apparatus.

HR is considered one of the main physiological variables when referring to the exercise prescription and becomes a key tool in knowing the response of students in different exercise situations, showing at which stages students had higher intensity [2]. For HR records we used a HR monitor (Polar Electronic, FT1 model) fixed on student's chests, which recorded during the class time, as in the study by Guedes and Guedes [10].

In gymnastic apparatus class three measurements of HR were recorded in phase 1, two in phase 2 and five in phase 3. In the basketball classes two measurements were registered in phase 1, three in phase 2 and three in phase 3. Each record was taken every 6 minutes calculating an average value corresponding to the number of measurements taken.

Statistical analysis

The collected data were extracted to Excel, and later to the SPSS software (version 21.0 for Windows), where all the statistical analysis was performed.

Because of exploratory data analysis outliers were eliminated, as well as cases in which an item had no registration. The phase that corresponded to the students' FC when they arrived at the lesson was also eliminated (considered as phase t0), since there was a large discrepancy between the students' levels at the beginning of the class, compared to levels from previous activities and the initial levels and those taken during the class.

We analysed mean, standard deviation, minimum and maximum values. For comparison of the mean values (HR in basketball exercise classes and gymnastic apparatus classes) we used the t-test for paired samples to infer the equality of means between the two types of classes and comparable phases. The established statistical significance criterion was predetermined by $p < 0.05$.

Results

Table 1 shows the HR means results, the standard deviation and sig-nificance level of the three phases defined: organization (T1), transition (T2) and drilling (T3).

Table 1. HR values depending on the class phase (Mean ± standard deviation).

Phase	Sport	HR mean ± standard deviation (Minimum - maximum)	*P-value*
T1	Gymnastics Apparatus (n = 15)	132.3 ± 23.9 (85-191)	0.526
	Basketball (n = 15)	136.8 ± 26.6 (79-190)	
T2	Gymnastics Apparatus (n = 15)	138.4 ± 25.8 (91-187)	0.001
	Basketball (n = 15)	146 ± 27.2 (80-198)	
T3	Gymnastics Apparatus (n = 15)	143 ± 27 (87-199)	0.000
	Basketball (n = 15)	151.2 ± 26.1 (87-202)	

It is observable that when comparing the HR mean values of each sport and class phases we found that HR results in basketball are always higher (in mean values) than gymnastics apparatus values in each phase. Also, in basketball we have higher maximum HR values than in gymnastics apparatus, during the time of transition and drilling, and gymnastics apparatus registered a higher maximum HR, in time organization. Regarding the minimum HR values, it was found that basketball was the activity that registered the lowest minimum value, and during

the time of organization and drilling there were values of a minimum HR identical for both sports. The data also revealed the existence of significant differences (p = 0.05) between the two sports at the transition and drilling phases, with basketball achieving higher averages. In the organization phase there were no significant differences between the two types of classes (p=0526).

Discussion and conclusions

The purpose of this study was to establish whether there are dif-ferences of HR in collective and individual sports during PE classes. The data revealed the existence of significant differences in intensity, collected by HR measurements, between the two types of classes / sports that we studied in the transition and drilling phases.

The school should be a privileged place to promote physical activity in young people and, given the frightening prevalence of obesity that currently exists, and bad lifestyle habits that contribute to this situation, the role of the school as a promoter of physical activity is determinant.

In this study we compared effort intensity by HR measurements over five random PE classes in basketball and gymnastics apparatus. For this, we analysed and separately compared the different phases of these classes. The results demonstrate that mean values of HR achieved in team sports classes are higher than in individual sports, with significant differences in transition and drilling phases.

For this study HR recorders were used, allowing us to quickly and efficiently register the heartbeats. The student sample was carefully selected because it is a homogeneous group regarding physical activity, and not one which practiced sports in an extracurricular form. As already mentioned, the kinetics of frequency throughout the different classes was defined in three main phases – adapted from Guedes & Guedes [10] – expecting lower values of HR in phases of organization and transition, and higher in the drilling phase.

The results of this study indicate that students maintain an average level of physical activity above 60% of their maximum heart rate, given the simplified calculation (HRmax = 220-age) proposed by Karvonen, Kentala and Mustala [12] and widely applied in different studies. Thus, student's HR assumes values of physical activity from moderate to vigorous, considering the existing literature [6] for moderate to vigorous physical activity (60 to 90% of maximum heart rate).

According to Thompson, Gordon and Pescatello [20], The HR values obtained in the organization phases of gymnastic apparatus and basketball (132 bpm and 136.8, respectively) can be described as low to moderate exercise, so it could be considered a sufficient incentive to improve the base resistance. The same is observable in periods of transition of the gymnastics apparatus classes.

The values observed in periods of transition in basketball classes exceed 70% of the maximum heart rate of students, and therefore correspond to values of moderate to vigorous, according to Gao, Hannon and Carson [6].

The drilling phase has shown major differences, verifying values corresponding to a moderate to low effort in gymnastics apparatus classes compared to basketball, where HR was found with values close to 75% of FC maximum predicted. There was therefore the occurrence of vigorous exercise values in all of the types of classes, although, in basketball, HR values were higher than the gymnastics apparatus. These data are like the results reported by Guedes and Guedes [10], in which students have HR means in the classes observed between 132 and 147 bpm.

We assume, as referred in their studies Guedes and Guedes [9, 10], Wang, and Pereira Mota [21], Gao, Hannon and Carson [6], Sarradel et al., [6], Kremer, and Reichert Hallal [13] the values of HR mean are far lower than what should be desirable, and happened given the short time that students were in moderate to vigorous physical activity. However that in-sufficient time is conditioned also by the fact that class time has been reduced, since the students lost about 25 minutes of class time during the period referred to as Discipline Regulations for changing and hygiene. The recorded HR values also appear due to the existence of too many

drills transitions due to the high number in the program content that exists in schools. This factor does not allow for ongoing drilling and consequently the expected increase in HR. Thus, the lowest percentage of maximum FC achieved may be due to pauses between exercises. In fact, some au-thors describe the national programs as overloaded; Gonçalves and Carvalho [7] have reported that teachers tend to classify the allotted time to meet the programs as "rudimentary", "short", "almost impossible to work," "almost always the same," "does not have a very favourable opinion". Despite the school being studied having adapted the program, this problem persists.

Our study also noted that in basketball classes students maintain HR values significantly higher than in the gymnastics apparatus classes when they are in transition phases and drilling. According to the organization phase, the differences were not significant. In our opinion these results happen because in basketball lessons exercises are more intense and dynamic and the students present a higher commitment to this tasks, which makes the transition time between exercises insufficient for there to be a greater decrease in HR values. Regarding the organizational phase, the significance of the compared results is less, because, while basketball students rest in this phase, students in gymnastic apparatus classes help with the transportation of the devices, which automatically increases HR and thereby brings both sports to similar HR values.

One of the most relevant limitations of this study was the unavailability of registering HR values automatically and with shorter time intervals. This would require using HR monitors with a possibility of automatic HR records to avoid pauses in class to measure HR, as reported in previous studies [6, 10, 21]. As a proposal for studies in this context, we suggest that in the future the sample and the number of analysed classes could be increased, seeking greater rules regarding diversification. Additionally, we also suggest that the classes can be filmed to improve the reliability of recording time of each student throughout the different phases of the defined classes, also maintaining the direct observation instrument as used in the study of Guedes and Guedes [10], checking the type of activities that students are doing.

This study allows us to conclude that there are significant differences between classes of team sports and individual sports, with significant differences in the drilling phase and transition. In these phases the students are always active, with HR levels that correspond to an important stimulus for the development of aerobic capacity (except for the transition phase in the apparatus gymnastics). As the HR values were recorded over 10 classes, the representativeness of the same in the trimester is relevant (representing about 43.5% of all lessons), so it is pertinent to highlight that teachers should pay special attention to these phases in classes to succeed in keeping students active.

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TEACHING STRATEGIES TO ENHANCE MOTOR SKILLS LEARNING FOR GROUPS OF STUDENTS: THE EFFECTS OF VERBAL AND VISUAL FEEDBACK ON PERFORMANCE IN POLE VAULT PRACTICE

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Abstract

This paper contributes to the enhancing of a comparative study on the creative implementation of teaching methods in physical education sessions. We aim to determine the evolution of teacher representations related to the understanding of the particular practice of pole vaulting and its teaching by integrating a computer-video element into an educational environment. This study was carried out in two graduate classes of high school including (N = 44) students. These are two groups aged between 15 and 18 (One group of students was provided with verbal and gestural communication, while the other was asked to view a video). The pole vault learning cycle consisted of 14 sessions, divided between two sessions per week. The findings were consistent with the difference between methods of teaching in line with the respective tasks. Through this experiment and feedback from the lessons, we have been able to conclude that the use of Computer Communication Technology and specifically of the element of video footage, contributed to progress in motor learning for the large majority of students from the all group study. This research is open to the understanding and appreciation of how to best design video lectures that encourage learning and the development of knowledge.

Key words: *physical education, artifact video, feedback, motor learning, skills*

Introduction

In recent years, the value of sport has evolved in physical education programs [2, 31, 49]. Indeed, the use of physical activities and sports (PAS) at school is highlighted as a teaching discipline and as an important environment for the promotion of physical activity [36]. It is becoming difficult today to recommend an integration of sports practices without it being reproved by a part of the community. So, what is the logic behind the choice of teachers' practices today? Several research projects have already been carried out on the choices of the teachers in bodies of sporting practices. Many studies conclude that one of the aims of physical education (PE) is to develop social skills such as cooperation, teamwork, and mutual assistance among students. Or, on the contrary, on the moral value of physical activity: both physically and mentally [10]. These studies provide a global and stable view of teachers' choice of PAS. They reveal the importance of this sport standard, traditional in PES. The new analyses show that changes are related to the context that infers vigorous constraints. The social context of sport in transforming communities [50], or internally, as institutional constraints [42] are perceptible through a marked distance to the practice of sport and physical self-perception [24, 25, 34] or a delay in introducing new activities. Classification analyses are aimed at terminating the dominant rules that are required in physical education and sports (PES). These constraints

tend to determine a relative homogeneity of the teachers' choices. While, beyond these constraints that balance programming and tend to standardize them, teachers are differentiated in terms of the choices of PAS. Would the technical skills of pole vaulting reveal a heterogeneous educational use of bodily practices? What are the meanings of these different uses of pole vaulting in PES?

Firstly, assessment is, on the one hand, ubiquitous in the school system and poses many issues of fairness [9]. On the other hand, unequal sexual gender relations are still present today in society workplace [51]. This is the same at school and in PES. In the latter, the grades of boys are generally higher than those of girls. This scoring gap poses, for example, a problem of legality between students in PES exams. Here, the answer is not limited to a difference in motor abilities. Several elements interfere, such as the predominance of male activities, and girls' introduction to new activites. Assesment systems are not very sensitive to genetic differences. Previous studies focusing on what the student thinks are rarer and do not answer the questions that challenge us: do students perceive inequalities between the sexes? Do they feel an injustice in PES assessment? The school, vector of equality between the sexes, participates at the same time in the construction of gender differences. In school, boys and girls experience very different forms of socialization [26].

These consist of behavioral coherences combined with evaluation, organization, influencer design and management, effort and retrospection in a particular practice. In addition, changes in PE education could be desirable in which a sense of coherence is supposed to be the major indicator of health-oriented behavior. The strategic choice leads to a variation in the perceived risk intensity of the activity or importance associated with the situation. It finds its origin in the value of achievement of the task. But the strategy adopted will not always result in success. This work section defines two particular motivational strategies for effectively managing the fulfillment of situations. First, defensive pessimism [38] is used when the apprehension of failure is strong but the desire to succeed is important. To rely on the strategy mentioned contributes to the development of negative effects, through the amount of effort exerted. On the one hand, to protect oneself against a possible failure, while preparing oneself, on the other hand, to motivate oneself by intensifying the effort in order to succeed the task and to increase the pleasure to have properly intervene [4, 17]. In contrast, the strategy of optimism [38] is used by people with high self-esteem, low anxiety, and the possibility of failure. Also, optimism may influence mental and physical well-being through the encouragement of a healthy lifestyle as well as through adaptive behaviours, associated with greater flexibility and problem-solving capacity [14]. The use of a defensive pessimism strategy may involve students with either low or high self-esteem.

The outcome is often associated with a sense of control and the perception that students have of their abilities is quite close to reality. In addition, teachers must have expectations regarding the teaching of PES in general and pole vaulting in particular. More specifically, the educational reform reviews the objectives and contents of teaching, at all levels and for each discipline, decreeing fundamental objectives and the minimum of compulsory content to be achieved by the students. In this general context, physical education in Tunisia has undergone significant changes, such as the perception of its status as an official subject in PES, which concerns athletic education: triple jump, high jump which lead to the integration of the the pole jump by treating it in a global context of jumping for fun, and as a form of technical education.

Theoretical and problematic positioning

The didactic approach supported in this study considers that the student is an actor engaged in a system of learning action. This approach could be in agreement with a sociology that assumes individual identity and social identity coexist [27], within the framework of motor praxeology. In this context of motor action Parlebas [40] presents an illustrative model of motor action and notes a classification of motor situations. For example, Teachers build a learning context encouraging

students to actively engage in and take ownership of their learning experiences, a setting stimulating learners to think deeply about how they might apply what they are learning to their envisaged practice [37]. When the student is engaged in motivated sport practice, he is considered to be at the center of an interactional system through engagement with both his peers and his physical environment. In the framework of the work presented here, the degree of motor interaction between peers is not the only determining factor in the learning situations proposed to the experimental group. At the same time, however, the intervention of the external regulator offers support for the learning phases of the pole jump, applying the logic of the motor action and the characteristics of the activity.

The various pole jumps are part of the learning situations practiced in the physical education class, soliciting imagery self-observation, video visualization and the intervention of the educator, as well as the modalities of learning. According to the praxic and psychological approach, relational modalities described as "psychomotor" are identified [40]. They put the learner in a situation of diminished interaction with others on a motor level. We note here that the particular practice of pole vaulting can be considered a psychomotor activity [23]. In the field of psychomotor situations, none of the given motor tasks requires the participation of others in order to be accomplished. However, notwithstanding the absence of praxic interaction, several relational possibilities still exist. Thus, we mention three: simultaneity, alternation and motricity in isolation. The first two are generally called "comotrices" because they are located together, in the same space with several participants, without the action of each being immediately influenced in its functional achievement by the behavior of others [20, 41]. They offer students the chance to act in a common space and time. They represent the category of situations of active co-presence. Simultaneously, the tasks to be performed start from a common starting signal for 2 or more students and are placed for anyone in symmetrical places, whether they are parallel or sharing an arbitrary axis of symmetry. Thus, varied jumping courses in parallel are a translation of this learning mode. Here, it is in pole vault that this relational modality of practice is maintained. The temporalities of the observation, with the help of the teacher, which admit the visualization of the benefit of others and of argumentative language activity, participate in this mode of learning. During isolated motor skills, practitioners intervene singly to perform the tasks requested. Isolated situations correspond to a form of passive co-presence. Specific examples of the procedure and instructions offered to students will be detailed when describing learning tasks in pole vaulting. Thus, we discuss feedback interactions coupled with video observation of gender-differentiated treatment as a teaching-learning tool.

Observation and feedback

Video observation during action in motor learning

To explain learning in the field of physical education, video could be a sophisticated method for the understanding and correction of student movement. In the school context of pole vault learning, we invest in the observation of student behavior and the use of video images. The filmed learning sequences could produce figurative forms. The interest of this study is first to study the reliability of the implementation of the video tool in a cycle of teaching and learning of the practice of pole vaulting. Then, to determine the effectiveness of feedback on learning through the video image.

According to Schmidt [47], feedback is information concerning the difference between the statement of an objective and its performance. Through feedback, the learner can grasp the difference between what he actually achieved and what he was required to accomplish. To ensure that the task is learned and to guarantee the acquisition, the learner must know the course of the action and its result [45]. Feedback can be divided two categories. Intrinsic feedback, derived mainly from one's own perceptual channels, vestibular and proprioceptive systems, and extrinsic feedback which is mainly managed by the educator,

coach, and teacher in visual form such as, video footage [45, 48]. The tautology of meaning in these two types of feedback does not diminish motor learning [47]. However, the feedback concerns the knowledge of the result of the action and the knowledge of the performance. First, if the learner can know if he has succeeded or failed, it is because it does not require great precision. This need can usually be obtained through intrinsic feedback. Then, in the case where the information concerning the result has to be more precise; or if the practitioner does not have the potential to distinguish by himself the result of his action, it may be necessary to resort to external reinforcement through extrinsic feedback. In fact, at the beginning of the training period, the practitioner does not know how to use the potential of his proprioceptive system, which is an important clue to information about the progress of the action [35]. Thus, knowledge of performance may be considered more difficult to exploit by the novice, as it seems to be more effective at ensuring the acquisition of complex tasks involving a variety of movements [53].

In our case, the resulting knowledge would not give sufficient information on the inter-segmental coordination, air balance and control of the pole, which characterize this type of jumping task. It is necessary to explain this fact to the practitioner of motor skills not only according to open space but also closed. It is necessary to know what is required to master a form from the quantitative point of view and certainly qualitative in order to be informed on the quality of its performance. For this type of task, the knowledge of performance is similar to a form of knowledge of the result [53]. In general, consolidated and well-argued feedback assists learning in a variety of ways. An important motivational role could be translated into greater and more sustained engagement by the learner over time [45]. Another supportive role can be played in producing good performance through the positive reinforcement of good deeds. The motor models introduced will thus be favored over those leading to failure. This provides the learner with information about the outcome or course of action [45, 47]. To ensure the development of the necessary cognitive and motor skills and to interpret and correct its movement, the usefulness of this approach is precision and support for the improvement of learning by stating the gaps and actions to be repaired. During the next intervention, the mechanisms facilitating learning would be identical for all types of feedback. Still, at the beginning of the learning, the subject needs to be oriented by frequent feedback, but this must gradually be reduced to oblige the learner to use his own sensory perceptions. The need for frequent feedback depends not only on the level of the student but also on the corresponding difficulty of the work and the timing of the action.

Video feedback

The understanding of motor behavior in the pole vault requires an observable processing of information. This requires the visualization of the result to know the performance. Hence, the need for external feedback, considering the video as a source of information regarding the behavior of the practitioner. It enables him to view his own performance directly at the end of it and thus compare it to the mental representation of the movement he had built following the demonstration or the instruction. Subsequently, we present this comparison as a useful way of refining this mental representation and helping as a support for the programming of the next attempts.

The video provides elements of motion that can be observed and corrected on the basis of visual information [3, 47]. Little research has supported the use of video in the context of school physical education. It seems that this tool is only rarely used by physical education teachers. Guadagnoli et al., [28] discuss the efficacy of the proper exploitation of time and available resources required for the use of video. In addition, some studies highlight the importance of repetition for the acquisition of a task [5, 6, 29]. Indeed, the time reserved for the feedback and the analysis of the movement must not be in spite of the practice time. Then Swinnen [52] adds that the teacher of PES is responsible for optimizing the conditions of realization of the task and he is not a distributor of feedback, in order to facilitate the emergence and the repetition of the motor response more

appropriately. Feedback through the film sequences induces progression and improvement if the learning of complex tasks in students not only at the level of acquisition of morphokinesis [11] but parallel to the level of equilibration and adaptability. This furthermore gives an advantageous malleability of use for the learning of the action. For example, the movement can be observed more than once and can be delayed while a specific element is examined.

The reading of physically characteristic movement in EPS in a given environment is most often complex because it is very different depending on the individual. The verbal regulations of the teacher should almost all be different and in this, the video is a very privileged tool to access the different information given by the bodies of individuals in motion. It ensures very realistic representations thanks to the coupling of the visual and the auditory, which implies that it is very adapted to the motor learning of the practice of the Physical and Sports Education. This study seeks to confirm the hypothesis that video feedback facilitates the learning of new complex skills as part of a pole vault cycle. This learning will be strengthened because the video magnifies learners' motivation and allows them to better distinguish differences in form [47]. The crucial objective of providing video feedback is the understanding of the function of error and consequently the identification of student successes. The verbal correction of the teacher will allow students to situate in the motor learning where the errors and successes are and thus set up a guide to more appropriate and more effective movements.

Method

Experimental protocol

We seek to determine the evolution of teacher representations related to the understanding of the particular practice of pole vaulting and its teaching by integrating a computer-video element into an educational environment. This study was done in two graduate classes of high school. These are two groups, aged between 15 and 18 (a "video group" and a "non-video group"). These are motivating and active classes where we find parity between girls and boys with class sizes of between 21 and 23 students. The pole vault learning cycle consisted of 14 sessions, divided between two sessions per week, planned on Thursdays and Saturdays from 10 am to 11 am for the first class and from 11 am to 12 am for the second class. The sessions took place in the gym and in the sand jumper. To establish a comparative study between two teaching methods (with and without video), it required setting up two heterogeneous groups. This was organized after the predictive assessment at the first session, while adjusting the detailed learning content for the students during this pole vault cycle. The objective of the learning cycle was to transmit motor, affective and cognitive learning with strategies that postulate the motivation, control and support of student autonomy during pole vaulting while having the most appropriate didactic and pedagogical situations. The diagnostic assessment at the beginning of the cycle and the summary evaluation at the end of the cycle would be done by the teacher, concern pupils' skills and their performance levels. Thus, we examined the technical and motor level and we measured progress on the level of motor skills and their performance. Finally, we identified the evolution of students in the practice of pole vaulting.

In the middle of the session, we integrated learning situations that would allow the language and gestural corrections of the teacher for one group, whereas for the other group, the video allowed reliance on the students' short-term memory to visualize their performances to which verbal corrections were added as well as a debate of ideas. It was important that the sessions be completely identical in both the video and non-video group. We aimed to ensure that girls and boys of both classes received the same instruction, games, education task and exercises. The goal required experimentation to be done under similar conditions so as not to distort the results. Our exchanges throughout the cycle were numerous in order to stay on target and ensure that there was the least possible lag in instructions and corrections. We also made

sure to start each session with the class group and finish each session in the same way so as to maintain unity and not break the overall dynamics of the class (see Figure 1).

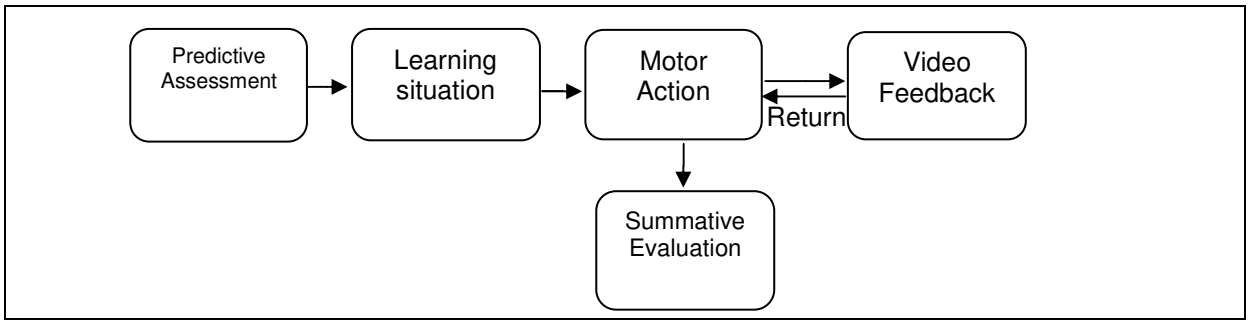

Figure 1. Structure of sessions of a teaching-learning cycle with video element

Protocol of action with both classes

To test the reliability of the tool, we have implemented exactly the same protocol. We had two classes for this investigation. We separated each class into two heterogeneous groups following the first session which was the diagnostic assessment. One of these groups received instructions using video supported by verbal and gestural corrections, while the other group only benefitted from verbal and gestural corrections (without video). Each session of the cycle was broken down as follows:

-Situation1: Group warm-up class.

-Situation2: Placing the technical element to work during the session in the form of jumping and group jumping class games.

-Situation3: Technical workshops in the group, with the use of the video for one group.

-Situation4: Placing the technical element to work in the session in the form of jumping and group jumping class games.

The video workshop accompanied by educational exercises was certainly motivating because it happened in front of the camera. Again, the use of the video applied to all sessions, for a duration of around 15 minutes. The material used to ensure the video observation is as follows: A computer, a camcorder, a FireWire cable and "Dartfish" software for managing the reading of the student's passage. In the field of the camera the workshop "video" runs. The students perform their exercises at first. Then, at a second time, they go behind the computer to view the video of their performances. Each student then makes an immediate return and starts the exercise again correcting their mistakes once the visualization is done. This operation allows students to increase their motivation, to have an immediate knowledge of their performance and to make visible the verbal and gestural advice of the teacher. They gradually self-evaluate with a real look at their achievements. This approach allows the teacher to make sense of the different advice given to students.

A similar structure was developed for all sessions with the exception of the Predictive Assessment at the first session and the Summary Evaluation at the 12th session. The interest of the study is to offer these students benchmarks to facilitate and improve motor skills. However, the content was distributed according to the logic of the cyclical programming and according to the objective of each session of ludomotor learning.

PLAN OF A PHYSICAL EDUCATION LESSON

Class : **Operational Objective of the Session** **Date:**
Cycle : **Describe in a univocal way the content of the pedagogic purpose** **Schedule:**
Session: **(know what to do and know how to behave)** **Duration:**
Effective: **To be able of + verb of action and object + conditions of realization + success criteria** **Material:**

Parties	Sub-objectives	Lesson Content	Schema	Time	Criteria for success
1. TAKING CONTROL OF THE CLASS. "Lesson start"	Be attentive to the presentation of the work, understand the lesson rules, remember what has been experienced, and be mentally ready to practice...	• Reception and grouping, the call, clothing; • Reminder of what we experienced in the previous session and lesson work presentation • Presentation of the task, device, groups, roles, instructions ...; • Development of the personal project ...	Descriptive diagram of a device "A beautiful scheme is better than a long speech" **Expressive Diagram: Organized, Detailed and Clear** Device: - material, space; forms; groups; passage; action - Colored lines: ropes to delimit two spaces; -Scotch or sticks to delimit the space layout - Arrows: circuit to follow -Square + rectangle + round + triangle + stud with keel above	3-5 min ***Indicate the Duration of each step and activity*** 10-12min 30-35 min 3-5 min	Vigilance, silence, attention, speed of answers, collective comments (prerequisites..)
2. STARTING THE LESSON. " Warming up "	Prepare muscles and joints for physical effort and activity, activate circulatory and respiratory functions, and protect against incidents and injuries. **"Prepare the organization for learning and the efforts of the session"**	• Physiological activation of the body's functions. • Muscle tension adjustment by contraction and stretching adapted to the type of effort seeking the muscular amplitude. • Joint mobilizations most requested by the APS. • Progressive warming from general to APS specific • Games adapted to the warm-up and introductory to the lesson.			- Face redness; - Body sweats - Breathing quality; Heart rate (beats / min) - Fun of the game (happy / activated)
3. LESSON BODY "Learning Situations"	Necessary progression into "sub-objectives" to achieve the objective of the lesson. **They must be formulated using an action verb inducing behavior observable.** What the student needs to achieve	**Learning Situation No. 1, 2 etc.** • Device: environmental management and grouping of students; • Procedure: procedure and instructions; • Achievement criteria: how to do it; useful actions, operations to be done to succeed; • Rules of action link and articulate the criteria of achievement; - "what are the conditions and how to do it concretely? "- data to the student or researched (practical knowledge); • Evolutions: revive student interest, change behaviors and strategies; challenge of pleasure and challenge. • Regulations / adaptations / extensions: Possibilities of simplification or complexity of the situation or task • **Discovery situation** - situation-problem (identify where the student is, in relation to the objective. • **Structuring situation** - situations-problems with evolutions, proposing variants, to help the student to discover the rules of action necessary for his success. • **Reinvestment situation** -Reuse the action rules discovered in other situations			Terminal performance requirements criterion, as a favorable result. it is the visible manifestation of the attainment of goal. **Observable, Quantifiable and Verifiable Criteria** -Inscribed in the device: impulse on the board - Abstract: run without slowing down - Quantifiable: successful 6 times / of 10 - In relation to a criterion for carrying out the action
4. RETURN TO CALM. "End of lesson"	Bring the body towards the state of rest and to normalise itself by defining feelings verbalizing emotions, actions, rules and security	• Physiological recovery, stretching, and relaxation: gradual return to calm (do not go directly from the race to a static position); to lie down and listen to the music. • Reminder of what has been done, learned and met; Collective presentation of instructions and supervision • Collective lesson report, storage of equipment, re-dressing			Check normal cardiac and respiratory rates; body relaxed and elongated, at ease not out of breath.
Lesson Analysis	• Envisager des ajustements et des développements ultérieurs. • Mettre en place des outils de référence à partir des observations et des analyses. • Mettre en œuvre des actions de prolongement sur les domaines retenus dans la progression.				

Figure 2. Technical elaboration of a physical education sheet lesson

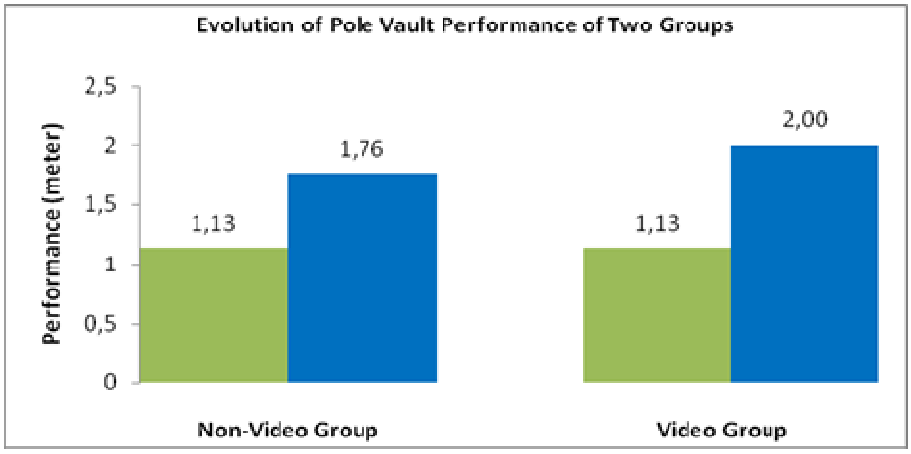

Figure 3. Evolution of motor performance in pole vault of video and non-video groups.

Table 1. Descriptive statistics of young boys' performance and progress by groups

Boys	Initial Performance	Final Performance	Progression (meter)	Progression (%)	Group (N=23)
1	1.70	3.50	1.80	51.42	Video
2	1.40	2.40	1.00	41.66	Video
3	1.30	2.25	1.05	46.66	Video
4	1.30	2.20	.90	40.90	Non video
5	1.30	2.15	1.15	53.48	Video
6	1.30	2.10	.80	38.09	Non video
7	1.20	2.05	.85	41.46	Video
8	1.10	2.05	.95	46.34	Video
9	1.10	2.05	.95	46.34	Video
10	1.00	2.05	1.05	51.21	Video
11	1.20	2.05	.85	41.46	Video
12	1.10	2.05	.95	46.34	Video
13	1.20	2.00	.80	40	Video
14	1.10	2.00	.90	45	Video
15	1.20	2.00	.80	40	Non video
16	1.20	2.00	.80	40	Non video
17	1.00	1.90	.90	47.36	Non video
18	1.30	1.90	.60	31.57	Non video
19	1.20	1.80	.60	33.33	Non video
20	1.30	1.80	.50	27.77	Non video
21	1.20	1.80	.60	33.33	Non video
22	1.30	1.80	.50	27.77	Non video
23	1.20	1.40	.20	14.28	Non video

However, the progress in meters is not indisputably demonstrative of the real improvements in the pupils since they do not begin all with the same level of practice. In addition, we considered the percentage of individual progression between the diagnostic assessment and the summative evaluation. As a result, we could compare students not with their performance, but with their percentages of progressions. Tables 1 and 2 below were therefore more significant for the students' situation in terms of their place in the groups. The contribution of the video tool in the progression of the students is presented very clearly. Thus, the average percentage of progression observed varied for the video group from 29 to 53%, whereas for the non-video group, it ranged from 12 to 47%, showing a greater homogeneity in the video group compared to the non-video group. But we especially remember that the average

percentages of the two classes are almost different.

Table 2. Descriptive statistics of girls' performance and progress by groups

Girls	Initial Performance	Final Performance	Progression (m)	Progression (%)	Group (N=21)
1	1.40	2.45	1.25	51.02	Video
2	1.10	2.00	.80	40	Non video
3	.90	1.80	.70	38.88	Video
4	.95	1.75	.80	45.71	Video
5	1.00	1.70	.70	41.17	Non video
6	1.00	1.70	.70	41.17	Video
7	1.00	1.70	.70	41.17	Video
8	1.20	1.70	.50	29.41	Video
9	1.00	1.70	.70	41.17	Video
10	1.00	1.70	.80	47.05	Video
11	1.00	1.70	.70	41.17	Video
12	1.00	1.70	.70	41.17	Video
13	.95	1.65	.70	42.42	Video
14	1.00	1.65	.65	39.39	Non video
15	1.10	1.65	.55	33.33	Non video
16	1.00	1.65	.65	39.39	Non video
17	.80	1.60	.60	37.50	Non video
18	1.30	1.60	.30	18.75	Non video
19	.85	1.60	.75	46.87	Non video
20	1.10	1.60	.50	31.25	Non video
21	1.10	1.25	.15	12	Non video

Note. m: meter, - Pole vault performance measured by meter; %: Parentage of performance progression; N = 21: Number of students.

Table 3. Averages, standard deviations, and percentages of performance and progress

		Initial Performance (m)	Final Performance (m)	Progression (m)	Progression (%)
Video Class	*M*	**1.13**	**2.00**	0.89	**43.82**
	E-T	0.18	0.40	0.26	5.21
	Min.	0.90	1.65	0.50	29
	Max.	1.70	3.50	1.80	53
Non-Video Class	*M.*	**1.13**	**1.76**	0.61	**33.90**
	E-T	0.15	0.23	0.20	9.52
	Min.	0.80	1.25	0.15	12
	Max.	1.30	2.20	0.90	47
Video Group Boys	*M.*	**1.22**	**2.21**	1.02	**45.75**
	E-T	0.18	0.42	0.26	4.28
	Min.	1.00	2.00	0.80	40
	Max.	1.70	3.50	1.80	53
Non-Video Group Boys	*M.*	**1.22**	**1.88**	0.65	**34**
	E-T	0.09	0.20	0.21	8.85
	Min.	1.00	1.40	0.20	14
	Max.	1.30	2.20	0.90	47
Video Group Girls	*M.*	**1.03**	**1.77**	0.75	**41.72**
	E-T	0.14	0.22	0.18	5.51
	Min.	0.90	1.65	0.50	29
	Max.	1.40	2.45	1.25	51
Non-Video Group Girls	*M.*	**1.03**	**1.63**	0.56	**33.80**
	E-T	0.14	0.17	0.20	10.70
	Min.	0.80	1.25	0.15	12
	Max.	1.30	2.00	0.80	47

Note. m: meter, - Pole vault performance measured by meter; %: Parentage of performance progression; N = 44: Number of students.

All students, whether in the video group or the non-video group, improved their performance during the pole vault learning cycle, as they have no experience in this practice and it was their

first participation. However, we find that all students in the video group have a higher percentage progression than students in the other group. The table 3 below summarizes the results of each group with different statistics.

Statistical data with a student test showed us a comparison of two averages for experimental groups (see Figures 4 and 5). It is calculated with the average performances, according to the two groups (Video or Non-Video) and on both tests. We can see results below.

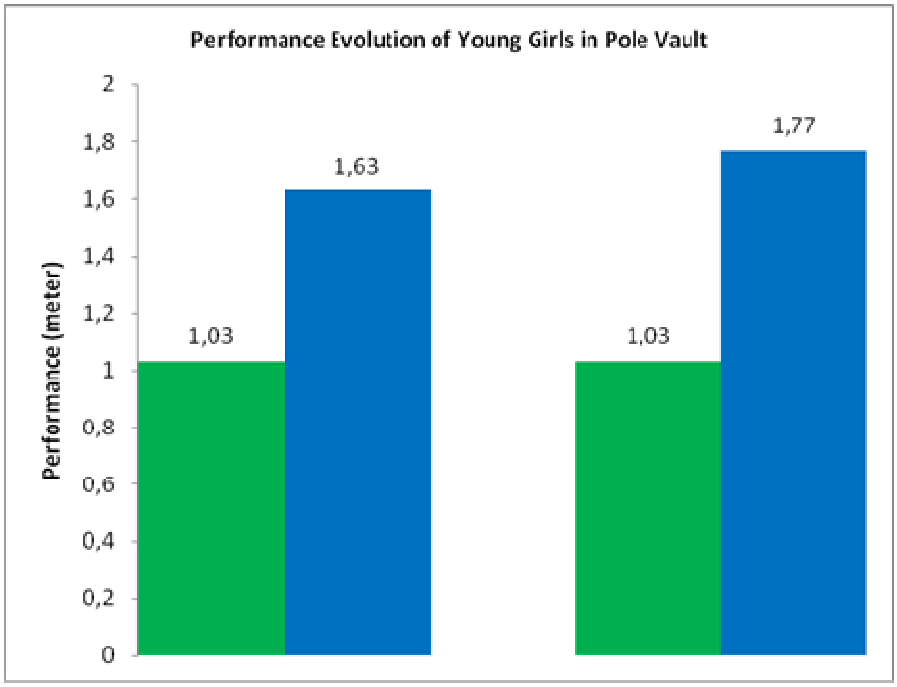

Figure 4: Evolution of driving performance in pole vault of girls

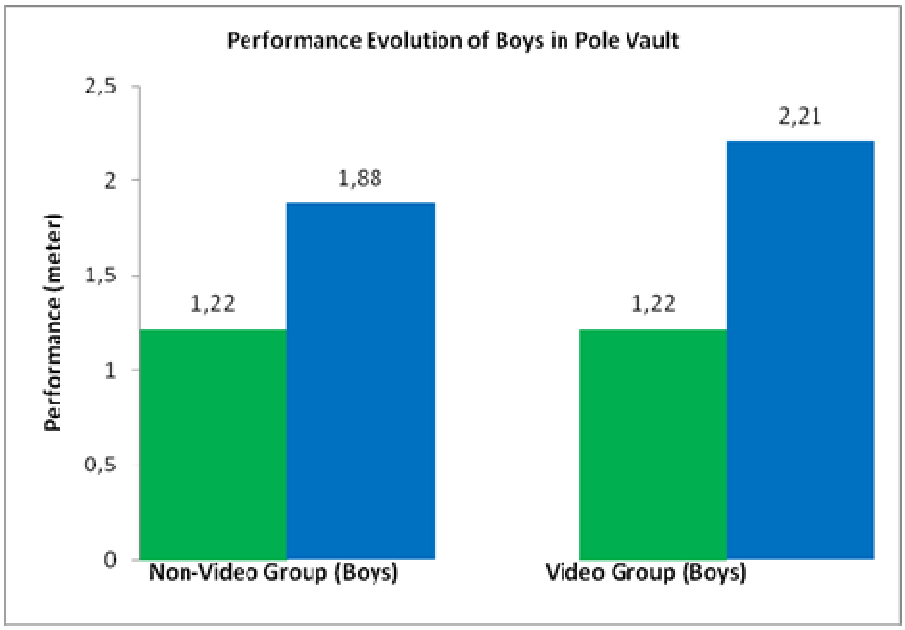

Figure 5. Evolution of motor performance in pole vault of young boys

Statistical analysis of the evolution of the performance of the non-video video group

Table 4: Student's test and the effect of the video on the progression of student performance (N = 44)

		Initial Evaluation	Final Evaluation
Video Class		1.13	2.00
Non-Video Class		1.13	1.76
T-Student		*t = 0.352* *p = 0.728*	***t = 4.269*** ***p < 0.001***
Video Group	Boys	1.22	2.21
	Girls	1.03	1.77
T-Student		*t = 3.929* *p < 0.005*	***t = 7.145*** ***p < 0.001***
Non-Video Group	Boys	1.22	1.88
	Girls	1.03	1.63
T-Student		*t = 3.311* *p = 0.01*	***t = 8.216*** ***p < 0.001***

The Student's test in Table 4 tells us that in the first diagnostic evaluation the result is insignificant with (t = 0.352, p = 0.728), which is normal in the sense that we checked the homogeneity between groups and the cycle had not started. As might be expected, the averages of the two groups are almost identical. On the other hand, at the end of the cycle, the student's test is significant with (t = 4.269, p < 0.001), it confirms the hypothesis that the use of video in the context of computer technology coupled communication of regulations verbal and non-verbal (gestural) by an expert speaker is a source of motor progression for students.

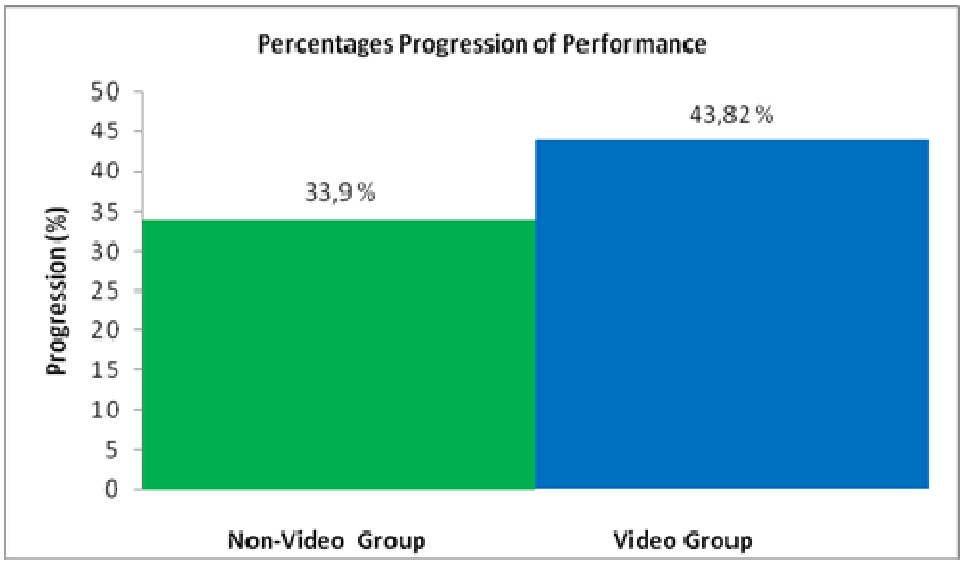

Figure 6. Percentage Progression of Motor Performance in Pole Vault

We are now interested in the various progressions within each group. Thus, it is a non-video group that benefited from verbal and gestural regulations from the teacher and a video group that benefited from verbal and gestural regulations from the same teacher in the discipline, as well as being able to view the performance at the same time corrected on a control screen. On the one hand, we note the percentage difference in progression that exists

in each class between girls and boys. On average, boys and girls in the video category grew by more than (12% and 9%), respectively, compared to their peers in the non-video group (see Figure 6).

The crossed results of the two classes allow us to know if the use of a video element is a source of motor progression. This is achieved by combining the verbal and gestural corrections while relying on the video images broadcast before the teacher and the student. We therefore analyze the results with the progression indices of these two classes sorted by percentage. Thus, in this teaching in the form of oriented jumping tasks, a certain differentiation of pupils according to their level and gender position appears. Students do not invest in their tasks in the same way, as long as these subjects were judged to be of equivalent level by the teacher at the beginning of the cycle. It should be noted, however, that the observations made cannot be minimized to a limited differentiation between girls and boys, since pupils (girls and boys) succeed to varying degrees in responding to the teacher's orientations and their interests in the task, during the pole vault cycle.

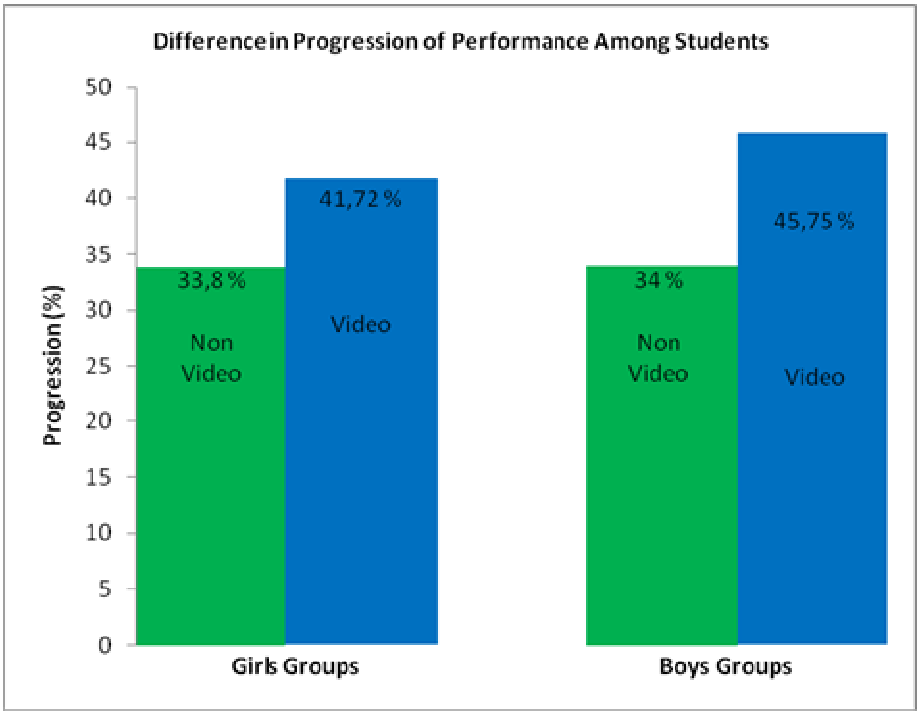

Figure 7. Differentiated Progression of Pole Vault Performance for Girls and Boys

The results also highlight the use of the video associated with the computer tool attached to the verbal and non-verbal regulations of the teacher of the discipline promotes student learning. All students in the video group increased by more than 43% and their percentage increases are all higher than the percentages of their peers in the non-video group 33% (see Table 3 and Figure 3). Also, the difference is significant between the two groups of young boys (video and non-video) (p <.001). Tables 1, 4 and Figure 4 present the results of boys. We see here that the results are also different. However, from the results it was observed that the boys in the video group progressed (from 40% to 53%) as much as the non-video group (from 14% to 47%) with a significant difference (p = .001) in Table 4. While the difference was very significant (p <.001) between the progression of the girls' video group (from 29% to 51%) compared to the non-video group of girls (from 12% to 47%), (see Tables 2,

4 and Figures 4, 5 and 6). Thus, Pole vault learning using video takes precedence over the progression of non-video group learning during a pole vault cycle.

These different observations and this cross-over of roles with video and non-video group classes show us very clearly the contribution of using a video element and the computer tool. Of course, entrusted to a specialist in the activity of pole vault (athletics), the progress will be even stronger. But what must be remembered is that video and imaged teaching still seems effective when put in either the hands of a specialist or non-specialist in the pole vault discipline.

Discussion

Analysis of the Computer Communication Technology (CCT) function on teaching

Videotape feedback in the educational classroom has been widely used for teaching and assessment to encourage certain behavioral changes in children, like the use of instructions for video self-modeling [7]. Among the difficulties that we expected were those due to the students' confrontation with their own image in the presence of the video camera. The presence of the camera did not appear to affect their activity; their attitude was the same in all the educational situations put in place. We do not think it should be concluded that the use of video will no longer interfere with students. So, reflecting on video feedback as a tool for learning skilled movement [12] we must be cautious and take into account all the data related to the context. During our reading, it was often a question of autoscopy problems but with high school classes, college or high school. A teenager is often much more motivated by his motor image that develops from one session to another. At certain stages, we agree that the adolescent can not bear to be criticized for his own image and to be judged less before and by the other students in his class and is sometimes hesitatant to intervene in action. However, in our implementation with the two classes, there was never any question of collective feedback. The work with the video was done only in a separate workshop and individually with each student; this already greatly reduced the anxiety of the students. Potdevin et al., [43] add that video feedback can be used in physical education to support novice learning in gymnastics and motivate students. The fact that the tools were used unambiguously gave students the feeling that the camera was part of the work equipment that helps them progress and they adapted more easily. Thus, images and other computer communication technologies (CCT) present accessories (video, computer, computer software) which are very functional and may become a common feature of learning tasks. Not only should the use of CCT not be too problematic for PES teachers, but for early use they will gain a better understanding of the use of CCT. Palao et al., [39] show in their study the impact of video technology on student performance in physical education.

Analyzing effects of video feedback

At the end of different results that we obtained with the two classes that participated in our experiment, we can only signify the positive effects of the video feedback on the motor progressions of the pupils. The effect of integrating video-based feedback into teaching games was for understanding the activity unit [30]. In line with this analysis Aranha and Gonçalves [1] highlight the importance of video-feedback and instruction in a study that involves the training of of the fosbury flop in physical education lessons. It should be noted, however, that all video feedback was paired with verbal regulations from the teacher. The fact of these regulations allowed the subject to concentrate on the elements of the task to be corrected. Without a doubt, a subject who is not used to being seen on the screen could be distracted by the image if the verbal regulations did not help to refocus the main function of the CCT and its video feedback. We find, therefore, that video feedback is effective on teenage students having an age that allows them to perceive the image message. So we think, based on the results obtained, that young beginners are able to use their visual analysis capacity effectively to perceive the information that video feedback puts forward. The quality of the verbal regulations that will accompany it will then be very important, but as long as the attention of the subjects is focused on specific elements of the action; that the

instructions are targeted and that the advice given correlates with their potential engines, there is no reason for the student to be unable to manage and interpret the video feedback. It seems that the tool is interesting regarding the perception of errors in anticipating the regulations of the teacher or the speaker during their verbal corrections. Let's not forget that it is the verbal regulations associated with video feedback that are the source of important motor progressions [43, 44]. Furthermore, sometimes students may correct themselves. What is important is the students' perception of their mistakes through video footage. To understand one's mistakes and to verbalize them is to tend towards self-regulation. In that respect the intervention of the CCT is anyway a success.

Analysis of the relationship between gender difference and motor performance

Studies have shown that the gender difference in class is an assurance of student engagement in pole vaulting and other physical and sport activities [8, 16, 22]. Despite this, the results of our research show that boys' performance was higher than that of girls with a significant difference in video and non-video groups respectively ($t = 7.145$, $p < .001$, $t = 8.216$, $p < .001$), while the increase in motor performance is high and exceeds 34% for girls and is over 45% for boys. We note that the positive evolution of boys' motor performance is better compared to that of girls. Interpretations of different research in PAS show that boys progress more than girls [15] and that they are more reluctant than girls to go beyond stereotypes. Many studies done on PAS assessment show that girls get lower averages than boys [18, 33]. On the contrary, there is a study indicating that boys and girls presented quite different behavior in multiple sets of weight exercises, and girls presented a more stable performance and a higher endurance ability to fatigue as well [46]. Whereas, teachers' perceptions of physical education content and influences on gender differences as attitudes and pedagogical practices are marked by implicit sexism [13]. Finally, although more formally, girls are less active than boys in the field of motor skills [16]. The consequences of the research indicate that there are two categories of teachers. Those who provide a stereotypical view of roles perceiving girls as rather passive, while boys are active, with girls withdrawing in some activities, boys in others. On the other hand, there are those for whom the gender variable is not satisfactory with regard to the development of differences in results. Many teachers therefore feel it is essential to modulate students' demands according to gender, while others believe it is better to have the same requirements for all. Student performance in the assessments shows that girls perform worse than boys at the beginning of the cycle and at the end of the pole vault cycle. In this regard, the results corroborate those which found that it is the most taught PAS that are particularly discriminating for girls, and even more the combination of activities. Why then continue teaching in the same curriculum (gymnastics, volleyball and athletics), while the results show that it is in these activities that girls perform the worst results? The bodily education of the learner still goes through the physical practice fundamentally of sports. At the end of these observations, prospects can be envisaged. How to find a compromise between the recognition of the differences of girls and boys and at the same time the recognition of equal treatment in the scales of the pole vault? The innovative prospectus undertaken initiates proposals creating benchmarks to mitigate this gap. Thus, it is obviously not a question of programming exclusively feminine PAS [16], but rather of finding a balance between PAS. Studies have shown that gender difference is a guarantee of student engagement in physical activity: Pole vaulting, football, rugby, judo, are accessible to girls and boys [8, 16, 19, 21, 32]. Globally, video technology has an impact on student performance in physical education [39].

Conclusions

We wanted to investigate the application of a video device during a school pole vault cycle. Recalling that, the objective of this study was to facilitate and improve motor learning among students during a pole vault cycle by respecting the differences between girls and boys. The purpose was to determine the effect of this video

artifact and the computerized communication tools (CCT) on learning through a comparative study between one group that used the video and another without using the observation of video and limited solely to spoken language and gestural activity.

Our research was oriented towards the replication of the computer communication technology (CCT) device under identical conditions to validate the desired results with a cross-placement of the video and computer device with two high school classes by entrusting to each the same teacher, a video group of the first class and another non-video belonging to the other class. Through this experiment, we were able to conclude that the use of the CCT and precisely of the video image artifact, was a source of progression of motor learning for the large majority of the pupils with percentages of progression which vary between (12% and 53%). When the verbal regulations accompanying the video procedure were made by an EPS teacher the progression results were significant in showing the effect of the CCT on improving performance. It can then be said that impeccable results could be obtained in the same conditions but with a teacher specializing in pole vaulting. These results were very significant in showing a considerable improvement in motor behavior as well as self-regulating performance and error correction. To this extent, we find that the results show that the performance of all students increases significantly when they benefit from verbal and gestural regulations based on sufficiently analyzed video sequences. It seems clear that students, thanks to video feedback, are able to construct a more precise mental representation of their performances, which, in terms of motor learning, gives them a better regulation of their actions and therefore a greater success in the progression of their performances in pole vaulting. Repetitive use of video feedback is therefore essential to the improvement of performance. We can, thus, confirm our first hypothesis of departure, the device CCT is a good source of motor progressions for high school pupils in the pole vault cycle. Although both teachers mark a significant effect in the use of CCT on the learning progress of their students, we find a gap in measurable performance (the height of the jump) between girls and boys. This gap could be related to three main factors. Firstly, we think that the physical and morphological qualities (height and weight), could influence the performance of the learner. Secondly, boys may be more energetic and technically skillful than the less active girls. Finally, we note that the teacher showed a tendency in his teaching towards sportivization. Hence the research, in conclusion, optimizes the measurable performance (the highest possible jump). This, of course with the search for improved skills and motor skills through the practice of pole vault for girls and boys in the educational environment. In addition, the intervention of the CCT device technique allows students to view their performances in the seconds preceding them. They perceive that they still have in mind their postures and their actions. It also allows a verbal and gestural correction with other teacher analyses in the short-term memory of students; this phase of memory which is very receptive in facilitating the installation of learning. Furthermore the various results and analyses made in this paper show that students who have benefited from these educational situations imaged on video all increased on average by 44%, where other students were up by 33%. In addition, it is important to remember that information feedback by computer and imaged communication technology was individual. Indeed, the teacher incorporates into his educational project the tool and its use by associating meanings and teachings, then it will target its regulations on content that images will illustrate and justify. Moreover, this explains his desire and enthusiasm to form the best use of the device that was their motivation in the pole vault cycle. Given these results, with the experience of implementation in a real professional context, we can extrapolate that it is possible to set up a computer-video element as used in the sessions teaching-learning of a pole vault cycle.

Finally, for us, it is clear that this new instruction comes to serve the didactics of physical activity is sports. Here, CCT is not seen as an end in itself but as a means of acquiring

the motor skills of new knowledge among others and should not exclude other forms and other teaching aids. The variation of the material and its current ease of use, the used tools of CCT are supports to the setting up of educational situations in physical education and sport. We could also imagine the design of a video-computer-type educational support accompanied by didactic scripts. We have seen in individual analyses that all students, without exception, have made much progress over the cycle. Finally, this entails a call directed to institutions to develop their tools for transforming knowledge.

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HOW DO FOOTBALLERS COPE WITH STRESS?

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Abstract

Background: *Stress is an inseparable attribute of sports activities. The answer to the question of how to effectively cope with stress in a competition is one of the most important challenges of sports psychology. The aim of this research is to analyze the stress-management strategies used by football players.*

Methods: *Participants in the study were 32 students of physical education specializing in football and 39 students of management, aged between 19 and 27 years (M = 21.41, SD = 1.76), including 24 women (34% of all respondents). Coping strategies were assessed through application of the multi-dimensional COPE inventory.*

Results: *In comparison with the sample of management students, the group of footballers use the strategy of positive reinterpretation and growth significantly more often, and less frequently use alcohol or other psychoactive substances in a stressful situation. Women use the strategy of seeking emotional support significantly more often than men, while significantly less often using psychoactive substances and humor.*

Conclusion: *This research revealed that trainers and sport psychologists should take into account gender differences and the specificity of the sports discipline of the athletes when working on selection of the best strategies for coping with stress during competitions.*

Key words: *COPE inventory, coping with stress, football, gender differences, sports stress.*

Introduction

Obesity and Stress are defined as states of mental or emotional strain or tension resulting from adverse or demanding circumstances. Stress is caused by an imbalance between the requirements and abilities of the individual (both real and perceived subjectively). Lazarus and Folkman [23] emphasize the contextual dimension of stress, which occurs as a result of a specific relationship between a person and their environment, which is assessed by the person as aggravating or exceeding resources and threatening their well-being. Stress is a two-way process; it involves the production of stressors by the environment, and the response of an individual subjected to these stressors. According to theory of cognitive appraisal, stress involves the production of stressors by the environment, and the response of an individual subjected to these stressors. Experience of stress consists of two factors: the threatening tendency of the stress to the individual (primary appraisal), and the assessment of resources required to minimize, tolerate or eradicate the stressor (such as opportunities, competences, social support, material resources) and the stress it produces (secondary appraisal).

Coping with stress may be defined as the behavioral and cognitive efforts to manage the internal and external demands encountered during a specific stressful situation [23]. Lazarus and Folkman [23] distinguished two basic functions of coping: (1) instrumental: focused on solving the problem that is the source of stress; it serves to master the stressor in order to reduce or eliminate its stressful properties; (2) regulatory: focused on the emotions accompanying states of stress; helps in controlling the emotional response associated with a given stressor. Referring to the transactional theory of stress [23], Endler and

Parker [9] distinguished (apart from the task and emotional style) another style of coping which focuses on avoidance, and which primarily serves to reduce the effects of the stressor.

The basis for the construction of the COPE inventory [7] is the concept of coping with stress, referring to the self-regulatory behavior model [23]. Several strategies for coping with stress can refer to both disposable coping, which reflects a certain constant tendency to cope in a particular way in a stressful situation, as well as to the methods used in a particular stressful situation, referred to as situational coping [7]. This concept combines two approaches to coping, understood as a style and as a strategy. The COPE Inventory has been used in numerous research projects among athletes [10, 12, 18, 27].

Each coping strategy may be adaptive or maladaptive, depending on the situational context and resources available [26]. Strategies can be particularly dysfunctional if they are used continuously over a long period of time, and which are inadequate in relation to the situation and to real coping capabilities [7]. Avoidance strategies such as denial, lack of commitment, use of psychoactive substances or venting of emotions are positively correlated with symptoms of mental disorders such as depression, anxiety, anger, fatigue or disorientation [22].

The coping process in sport performance consists of an individual's cognitive and behavioral efforts to manage stress [6, 24]. In sport psychology, styles and strategies for coping with stress have been widely explored, inter alia in the context of sport disciplines [4, 5, 8, 25], or gender [2, 3, 11, 14, 17, 25]. Research on gender differences in coping with stress among athletes has shown that men more often experience stressors related to injuries and errors, whereas women are more often stressed with communication in a team, and with the coach [25]. Compared to men, women more often use strategies related to planning, seeking social support, and focussing on technology and communication [3, 17, 25].

Stress is strongly related to sports competition and significantly affects sports achievements. The question of how to effectively deal with stress during a competition is one of the most important challenges of sports psychology. Although the strategies and styles of coping with stress have been explored in the perspective of sports psychology and physical activity in England and the US, little is known about the styles of coping with stress among Polish athletes representing various sports disciplines.

The aim of this study is to analyze stress coping strategies used by physical education students (future physical education teachers and sports instructors) who are currently practicing football. Improper forms of coping can cause difficulties with concentration or inadequate levels of arousal [6], which inevitably leads to errors and low achievement, and in some cases even to injury [13, 20, 30]. It should be noted that football is one of the sports with the highest risk of injury [1, 19].

The following research questions were formulated:

1. Which strategies for dealing with stress are used by footballers most often?
2. Are there differences in coping strategies between students of physical education playing football and those studying management?
3. Does gender affect the student's strategies for coping with stress?

In the light of scientific literature, the following research hypotheses were formulated:

H1. The players most often use behavioral-avoidance coping strategies.

H2. There are differences in coping with stress between physical education students and students of management.

H3. Gender significantly affects students' strategies for coping with stress; women more often than men seek social support and use strategies focused on emotions, while men more often use task-focused strategies.

Materials and methods

Participants were 71 students of the Opole University of Technology with an average age of 21 (M = 21,41; SD = 1,76; range of age 19 – 27), including 24 women (34% of the total number of respondents) and 43 men (66%). The two groups

of students represented two faculties: Management (n = 39; 55%) and Physical Education (n = 32; 45%). The sample of physical education students specialized in playing football.

The multidimensional COPE Inventory was used in the study to assess the different ways in which people respond to stress [7]. The inventory is a self-assessment tool, consisting of 60 items grouped into 15 scales (each scale describes a distinct strategy for coping with stress): active coping, planning, use of instrumental social support, use of emotional social support, suppression of competing activities, religious methods of coping, positive reinterpretation and growth, behavioral disengagement, acceptance, focus on and venting of emotions, denial, mental disengagement, restraint, substance use, humour. Participants answered on a 4-point Likert scale, which indicates the frequency of a given behaviour (from 1 = I almost never do this; to 4 = I almost always do this). Cronbach's alpha for the 15 scales of COPE ranged from .37 to .93 [7], but in the Polish adaptation (Juczyński & Ogińska-Bulik, 2009) Cronbach's alpha coefficient was around .80.

The respondents anonymously and voluntarily completed the COPE questionnaire during didactic classes at the university, with the consent of lecturers. The following statistical analyses were performed: analysis of the reliability of the COPE scales by using Cronbach's α coefficient, Kolmogorov-Smirnov D test to examine for normality of the distribution, and analysis of intergroup differences in coping strategies by gender and field of study, by using the Student's t test. All statistical analysis were conducted by using the STATISTICA 12.5 software.

Results

Descriptive statistics for total sample (n = 71), such as Range (Min. – Max.), Mean, Standard Deviation, Kolmogorv-Smirnov D statistic, and Cronbach's α, are presented in table 1. Mean scores of the sample of football players (n = 32) in coping strategies are shown on figure 1. Footballers most often use strategies: active coping (M = 2.83), planning (M = 2.83), and positive reinterpretation and growth (M = 2.82). Most rarely they use restraint (M = 1.68), substance use (M = 1.68) and denial (M = 1.75) as coping strategies.

Table 1. Descriptive statistics for the COPE in the total sample

Coping strategies	Min.	Max.	*M*	*SD*	*K-S D*	α
Active coping	1.75	3.75	2.83	0.43	0.16	.35
Planning	1.50	4.00	2.83	0.55	0.15	.69
Use of instrumental social support	1.25	4.00	2.68	0.63	0.15	.73
Use of emotional social support	1.25	3.75	2.54	0.64	0.12	.79
Suppression of competing activities	1.25	3.50	2.57	0.56	0.12	.68
Religious coping	1.00	4.00	2.10	0.88	0.15	.91
Positive reinterpretation and growth	1.25	4.00	2.82	0.52	0.13	.63
Behavioral disengagement	1.50	3.75	2.46	0.46	0.11	.44
Acceptance	1.00	4.00	2.42	0.67	0.15	.81
Focus on and venting of emotions	1.25	3.75	2.48	0.55	0.10	.56
Denial	1.00	3.25	1.75	0.55	0.14	.66
Mental disengagement	1.00	3.25	2.09	0.52	0.12	.51
Restraint	1.00	3.25	1.68	0.51	0.14	.75
Substance use	1.00	4.00	1.68	0.81	0.22	.94
Humour	1.00	3.25	1.97	0.62	0.11	.82

The results of the Student's t test indicate that compared to the group of management students, footballers more often use the strategy of positive reinterpretation and

growth [t(69) = 2.03; p < 0.5], and less frequently they use alcohol or other psychoactive substances [t(69) = -2.64; p = 0.01] in a stressful situation. Women use the strategy of seeking emotional support significantly more frequently than men [t(69) = 2.95; p < 0.01]. Men use the planning strategy considerably more often [t(69) = -2.01; p < 0.05] and consumption of alcohol or other psychoactive substances [t(69) = 3.08; p < 0.01] in stressful situation. The mean scores, standard deviations and t tests coefficients are showed in the table 2.

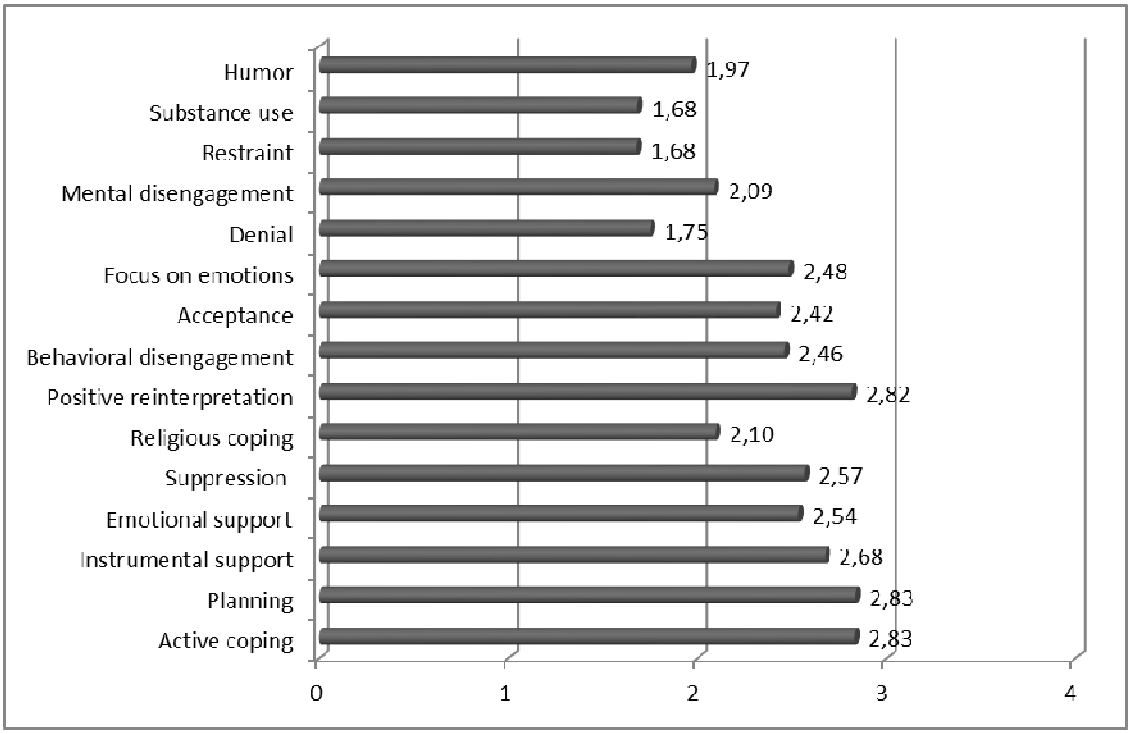

Figure 1. The mean scores of footballers in the COPE strategies.

Table 2. Differences in coping strategies between footballers (students of the Physical Education faculty) and control sample (students of Management faculty) as well as between women and men

	Footballers		Control			Women		Men		
Coping strategies	*M*	*SD*	*M*	*SD*	*t*(69)	*M*	*SD*	*M*	*SD*	*t*(69)
Active coping	2.80	0.33	2.85	0.50	-0.47	2.90	0.39	2.80	0.45	0.91
Planning	2.88	0.52	2.79	0.57	0.67	2.66	0.54	2.93	0.54	-2.00*
Instrumental support	2.75	0.56	2.62	0.69	0.89	2.78	0.69	2.62	0.60	1.00
Emotional support	2.56	0.56	2.51	0.71	0.32	2.83	0.56	2.38	0.63	2.95**
Suppression	2.56	0.47	2.57	0.64	-0.06	2.54	0.54	2.58	0.58	-0.27
Religious coping	2.09	0.83	2.10	0.93	-0.01	2.02	0.96	2.13	0.84	-0.51
Positive reinterpretation	2.95	0.48	2.71	0.54	2.03*	2.79	0.55	2.83	0.51	-0.29
Behavioural disengagement	2.42	0.43	2.49	0.49	-0.65	2.39	0.29	2.50	0.53	-0.98
Acceptance	2.45	0.73	2.38	0.63	0.43	2.38	0.63	2.44	0.70	-0.36
Focus on emotions	2.35	0.53	2.59	0.55	-1.84	2.57	0.50	2.44	0.57	0.99
Denial	1.80	0.52	1.71	0.59	0.64	1.64	0.50	1.81	0.58	-1.25
Mental disengagement	2.08	0.51	2.10	0.54	-0.14	2.05	0.58	2.11	0.50	-0.41
Restraint	1.71	0.55	1.65	0.48	0.47	1.65	0.49	1.70	0.52	-0.40
Substance use	1.41	0.62	1.90	0.88	-2.64**	1.29	0.55	1.88	0.85	-3.08**
Humor	2.01	0.61	1.94	0.64	0.48	1.77	0.55	2.07	0.64	-1.95

Discussion

Hypothesis 1 has not been confirmed. This research indicates that footballers most often use approach strategies focussed on the task, such as: active coping, planning, and positive reinterpretation and growth. This is inconsistent with the results of other studies [25], in which team players usually applied behavioral-avoidance strategies. Perhaps this inconsistency stems from the fact that the instruction in American studies [25] concerned coping with stress in a sporting situation, whereas the present research referred to coping strategies in general, in different circumstances, regardless of environmental conditions.

Research [6] showed that the approach style of coping with stress has an adaptive value in such sports, in which one can influence environmental factors that are a source of stress. However, the avoidance style of coping with stress can be highly adaptive in sports requiring continuous and open tasks, in which the environment is unstable and unpredictable, sources of stress are unknown, and the results are of short-term activities. Comparing individual and team sports it was found [25] that representatives of individual sports declared more stress related to training and trainer and more frequent use of emotion-focused strategies (e.g., relaxation, visualization, or blaming) and more effective use of strategies concentrated on sport technique. Players representing team sports showed more stress related to the game in the team (such as selection, team errors, allowing competitors to drop their form), more frequent use of communication and more effective use of behavioural-avoidance strategies (e.g., avoiding the opponent). Further research should be provided in various team disciplines (e.g., basketball, volleyball, handball, football, hockey, etc.) and in a much larger sample size to resolve this issue. The other explanation for results of this study may regard cultural differences. Thus, the study on coping strategies between athletes of various disciplines should include people from different countries and regions of the world.

According to Hypothesis 2, there are differences in strategies of coping with stress between students of physical education and management faculties. Footballers use positive reinterpretation and growth more often than management students, as well as less frequent use of alcohol or other psychoactive substances. An athlete often has to deal with failure, make reevaluations, or determine the meaning and hierarchy of goals - both sports and life goals, and goals related to learning (as in the case of students of physical education). Perhaps, therefore, the sporting situation tends to make a positive reevaluation of the stressful situation more often, to notice its good sides, to draw conclusions from a difficult situation and treat it as a starting point to improve skills and personal development, in order to cross the borders of human capabilities. The less frequent use of alcohol and psychoactive substances also seems to be related to the sporting situation. In order to maintain fitness, an athlete must train every day. Because stressful situations related to competition and training are presented constantly, the use of psychoactive substances and drinking alcohol would lead to addiction in sportsmen. Due to the low adaptive value of this strategy, the result of this study seems to indicate high skills in coping with stress in footballers.

Hypothesis 3 has been confirmed: this research indicates that women are more likely to seek emotional support than men, and men more often use planning. This probably results from stereotypes about the role of sex, reinforced by learned reactions to stress. According to the stereotypical reaction to stress, women are expected to use emotion-focused strategies, whereas men should use strategies focused on problem solving [17]. In addition, men in these studies more often use alcohol or other psychoactive substances as well as more often using humour in a stressful situation. This result is consistent with many studies [15, 16, 28, 29],

conducted in the field of addiction prevention, which shows that men drink alcohol more often and in greater amounts than psychoactive substances, compared to women (men also have higher binge drinking standards than women).

Conclusion

Approach strategies were most often used by footballers in these studies, as well as lower use of psychoactive substances as a strategy for coping with stress. This result showed a high adaptive value of coping with stress among footballers, and testifies to the good mental preparation of athletes for sports competitions. The results of the research also indicate that in work on the control of pre-start stress and emotions, trainers and sport psychologists should take into account gender differences and the specificity of the sports discipline of the players. Further research on coping strategies in a sports situation should include a larger sample size and athletes of various disciplines (i.e., representing individual and team sports), who are members of different cultures.

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MATHEMATICS AND PHYSICAL MOTOR EXPRESSION: A STUDY OF PRE-SCHOOL CHILDREN AT THE LEVEL OF TASKS TIME EXECUTION

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Abstract

This investigation intends to examine whether there is a correlation between the speed of execution of mathematical tasks successfully resolved and the execution speed of the physical motor control tasks. The specific objectives defined are: knowing if there is a correlation between the times obtained in the activity of Mathematics and times in the activity of Motor Expression; Verify if there is a correlation between the times obtained in the activity of Mathematics and times in the group activity; Verify if there is a correlation between the times obtained in Motor Expression activity and the times obtained in the group activity. The methodology adopted for the realization of this study falls mainly on a positive paradigm, assuming a correlational nature typology. The study was conducted with a group of 22 children. These children performed three timed activities, individually, one for each domain and for the group task. The data analysis was conducted using the statistical program SPSS (version 20). After analysis and processing of data we have obtained positive correlation for all tests, however with very different correlation coefficients. We had a correlation coefficient of r = 0.051 between the activity of Mathematics and the activity of Motor Expression, revealing a tiny positive correlation. The test between the activity of Mathematics and Group Activity originated the correlation index r = 0.749; revealing a moderate positive correlation. In the test between the activity of Motor Expression and Grupo Activity, we had a correlation coefficient r = 0.191, which indicates a weak positive correlation. It was still observable that these data change when we focus only on the results of children aged 5 years old. In the first a correlation index r = 0.315 was obtained, changing from tiny to weak positive; the second got an index r = 0.843, changing from moderate to strong positive; the third got an index r = 0.678, and therefore the positive correlation moderate.

Key words: *Mathematics, Motor Expression, simple classification, multiple classification, Preschool Education*

Introduction

Over many years in school, we as students have been faced with several children and young people who consider that Mathematics entails various difficulties, and who frequently question its usefulness and importance on a regular day basis. These difficulties and doubts sometimes lead these children and young people to fail to develop any interest for this area of knowledge. The same sometimes happens with the area of Motor Expression and Physical Education, when some children and young people believe that they have no capability for games or sports. Sometimes, in these classes it is not so much a lack of enthusiasm that disturbs these children or young people, but the shame of exposing themselves to those colleagues who have certain

attitudes and behaviours. For this reason and the interest of both these areas, we decided to study them in Preschool Education: a step where they develop the main bases of knowledge and the first motor skills.

Mathematics in Preschool Education

Moreira and Oliveira [25] consider that Mathematics today has more influence in society: the importance given to the fact that people require mathematical skills that help in making several decisions concerning their daily activities in a sustainable and informed way. Moreira and Oliveira [25] suggest that mathematics is a matter of thinking, involving the understanding, recognition and the use of relations in different contexts, thus considering that children and young people must have access to information that favours the understanding of mathematics as a way of thinking and as a human activity. The teaching of mathematics is fundamental at pre-school age, where the child, from a very early age, is faced with situations that lead to developing mathematical concepts in a natural and spontaneous way. The mathematical experiences that children have at this stage are essential for their mathematical growth, because in kindergarten children begin to build and develop feelings related to mathematics and about themselves; feelings that may influence future attitudes and decisions [23].

Motor expression in Preschool Education

Physical motor expression appears within the area of expression and communication, termed the field of motor expression. Pre-school education should provide moments of exercise of global and precise motricity, allowing the children to use and know their own body. According to Rigal [28], what emerges in the activity of a child is the driveability. The child is an active individual by nature, in constant movement and interaction with their environment. Physical activity and motor actions are aspects of most moments of daily life. Under these conditions, it is normal that a large part of his time is spent in motor activities generally and/or more precisely, during the pre-school stage. Gallahue [17] seems to agree with Rigal [28] revealing that movement is the centre of the active life of children and an important facet in all aspects of human development, be it in the motor field, cognitive or affective. For this author, "to deny children the opportunity to gather the many benefits of a vigorous and regular physical activity is to deny them the opportunity to experience the joy of efficient movement, the effects of motion and a healthy life as active persons being competent and confident" (p. 49). Rigal [28] considers that, along with morphological development, motor development is the most evident aspect in the child's behavioural changes associated with their motor coordination. "In fact, as it grows, the child will acquire and dominate motor behaviours increasing its complexity, and at the age of four, demonstrates a qualitative motor control very similar to adults, even if your income is very low" [28, p. 143]. Ferreira [16] affirms that through physical activities it is possible to work, improve and educate movements, as well as develop the physical well-being, both mental and social.

Mathematics and Motor Expression

Along with the child's development, the role of motor activity is essential not only in the coordination of activities of its own sensorial intelligence, but also in the development of other aspects of intelligence, intervening at all levels of development of cognitive functions [28]. Also Papalia, Olds and Feldmand [26] consider that all aspects of the child's development, physical, cognitive, emotional and social are connected. In education, this may be a condition of quality improvement, leading to the overall formation of a human being, Fazenda [15]. Rigal [28] affirms that the child may be encouraged to perform counting, comparison of quantities, or to identify digits and geometric shapes; starting the learning of mathematical content while practicing a physical activity. The interdisciplinary nature of these two areas provides the opportunity for the child to develop their psychomotricity and the ability to establish mathematical concepts present in their daily lives. Smole [35] considers that physical activities are a way for children to learn general concepts and mathematical concepts, adding that "there is no place in mathematics for the student's 'body', especially in the school playground, which are the genesis of all representations, of all the concepts, pre-

concepts and concepts that later will bring the possibility of a child learning the beauty of mathematics as a science" (p. 121). Motor activity, especially through manipulation, facilitates access to schemes and representative operating systems and is therefore the starting point for concrete ideas and the support of the acquisition of many concepts. Even though the role of motor activity in favour of school learning is not demonstrated with clarity, there is no doubt that it favours the global development of the child allowing them a greater diversity of experiences. Precise and general motor activities can improve basic motor skills, facilitate the perceptive-motor integration and allow motor skills to be a starting point of cognitive functions. For Rigal [28], the fact that perceptive/motor and cognitive functions often are correlated, raises the hypothesis that the improvement of the first can produce an improvement in the second. "Only if a motor activity involves an important part of cognitive abilities can we expect an improvement of these" (p. 23). The same author considers that the motor activity is a starting point for the concrete and inevitable acquisition of physical concepts as perceptive elements associated with the forms of discrimination or in the acquisition of motor control of graphic movement. If the perceptive and intellectual development favoured by motor action determines in large part success at school, we can infer the existence of a relationship between both. Also Ferreira [16] affirms that the interdisciplinarity of Motor Expression and Mathematics meets "The needs of the child to live, participate and understand a world that requires different knowledge and skills" (p. 41). The learning of concepts or basic skills through the psychomotor education corroborates the idea that the motor activity motivates the child and strengthens their gains. Motor activities usually raise a greater interest in the child, who considers them more pleasant, especially, because immediate feedback on the success or failure of the execution of an instruction is transmitted. Sicilia also [33] affirms that physical education will have a prominent place in pre-school education in all educative action, constituting the basis of preparation for multiple learning, which is more attractive to children. In short, Meur and Staes [23] consider that "the motor function, the intellectual development and the affective development are closely linked in children: The psychomotricity highlights the relationship existing between the drivability, the mind and the affectivity and facilitates the child's overall approach by developing a technique" (p. 5). Moreira and Oliveira [25] have stated that research in mathematics education at the level of pre-school education was still scarce, "being so important that educators with their educational experience and consequent collaborative work, along with readings and appropriate training, seek inspiration and make necessary changes in the environment of learning of mathematics" (p. 26). After some time dedicated to research, we were able to assume that there are few studies on the relationship of the two areas that we intend to study. As we have seen, there are already some studies on the relationship of sport with cognitive activity and school performance. In 1927, Bills, referenced by Costa [12], conducted a study which found that the increase of muscular tension constituted an element facilitator in the performance of several psychological tasks, as the subject in such conditions revealed greater accuracy in solving simple maths problems. The same author refers to Grupta, Sharma and Jaspal (1974), who conducted studies on the effects of aerobic exercise, noting that, immediately after 2 and 5 minutes of exercises, the performance of the subjects in simple arithmetic tasks significantly increased and decreased after 10 and 15 minutes.

The Concept of Classification

The logical-mathematical structures appear together in actions of classification and serialization [28]. In accordance with the GGOPS (1997), the classification shall constitute the basis for: forming groups of objects according to established criteria (colour, shape, size, etc.) and recognizing the similarities and differences between these objects that allow one to distinguish those which belong to a specific set; serialize and sort, recognize the properties that allow the appropriate categorisation of objects according to their qualities (height, length, thickness, lightness, speed, duration, etc.).

Sorting is a process that takes on special importance in Preschool Education because it contributes to the promotion of numerical and geometric skills, as well as for the development of capacities of observation and organization. The ability to reason systematically begins concurrently, and it is important that children have time to do so. The games based on properties of objects are useful for the development of capacity, and the educator can gradually introduce, classifications that contain multiple attributes [25]. According to these authors, the child knows how to sort when it can include an object in a set given certain properties. For this reason, it implies that the child cannot identify properties in the objects around them, and noticing that, sometimes, it is possible to classify in several ways, according to the properties. Through the application of a factsheet belonging to the training program of Mathematics in our school, the classification is one of the pre-numerical concepts, i.e., a concept defined as a pre-requisite for the understanding and consolidation of the concept of numbers. This mathematical concept is the grouping of objects, i.e., the ability to count as equal elements of a set. We can speak of simple classification or multiple classification, the first being related to the identification of only one attribute and the second to more than one attribute. There are many activities that children can accomplish, as suggested by Moreira and Oliveira [25, p. 42]: "to recognize some object properties, compare properties of different objects, select a classification criterion or discover the criterion used in a classification, sort objects taking into account a criterion or discover the criterion used in sorting". In short, it is important that the child has the possibility of making the classification of objects, things and events, in kindergarten. This activity should be rich, varied and continuous, because it is here, and in the creation of spaces of reflection upon it, that the child may disregard the numerical concepts [4].

Materials - The Logical Blocks

With respect to mathematics, many attempts to address it through a playful environment have been achieved with the use of games built specifically for this purpose. Based on Piaget Rigal [28] affirms that "knowledge is not simply a copy of reality, but rather the result of an assimilation characterized by the action of the subject on the objects or their properties" (p. 64). Therefore, that access to knowledge has its origin in action, manipulation and experimentation, which constitutes the basis of the first forms of representation. The child builds their knowledge from the actions they perform on the objects to determine their characteristics. i.e. the activities of manipulation facilitate the exploration of the world and their understanding. This manipulation, according to the same author, can be: random; guided or self-guided. The first characterizes the behaviour of the child when, without a plan, without anticipations to guide their steps, they manipulate randomly. This can be supplemented with an exploratory manipulation, in which the child first observes the objects and then selects some to perform an action according to a certain intention. In guided manipulation, the child performs an action planned by an adult, with defined objectives for future purchases. It is important that the child perceives what was asked, discovers relevant ways for resolving the situation, analyses their action and evaluates its results. These experiences allow extraction of information about the objects through reflection and abstraction. Finally, self-guided and experimental manipulation attempts to verify through the action if what is produced from a mental hypothesis is correct or not" [28, p. 69]. In accordance with the GGOPS (1997), the use of ludic and didactic materials gives the child opportunities to solve logical problems, quantitative and spatial. These are a resource for the child to relate with the space and can support learning and the development of mathematical concepts. Considering Moreira and Oliveira [25], they suggest that the manipulation of physical objects "can allow the creation of learning environments conducive to the development of thought processes" (p. 42), being often used by children to demonstrate their reasoning.

METHODS

Objectives and description

This study was intended to understand whether there is a correlation between both the activities carried out, the level of execution time of physical tasks and tasks related to the simple mathematics content and multiple classification. The main objective of our study is: To examine whether there is a correlation between the speed of execution of mathematical tasks successfully resolved and the speed of execution of tasks in the motor domain. The research took place in a kindergarten.

Table 1 - Characteristics of the study subjects.

Characteristic		Number of Children	%
Gender	Male	9	40.91
	Female	13	59.09
Age	4 years	9	40.91
	5 years	13	59.09

Tasks Performed

Initially we thought it important and relevant to make a diagnostic evaluation to see if children had consolidated the concepts of simple and multiple classification. For this were applied the following tasks:

a) Classification of geometric figures - activity in large group:

This activity was performed in a large group and each child classified a geometric figure (randomly chosen) according to its shape, its colour and its size, placing it in a table previously constructed for the purpose. Generally, all the children managed to sort their figure without hesitation, only two children failed in placing the figure in the table; however they orally classified it correctly.

b) Classification of geometric figures - individual activity:

Here the activity was distinct according to the age of the child, i.e. there was a table of classification for children of 4 years and another different one for children of 5 years. The task of the children of 4 years presupposed the packing of geometric figures and their collage in a table, classifying it according to its shape and its colour. The task of the children of 5 years presupposed the completion of a double entry table with crosses classifying the geometric figures according to shape, colour and size. In relation to these activities, we conclude that, in its generality, the entire group understood and correctly classified the geometric figures, except for some children who needed more support and monitoring. After the analysis of these results, we considered it important to confirm the responses of children and realize that these consciously classified figures. Then, we decided to ask the children about their answers, to corroborate if these concepts had been assimilated or not, reaching the conclusion that they were. After concluding that the theme of simple and multiple classification was not unknown to the children, we were able to attend the activities and perform the data collection to test the correlation. We held an activity in each area and an activity where we combined the tasks of both areas. The three activities were carried out by each child individually and were timed, as follows:

A) Mathematics Activity: consisted of a "route" of four sorting tasks. We had, in a table, four sets of logical blocks of which children were to choose the pieces according to the classification requested in a drawing. In the first case, the children were to only choose the form "circle". In the second box, they were to collect all blue parts. In the third box, they had to choose the yellow rectangular pieces. In the last

box, they sought the quadrangular, red parts of small size.

B) Activity of Motor Expression: consisted of a journey involving four physical tasks: jumping in a sack over approximately 2 metres; crawling beneath a table; running along approximately 5 meters; jumping 5 arches.

C) Group Activity: consisted of a path of eight tasks, alternating two areas, i.e., children performed the first task of Mathematics and the first task of motor expression, the second of Mathematics and the second task of motor expression, and so on: 1) simple classification according to form; 2) Bag race; 3) simple classification according to colour; 4) crawling beneath a table.

Collection and processing of data

Data collection was previously defined during a meeting with the parents of the children to explain how the study was developed, and they were requested to authorize the participation of their children by written informed consent. The anonymity of all subjects studied was also assured, the conservation of privacy and the confidentiality of all data and the protection of the rights, interests and sensitivities of children. Among these techniques we also used field notes and direct observation. The observation was the basis for all data collection, we observed the behaviours of children during the realization of the activities, ensuring that these were carried out successfully. During and after the activities, field notes were recorded: registration of diagnostic evaluation of knowledge of children according to simple and multiple classification; registration of the timing of the activities in both areas. Audio-visual recordings were also performed, photographs and videos, as evidence that they could be used for data confirmation. The statistical purposes were assessed using the SPSS (version 20) to a descriptive analysis, calculating the correlation coefficients between the results of Mathematics and Motor Expression, the results of Mathematics and group activity and the results of Motor Expression and group activity.

Results

The maximum and minimum values represent the values of the child who took more time in the implementation and the child that took less time, respectively, the amplitude, the mean and standard deviation for each set of data relating to each activity. The total number of subjects who carried out these activities corresponds to 22 children, represented by numbers from 1 to 22 in the graphic displayed according to their ages. These data were obtained using SPSS (version 20).

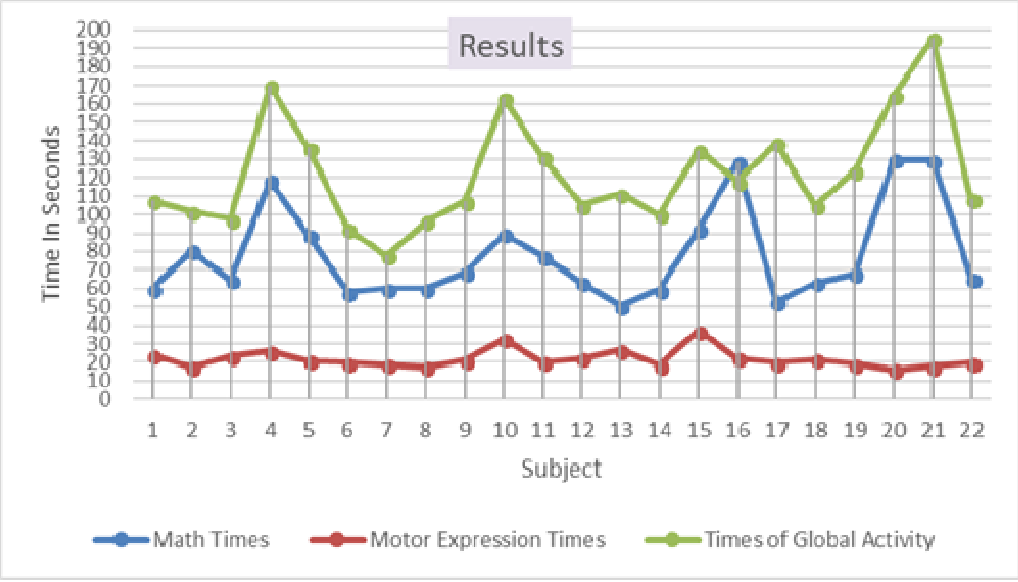

Figure 1. Results of the activities.

Figure 1 shows us the execution times recorded during the implementation of three timed activities. In the blue line, the results were obtained in mathematics. For this activity, the maximum value obtained was 129.75 seconds and the minimum value was 50.16 seconds, there is therefore an amplitude of 1 minute and 20 seconds, with a mean value of 8.57 seconds and standard deviation of 25.26 seconds. The red line refers to execution times recorded during the Motor Expression task. For this activity, the maximum value obtained was 37.16 seconds and the minimum value was 15.82 seconds, giving us a difference of 21.34 seconds, with a mean value of 21.92 seconds and standard deviation with 4.93 seconds. The green line represents the execution times recorded during the realization of the two previous activities combined. Here we have a maximum value of 195.65 seconds, a minimum value of 77.59 seconds and, therefore, an amplitude around 2 minutes. A mean value of 122.04 seconds and standard deviation of 28.84 seconds. We can also see that the child (21) that took more time in the implementation of the activity of Mathematics and of group activity was faster in the execution of the activity of Motor Expression. Another highlight goes to child number 13, who was the fastest in the execution of the activity of mathematics, but among the four who took more time in carrying out the activity of motor expression. For the correlation test the linear correlation coefficients defined by Santos were used [30]: **Correlation I:** results between Mathematics and Motor Expression. Correlation; II: results between Mathematics and group activity. **Correlation III:** results between motor expression and group activity. The following graphics represent clouds of points that give us the first tool to determine the possible existence of a link between these variables. Everyone is represented by a point that corresponds to a value for the first variable and a value for the second variable, the population being represented by a set of points [29].

Correlation I: there is a positive correlation fraction with a value r = 0.051

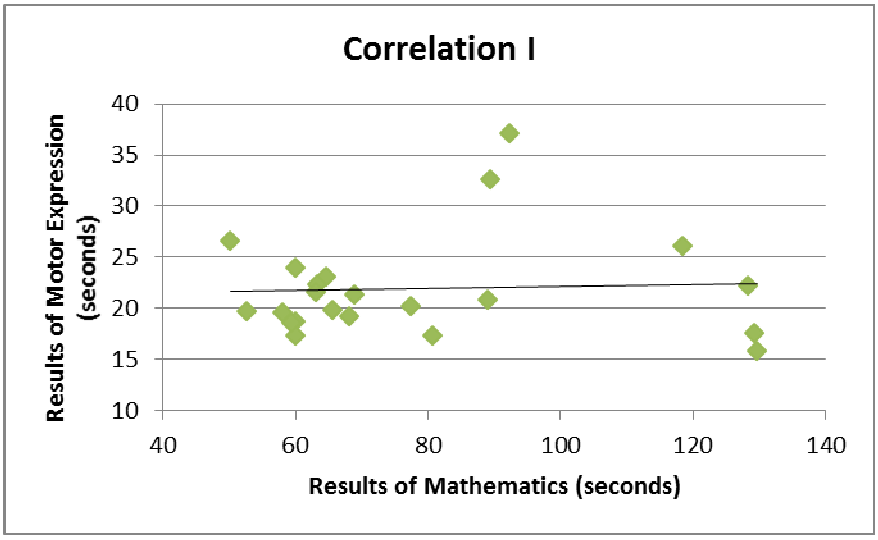

Figure 2. Correlation between the results of mathematical activity and Motor Expression

Correlation II: there is a moderate positive correlation with a value r = 0.749

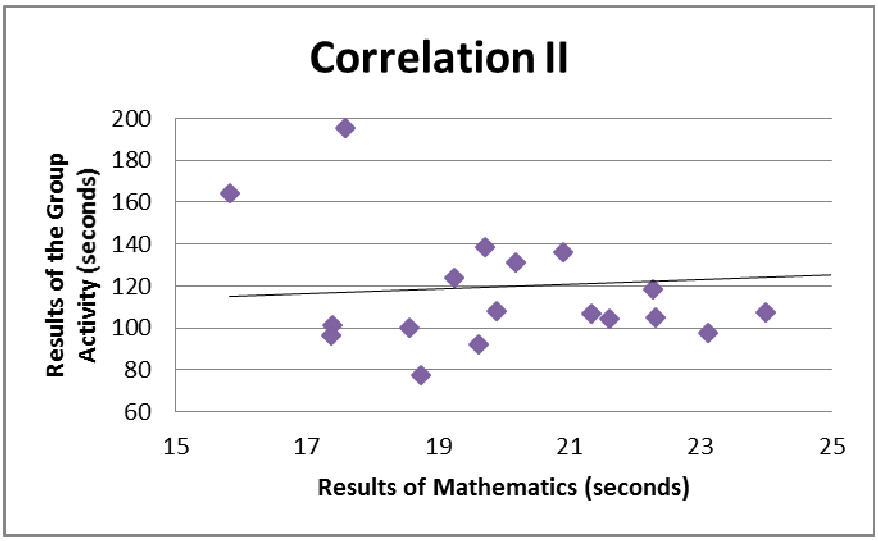

Figure 3. Correlation between the results of the mathematical activity and group activity

Correlation III: there is a weak positive correlation with a value r = 0.191

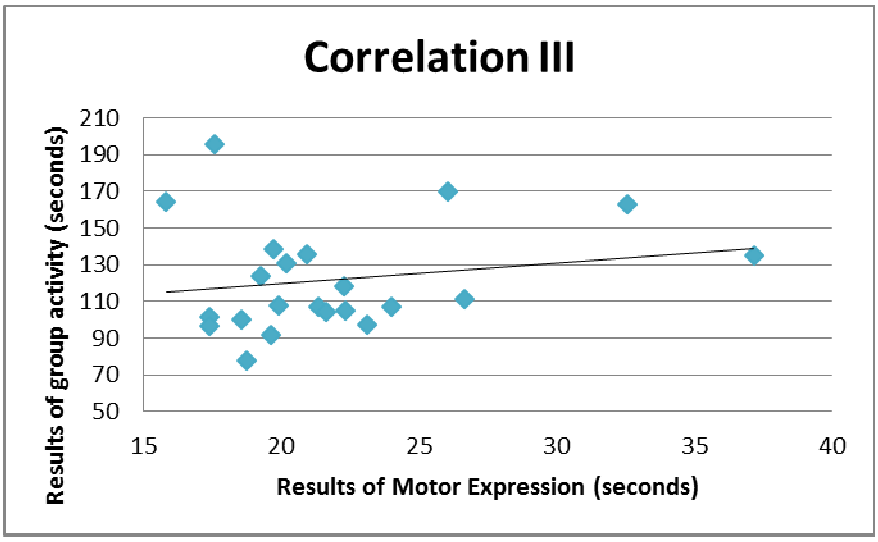

Figure 4. Correlation between the results of the Motor Expression activity and group activity

By isolating the data relating only to the group of children with five years, we get more significant values. Once the index of the Correlation I takes the value of r = 0.315, i.e., there is a weak positive correlation. The index of the Correlation II corresponds to r = 0.843, being therefore a strong positive correlation. The correlation III has an index of r = 0.678, i.e., a moderate positive correlation. We did not find any study like this, to assess the correlation between activities in the areas already mentioned, which does not allow any kind of comparison. However, our data meet the citation of Knapp [18, p. 103], which says that "it is noted

that the correlation between the intelligence, measured with the help of classical tests of intelligence, and the performances of motor skills is positive, but that is usually weak", since the correlations found are between a positive correlation and the moderate correlation positive. These numbers alter significantly when we isolate the data of five year-old children, as we can see by observing the following table.

Table 2. Correlation indices

Correlation	General Index	Type of Correlation	Index data from children of 5 years	Type of Correlation
I	R=0.051	Weak positive	R=0.315	Weak positive
II	R=0.749	Positive Moderate	R=0.843	Strong positive
III	R=0.191	Weak positive	R=0.678	Positive Moderate

We can affirm, through the correlation index between the mathematical activity and group activity, that in a general way, the children who achieved the best results in the activity of Mathematics were those who also reached the best results in the group activity, regardless of whether they had the best results in the motor expression activity. The factor that most determined the success in the group activity was the speed of execution of the Mathematics tasks and not so much of the tasks of motor expression, remembering the case of subject 21, which serves as an example for this statement. This was the subject who obtained the highest execution time in the activity of Mathematics and in group activity, but who is between those who took less time in the implementation of the motor expression activity.

Conlusions

We have observed the existence of a positive correlation between these activities, and that the correlation whose value was r = 0.749 was statistically more significant, was found in the test between mathematical activity and group activity. However, these values change when we restricted the results relating only to the children of five years old, assuming a value of r= 0.843 which indicates a strong positive correlation. It is also noted that there is a weak positive correlation, r = 0.051 between the times achieved in the activity of Mathematics and the times in motor expression. It appears that there is a moderate positive correlation, r = 0.749 between the times achieved in the activity of Mathematics and the group activity times, and even a weak positive correlation, r = 0.191 between the times achieved in the activity of Motor Expression and the times in the group activity.

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SPORTS AND OTHER FORMS OF PHYSICAL ACTIVITY IN THE REHABILITATION OF THE DISABLED

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Abstract

The axiological values of sport are a cultural element uniting individuals in the rehabilitation of people with disabilities. Sport also plays an important role in the comprehensive restoration of lost functions, and its dissemination through media has led to it reaching a larger number of disabled people, influencing their choices and perceptions of reality. This is particularly important in view of the decreasing number of handicapped persons interested in practicing various sports or other forms of physical activity. Representation and the publicising of biographies and the achievements of athletes with disabilities and other people in what is broadly understood as physical culture is a proper method of promoting movement, which in the case of the disabled, becomes an additional means of their revalidation. Unfortunately, media coverage of many sporting events and other physical activities of people with disabilities has been underrepresented. There is also a lack of competition transmissions, including the Paralympic Games. This is because the media, in the pursuit of profit, do not shape proper attitudes towards disability in the public eye and poorly promote the profiles and achievements of disabled athletes.

Key words: *sport, disability, media*

Sport unites people and is the most widespread form of culture [11]. In our times, it has undergone various transformations (through globalisation, commercialisation, professionali–sation, etc.) and created a series of connections with: economy, politics, economics, business and the media. That is why modern sports have less and less in common with those of antiquity [17, 3], while the aforementioned changes and dependence on numerous factors are the cause of a deep crisis visible in its brutalisation, violence, commercialism, corruption or doping. For this reason, among others, faith in the driving force of sports ideals has been undermined [7].

Sport and other - sometimes ordinary, everyday - physical activity is one of many forms of revalidation. It helps the disabled to restore lost functions to the maximum possible extent, and appropriate training supports a comprehensive rehabilitation process. Sport also restores confidence in one's own strength, regardless of achieved results, and the disabled, providing mutual support, are also an example for others who more strongly motivate each other to perform greater and more systematic efforts. Awareness of belonging to such a community gives pride, reinforcing self-esteem. The motives for practicing various disciplines by the disabled are different, but the most common include: a desire for self-fulfilment, improvement of physical fitness, further rehabilitation and increasing contact with society [2, 4]. Despite this, there is a reduction in the number of people with disablities practicing sports in Poland [16].

Sport is also represented by the media that have become an inseparable part of life.

Nowadays, it is hard to imagine this activity without media or the media without sport. On one side these are fans, and on the other, athletes and often "stars" of great popularity [6, 10]. It turns out that the importance of sport grows not for economic reasons, but due to the development of media techniques [12]. The mediality of this phenomenon means indirectly creating what should be valuable. Therefore, fitness or beauty may become desirable, because they are often presented and to a great extent. The image influences a viewer's consciousness, shapes his/her worldview, system of values, choices made, activity, lifestyle, beliefs and mental state [13]. For this reason, disability in sport, via the mean, can have an actual impact on hindering the decline in interest regarding the performance of this activity by the disabled.

Unfortunately, the laws of the market place make the issue of disability unprofitable. Meanwhile, the public wants to watch the sporting challenges of this group of people, including the Paralympic Games. The Paralympics in London 2012 brought 4,237 players together from 164 countries, and the transmission was broadcast by 100 countries around the world (without Poland). The Olympic Games in London included 221 Polish representatives, while only 100 took part in the Paralympic Games. The first won 10 medals and came in 30th on the medal list, and the second – 36, and 9th position in the ranking. Media interest in the Olympics was enormous, while engagement in the Paralympics was small. At the Paralympics in Rio de Janeiro 2016, Poland was represented by 90 athletes, winning 39 medals: 9 gold, 18 silver and 12 bronze. In the medal classifications at the Brazilian championships, Poland achieved 10th place. This was a completely different situation than in the London games four years earlier. TVP made an effort to report the event live, and the audience was not small, which indicates that the Poles want to watch the Paralympics at the highest level. The phenomenon of the axiologisation of sport is associated with high media interest in the Olympics, despite the lack of clear successes of Polish representatives and a low interest in the Paralympics, even though the success of the Paralympic athletes was enormous.

Personal examples, the involvement and achievements of people with disabilities in physical culture, ranging from sports and recreation to tourism, influence the increase in popularity of physical activity. The condition is to grant these events appropriate publicity. Media personalities such as: Jan Mela, Oscar Pistorius, Natalia Partyka, Philippe Croizon and Rafał Wilk are the best examples, even though many more examples of influential media activity in this field can be found.

JAN MELA. An accident resulted in the amputation of Mela's left lower leg and right forearm. His achievement in the area of extreme tourism was highly publicised. He succeeded in reaching both of the Earth's poles in one year together with traveller Marek Kamiński. Jan Mela was the first ever, youngest person to achieve this, and the first disabled person to achieve such an effort using a leg prosthesis.

The march to the North Pole lasted 10 days, and to the south - 15, in freezing and extreme weather conditions. Every moment was accompanied by fear, which at the same time, helped to avoid dangers, unusual emotions and the monotony of the area. The expedition was fascinating and boring at the same time, because everything around them was invariably snow-ice and white and blue. The North Pole was conquered by a miracle and superhuman effort. The expedition and the southern conquest were not planned. The scale of the media resonance gave birth to the natural need for another example of heroism. People were impressed that the North Pole had been conquered by an ordinary man, with illnesses, problems, and a disabled person, with whom more people identified than one could suppose. Numerous motivational meetings at various places (schools, hospitals, prisons, hospices, etc.) revealed the need to organise another trip, this time to the South Pole.

The physical activity and the boy's profile were made public by the media to a wider audience. Jan Mela was and is aware that the mediality of this extraordinary undertaking had

an impact on his life and the popularity he gained, and paradoxically thanks to a dramatic accident, could help others, including those with disabilities. That is why he has been invited to various types of motivational events, to schools, universities, hospitals, hospices, orphanages or penitentiary facilities, to motivate people to take action, to persuade them to change. His story shows that life can be subject to human fate, and yet, man is invincible because his true strength is faith and hope.

The activity described, supported by the disseminatory role of the media, fulfilled its task. The world has been shown the testimony of an unusual struggle by a young person to return to a normal life, which is unfamiliar to many adults. But this is not the end. The story about these amazing events has been transferred to the big screen in the form of the psychological drama titled "My Pole" [Polish: Mój Biegun]. Thanks to this, the success and conquering of the Earth's poles was again revived and thanks to the media, it was shown that, despite disability, it is possible to do great things. It opened the path to anything not limited by the mind. J. Mela claims that "if we try hard, we will succeed". It is important in describing this biography that the expedition to the pole was neither his idea nor his dream. The proverbial hand and purpose was given to him by someone else; he only undertook and faced the challenge. This shows that in the life of a disabled person, a support group (person) is necessary.

Active, extreme forms of tourism in the life of Jan Mela continue as he climbs mountains (Kilimanjaro, Elbrus, El Capitan). 9 people took part in the expedition to Kilimajaro, including 3 in wheelchairs and 1 blind person. Many people with disabilities, thanks to their physical activity and determination, are much more fit than many healthy people. Jan Mela met such people at the "Festival of Enchanted Songs" [Polish: Festiwal Zaczarowanej Piosenki] organised by Anna Dymna, to which he has been systematically invited. Contact with this environment resulted in the proposal to take part in conquering Kilimanjaro. Most of the participants of this trip are people greatly toughened, who care for their physical fitness every day. Apart from them, a blind boy, a girl in a wheelchair and a man with cancer took part in the expedition. Reaching the summit was a secondary matter for Janek, the most important was the mutual support and complementing of one another's deficiencies, for example, taking the hand of the blind, doing anything needed for them or instructing them to use their incredible spatial imagination. On the expedition to Elbrus, 1 blind person and a participant without one lung (cancer) took part. And the El Capitan mountain is the best known climbing rock in the world. Mela became the co-author of "Between the Poles" [Polish: Między biegunami], and of the travel programme broadcast on Radio Krakow. The media also accompanied the several-month expedition to Asia organised by the foundation (Thailand, Cambodia, Vietnam, Laos, Myanmar, India, China, Mongolia, Russia). Interestingly, after reaching a given country, an additional challenge was moving around its territory, mainly hitchhiking.

The "Beyond Horizons" [Polish: Poza Horyzonty] foundation, created by Janek, is the answer to the huge need for support, help, motivation and the purchase of equipment and prostheses as well as the organisation of integrational projects (Elbrus, ING Marathon, El Capitan, Beskid Niski, Bieszczady). People invited to take part in the projects are happy to be able to train. People who do not often want to be rehabilitated suddenly start fighting! The Foundation's task is to infect others with energy and make people with disabilities feel valuable.

In an interview, Mela stated: "I have my mission here in this world. It's about giving positive kicks, about transferring energy from hand to hand, about sharing what we've got. It is also about making healthy people familiar with the disabled. Because it is easier to live on wheelchairs, be deaf, blind, without hands, if treated normally". And in another interview he says: "If not for the accident and everything good that came after it, today I would be drinking technical spirits on a bench with my friends. Traumatic experiences have put me on a different track of life". The experience he has gained from the trip to the Earth's poles is best reflected in his words: "impossible - is very often

our excuse. I believe that almost anything can be done with hard work". Mela thinks that disability is only a "physical condition", and real disability is a "state of mind", meaning something much worse. Fighting with the latter is a real struggle, it is learning a different way of thinking, an active life with one hand and moving about with a prosthesis. In one of his interviews he said, "for sure, many of my traits have been strengthened by this accident. It has shown me that every problem, every difficulty, can be solved. I am living proof that anything is possible".

OSCAR PISTORIUS. As a result of the inborn absence of fibula bones, this track-and-field athlete underwent the amputation of both legs. He was an athlete competing with the best, and also with able-bodied players. Sport restored his self-confidence, functional and sport-related fitness, despite having prostheses. He was noticed, his athletic career blossomed quickly and he started to achieve results just as quickly. His debut took place at the Paralympic Games in Athens (2004), but then, his imagination went further, he dreamed of competing at the Beijing Olympics (2008), with able-bodied athletes. The media, press and the opinions of specialists in the field of biomechanics gave him an advantage over healthy competitors. Nevertheless, he was not allowed to compete with them. Pistorius appealed, and the appeal was recognised. He took part the Beijing Games. There, he won three gold medals - (100, 200, 400 meters), and achieved Olympic qualifications only 4 years later during the London Olympics in London (2012).

Persistence, determination, faith, fame and the magic of sport contributed to effects in revalidation. Pistorius became the first disabled athlete in history to come in 8th at the Olympic Games in London. Media admiration throughout the world praised his determination and courage. He was ever present among television and press headlines. Once again, the strength of sports in the media has proved that breaking barriers is possible. The pride of this South African citizen was even greater because his successes, were paradoxically beyond racial divisions and disability, and he grew as a symbol of the continuous struggle of the difficult history of his homeland. The social recognition which he experienced was strengthened by his personal conviction that sport is a powerful ally in overcoming racial barriers.

Despite numerous hardships and rejection, but thanks to the consequences and support of various environments through sport and its media values, society has been shown that anyone can achieve their goals and dreams. Unfortunately, in subsequent events Pistorius committed murder, but this is a separate problem. In his book entitled “The secret of Oscar Pistorius” J. Carlin, Pistorius' biographer wrote: "After the death of his mother, there was no one in his life who had the wisdom and authority to bring him down to earth, to see that the young man had fallen victim to his own success and needed help in reconciliation with his disability, with the restrictions his mother taught him to deny, he stopped growing-up at the level of turbulent adolescence, he was too immature to cope with fame and money (...). He was a teenager in an adult body and, like a teenager, he became involved in unwise fascinations with women in which he saw the reflection of his mother, with the dangerous charm of weapons and fast cars".

Oscar’s biography is a ready-made screenplay: disability from birth - prostheses and sports at the highest level – a life full of successes - admiration - popularity - and decline. This last epilogue of his life, and his cruel act of murder, have again led to the activity of the press, television and the Internet: notoriety in the shadow of drama, tragedy and the fall of a man with a beautiful sports history in the background. Later: investigations, courtrooms, conviction and guilt for the crime. The media - through which the world and millions of disabled people, for whom he was certainly a role model, saw him - this time, condemned him, and the film about this event and earlier events entitled “Oscar Pistorius: Blade Runner Killer”, was created in 2017 and advertised with the significant slogan: "Heart of a champion, mind of a murderer".

NATALIA PARTYKA. Is a table tennis player, a person of disability, and a representative of the national senior team with global successes in this given discipline. She

was born without a fully developed forearm but she competes with healthy competitors, although a lack of forearm has caused, for example, loss of balance and other minor physical problems, which give non-disabled people an advantage over her. She says that she is looking for methods to cope with these and other losses in health. This approach to barriers builds faith in one's abilities, being a positive example for others.

She started training at the age of 7 and did not have to wait long for success. After qualifying for the low-level disability category (Class C-10), she appeared in Sydney (2000) at the age of 11. She was the youngest athlete in history at the Paralympics. Later, there were only gold medals from the Paralympic Games: Athens (2004) - she would say, "the final was too easy, empty stands, nobody expected anything from me", Beijing (2008) - "I saw crowds of people" and London (2012) - "It was a horror, but I managed". She also participated three times at the Olympic Games in Beijing, London and Rio, competing with healthy players. In the last Games, she was the only competitor from representative of Poland and one of the few people of disability from around the world.

Constant and not accidental successes have resulted in great interest in her person. The national and foreign press wrote about her that: "This Polish teenager creates the history of table tennis" (Deccan Herald, India); "Natalia Partyka creates history despite the lack of Pistorius" (Belfast Telegraph, Ireland); "The Polish woman can even win a medal in team competitions" ("San Diego Union Tribune USA). Furthermore, extensive articles can be found about Natalia's story and achievements, her way to Beijing, Polish tennis and Olympic struggles ("Die Welt", Germany; "Deccan Herald", India; "San Francisco Chronicle", USA; "Belfast Telegraph"); Ireland; "Sueddeutsche Zeitung", Germany; "Sueddeutsche. WNBC", USA) and analysis of game technique ("The Gazette", Canada). The publicity in various media about her comprises 70% of all publications that have appeared on the Paralympics and the greatest recognition. Over 90% of information about N. Partyka appeared on online portals. They constituted the majority of references (5% press, 2.1% television, 0.9% radio). Natalia's enormous popularity on the internet and social media has coincided with her awareness of the need to be present on the web. Internet users admire her for her courage, joy of life, passion and determination in achieving goals. For many people, including the disabled, she has become a role-model and a person motivating them to act. Natalia is one of the most recognizable athletes. Her mediality, thanks to sports successes and overcoming her disability, was an opportunity for numerous awards, among others: she received the "Champion" title in "Sports Review" [Polish: Przegląd Sportowy] and the TVP plebiscite, being among a group of the 20 best athletes; achieving the distinction of "Woman of the Year 2012"; The Knight's Cross of the Order of Polonia Restituta; and the function of Polish Ambassador at the 2010 Expo in Shanghai and the title of vice-champion of the ETTU Champions League with the KTS Tarnobrzeg team, and also the KTS team championship of Poland.

To some extent, disability, persistence and determination, and later sports successes as well as popularity, also in the media, have shown that the revalidation process has brought about results. Natalia, despite her disability, is a physically and mentally fit person. However, this is not all. Paradoxically, when denied a scholarship by the city officials of Gdansk a few years later, she achieved success and recognition as a person of disability not only in table tennis, but by being generous with the "Natalia Partyka Scholarship Fund" [Polish: Fundusz Stypendyjny Natalii Partyki]. The motto of the foundation's activity are her words: "All I do not have is a hand, others have it worse". Her willingness to share with others was born out of personal tragedy and the fight against disability. And its revalidation in the social area has resulted in charity activity.

Her biography refers to a person who, despite disability, and thanks to determination as well as intense work, fights for the world's highest laurels. In this way, an attractive example and a positive image of a woman of disability and an athlete who is open towards others is created

at the junction of sports activities supported by the media. Means of mass communication, being a powerful tool, have decided the place of people of disability in society, especially in shaping attitudes and behaviour towards them among non-disabled people. In spite of this, people with disabilities are presented in the media usually in two extremely different ways, either as people who do not manage in life, and need help, or as heroes performing extraordinary deeds.

It is worth recalling that the "Convention on the Rights of Persons with Disabilities", ratified by Poland in 2012, item 8(c), obliges countries to take action in raising public awareness of matters related to people of disability, strengthening respect for their dignity and rights, combating stereotypes and prejudices and promoting knowledge about the abilities of disabled people. Actions undertaken include, among others, encouraging all media to present their image in a manner consistent with the aforementioned Convention, i.e. supporting, protecting and fully ensuring equal human rights and fundamental freedoms.

PHILIPPE CROIZON. Croizon is a man who underwent the amputation of arms and legs, after his limbs were lost in accident. After rehabilitation and a difficult period of adaptation to the new situation, as a result of strong will, determination and fascination with the story of another person who swam across the English Channel, this all allowed him to "learn" to swim and start regular trainings, first at the pool, then in the sea. In this case, we can see the noble influence of the media, and their missionary role indirectly showed Philippe the right way out of disability (the words of Janek Mela). The activity of this man, covered by the images and message of the media, showed evidence of a serious disability, high efficiency and motivation beyond the ability of average healthy people. The Frenchman, alone but belayed, crossed the English Channel (34 km in 14 hours) and covered four straits connecting all five continents, from Papua New Guinea to Indonesia (20 km in 7h 30'), from Egypt to Jordan, from Spain to Morocco, and from the USA to Russia (4.3 km in 1h20'). While swimming, he covered the distances in a suit protecting himself against the cold and used mono-flippers attached to the stumps of his legs and a tube through which he could breathe with his face under water. His swimming feat as shown in the media gave testimony to the abilities of a man with a serious health loss. Everyone could witness what he did, but success would not have been possible without prior training. Two years were dedicated to preparation. This attitude allows people with disabilities to pursue dreams, gain social recognition and be an example to others. In an interview given immediately after the passage of the English Channel, he said, "I wanted to overcome my disability and win". On other occasions, he said: "I climbed my swimming Mount Everest because I wanted to show the world a different side of life for people with disabilities"[1]. After travelling from the USA to Russia, he stated that it was the most difficult thing in his life, and he dedicated the feat to all handicapped people, saying: "let this be an inspiration for others with disabilities". His swimming achievements broadcast by the media are, as quoted by Philippe: "hope and encouragement for the disabled around the world". By his example, he wants to tell them that: "anything is possible, we can all succeed in life even if we are crippled, there is no difference, we are all equal".

His achievements also include participation at the Dakar Rally, a race extremely demanding even for healthy players. The route of the rally (9 stages, where he assumed 54th place out of 58 in the general classification) was covered as a driver in a specially adapted car. Before this race, he also took part in rallies but of lower rank, where he achieved results according to his abilities. The media followed him step-by-step, reporting the event. And in the story about reaching his next goal, another athlete also appeared - Qatari Nasser Al-Attiyah, who supported the Frenchman financially. Would the sponsor's loyalty have been possible without Philippe's popularity? The answer to this question still remains open, but the probability does not. The intensity with which Philippe survives his life is difficult to achieve by many healthy people. Paradoxically, he owes his success to great tragedy, but later, to a good and

courageous decision. This impulse gave him media popularity, which prompted sensitive and affluent people and those who were an example for him, enabling the abandonment of "mental disability". Philippe has achieved a lot and will continue to succeed, despite numerous barriers. Conquering disability has changed his life. Determination and commitment to fight made him turn the negative consequences of his accident - his personal tragedy - into success. This shows the character of a positive, exemplary hero, both for those healthy and disabled.

RAFAŁ WILK. Wilk is a former speedway racer who suffered a serious accident during a competition. Currently, a paraplegic with paresis of the lower limbs, he is confined to a wheelchair, and is a disabled athlete who practices handcycle racing. He has achieved great success in this discipline. He is a 2-time Paralympic champion (London 2012, Rio 2016), a 4-time winner of the World and European Cup, a 5-time world champion and has been in 1st place on the UCI ranking five times. Sport, after a period of trauma, brought him back to society and offered a new dimension to his life. Apart from cycling, he also performs mono-skiing and is an academic teacher lecturing in the subject: Sport of the Disabled.

His life motto is hard work. Thanks to that, he defeated the disability, succeeding as an athlete and teacher, proving to himself and others that life after speedway and the accident still exists, because you can always find a new, different way. By his example, he shows that even when something goes wrong, we can be reborn. In sporting society, he is called "Man of Steel", because despite tragedy, he never gave up.

The media gave considerable coverage to his accident. Nobody thought that he would be able to find his place in sport again. However, he did not give up, he found himself a new discipline and very quickly began to be successful. Huge persistence and determination, despite the adversities of fate allowed him to win medals and make his dreams come true. Overcoming disability also has its social dimension through the activity of the foundation "Sport is One" [Polish: Sport Jest Jeden]. The goal of this organisation is to support athletes with disabilities, so that "they can fulfil their dreams of medals and sports success". Sport is Rafał's greatest passion, which he carries out with great commitment. The accident undermined the possibility of speedway racing, but as he says, "it opened a path to a new discipline, I take advantage of this opportunity every day, I give my all at both practice and competitions".

His life after the accident and full revalidation in the mental and social dimension can be and are a model for others. The achievements were noticed by the country's authorities, granting him two decorations: the Knight's Cross and the Officer's Cross of the Order of Polonia Restituta. Rafał Wilk's activity was also appreciated by "Sports Review" [Polish: Przegląd Sportowy], where in the organised plebiscite, he won the title of "Disabled Athlete of the Year". He is also the most recognisable Paralympian next to Natalia Partyka. Awards and distinctions are recognition for outstanding sports achievements in Paralympic disciplines and promoting Poland on the international arena. On this occasion, thanks to the media, the world once again saw "human fate" and an attitude worthy imitating - he fell, suffered pain, but got back up. First, he helped himself and succeeded. Now he helps others by passing on knowledge and life experience to University students and those with disabilities through the work of foundations. About himself he says, "I could play the role of great tragedy or simply take life into my own hands, enjoy it and live to the fullest. I chose the second option". Accident, disability and the "strength of sport" paradoxically changed his approach to the challenges posed by everyday life. Our hero is fully aware of this, stating that: "If not for disability and the wheelchair, I would not be a 5-time world champion, I would not go to the Paralympic Games, I would not bring home medals. I would also not know a lot of people who I met thanks to the fact that I am in a wheelchair". Among his other statements, are many wise thoughts encouraging and inspiring others to live better and make choices in achieving goals, and not those big ones, but also those small, everyday,

ones: "everything starts in our head"; "I do not see impossible things, some just require a little more time"; "In the worst situations, one must recognize the good sides - we always have a choice".

Rafał Wilk found his place on cycling routes and became the undisputed leader in this discipline. His dreams have become real again, but competitions are not everything. During these races he repeatedly emphasises that he is competing for Podkarpacie, becoming the ambassador of this region in Poland and abroad. He promotes a healthy lifestyle and the pursuing of dreams, despite all, and thanks to successes and their publicity, his activity and "plan for life" reaches those who need it better. His example is extremely important, as research shows that athletes with disabilities are an example of how to overcome their own weaknesses and barriers, they are admired and can be an inspiration for young people; and society positions athletes of disability at the same level as non-disabled athletes. Interest in a discipline depends on success and medals which activate media activity. The combination of these dependencies is empirical and translates into the phenomenon of revalidation via sport. Unfortunately, this principle is neglected by the Polish media, whose intention can only be seen in theory. It turns out that many Paralympic medallists are completely unknown, and their successes at European or world championships are not even mentioned. Meanwhile, as shown in research, 20% of the population are interested in sports of athletes with disability and the same number of people follow their successes and career, while 14% simply like all sports, including those performed by the handicapped.

The selected examples show that disabled athletes, with the support of the media, have overcome numerous barriers, and their limitations were not a permanent social condition, but were a stage in their psychosocial development. Invalidity did not stop them from carrying out ambitious goals, but was an additional means of motivation and a driving force in constant readiness for further development. The activity in physical culture of each of these people has been shown by the media as people who train, engage in demanding disciplines and face new challenges. The degree of difficulty was often so great that healthy people representing an average fitness level could not manage as much as their disabled peers. Physical effort requires extraordinary fortitude and great work from the disabled. The media shows people wanting to overcome their own weaknesses. In their statements, they show humility and modesty, saying, among other things: "it could always be worse", "I am almost like you" [14].

Conclusion

1. The public want to watch sports events with the participation of disabled people, and the media can significantly initiate changes in the way of thinking about people affected by disability.

2. Axiologisation of sport is a concept attributed to the media and is an unfavourable phenomenon. The mass media, in the pursuit of profit, do not shape proper attitudes towards the disabled, including athletes, and thus, they do not fulfil the missionary obligation written in law.

3. Sport should be considered one of the most important elements of the rehabilitation process among disabled people, especially in the aspect of social integration.

4. Promoting the profiles, images, achievements and biographies of disabled athletes by the media is a chance to change the social reception of people affected by disability. Showing the struggle of these people within the specificity of the practiced discipline and with their own weaknesses, is a testimony of independent and autonomous people who are not only able to compete with those who are non-disabled, but can also be a role-model.

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RELATIONS BETWEEN LIFE SATISFACTION AND PROFESSIONAL DETERMINANTS AND SOCIO-CULTURAL FACTORS AMONG PHYSICAL EDUCATION TEACHERS

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Abstract

The aim of the study reported in this paper was to examine life satisfaction among physical education teachers, as well as to look for relationships of its level within selected parameters related to the occupation of teaching and socio-cultural factors.

The research applied to a group of 99 physical education teachers from the Opolskie Voivodeship. The Polish adaptation of the SWLS life satisfaction scale was employed for this purpose [10]. An original survey questionnaire developed by this author was also used, as it enabled the determination of the ways in which free time is spent and the duration of time per day when the interviewed subjects sit for excessively long periods.

The study did not demonstrate statistically significant dependences between the gender of the subjects as well as their level of education and the investigated parameters. Most teachers reported a high (55.6%) level of life satisfaction, whereas average satisfaction was reported by 41.4 % of the subjects, and by a few as low as 3%.

The study did not reveal any statistically significant correlations between life satisfaction and age, work experience nor the time spent in a sitting position. Only 46.5% of the teachers stated that if they had more free time for themselves, they would embark on some form of physical activity among other tasks. The subjects who declared working longer hours more often stated that they are willing to take various forms of rest excluding physical activity.

For the reasons outlined above, it seems necessary to encourage physical activity among physical education teachers as a manner of expending free time. Further research should strive to determine the factors responsible for life satisfaction among a variety of factors, not just socio-cultural, professional, or economic ones, with a note that such a study should involve a larger population.

Key words: *life satisfaction, teachers, public health*

Introduction

In the culture of hedonism which undoubtedly prevails nowadays, we are likely to place exciting experiences at the center of focus as they increasingly become the goals followed in human aspirations. Quality of life, the level of satisfaction in meeting human needs, and well-being in a biological dimension, as well as in a psychosocial one, play an increasingly important role in post-modern societies on both the local, regional and national scale. Satisfied people and employees perform duties at work more efficiently. Spiritual leaders with a specialty in cultivating joy and happiness, such as Nhat Hanh and Were state that only happy teachers can change the world [13].

Physical education teachers form a specific group of persons who perform duties at school. Their lessons provide students with the ability to express emotions in a loud and uninhibited manner. Competition, movement, large space, joy and laughter form the main factors which distinguish PE activities from other lessons. By implementing games, PE teachers offer the ability to experience success and endure defeat, and bring students into the world of satisfying experiences, teach free time organizations, encourage work on one's health and experience satisfaction by realizing challenges and goals related to health, body and physical fitness. Therefore, it seems necessary that teachers have satisfactory experience not only in these

selected areas of life, but that their overall level of life satisfaction should be high as well.

Life satisfaction is defined by the author of the research tool used in this work as a general assessment of satisfaction with one's own achievements and living conditions [3]. Since it forms a concept that is difficult to clearly define, Veenhoven identifies it as an equivalent of happiness, and states that it represents the level at which an individual assesses the overall quality of their life, and how much they enjoy their lives [19].

Ehrhardt et al. [5] consider that life satisfaction is a subjective state of mind and can be measured only by asking people simple direct questions in various forms, e.g. questionnaire surveys.

The search for the sources of life satisfaction undoubtedly forms an important task of the social sciences. It has been proven that there are dependencies between life satisfaction and emotional intelligence, self-efficacy and healthy ways of coping with stress [7]. Identifying teacher satisfaction forms an important aspect from the point of view of their attitudes to work, satisfaction with it and the ability not to transfer emotional states from the workplace to one's private life [8].

The objective of the research reported in this paper was to examine the life satisfaction of physical education teachers as well as look for dependencies between its level and the selected occupational conditions and socio-cultural factors.

Material and Methods

The study involved a group of 99 physical education teachers from the Opolskie Voivodeship participating in methodological conferences organized by the teachers' vocational development service. The mean age of the subjects was 41.3 years (64 women and 35 men). The interviewees work at various levels of education – 44 subjects are employed in primary schools, 30 in middle school and 25 work in secondary schools. The mean length of service in the teaching profession was 15.9 years at the time of the surveys.

An anonymous auditorium-based study was conducted for the purposes of this work. To assess the level of life satisfaction, the authors applied the SWLS– Satisfaction with Life Scale developed by Diener et al. [3]. The Polish adaptation of this tool was carried out by Juczyński [10]. It forms a questionnaire comprising 5 statements, and the role of the interviewed subject was to evaluate them on a scale from 1 to 7 to express the extent to which each of the statements relates to their personal experience. The total of the values of all statements gives an overall indicator of life satisfaction. The results of the test were found to be in the range from 5 to 35 points. The higher the value of the indicator, the higher the level of life satisfaction. In accordance with the procedure recommended by the author of the research tool, the overall indicator was transformed onto a sten scale. The results in the range of 1 to 4 sten were interpreted as low, 5 to 6 sten as average, and 7 to 10 sten as high. The reliability of the SWLS test determined on the basis of the Crombach alpha was found to be 0.83 (the author of the Polish adaptation of this research tool determined the reliability of the test to be at the level of 0.81).

The scope of the test described above was supplemented by the application of the results of an original questionnaire developed by this author. The open interview included questions related to such issues as preferred ways of spending free time if more time was available to spare. Teachers were also asked to determine how much time (in minutes) they spend in a sitting position per day. The questionnaire was also designed to assess the basic characteristics of the subjects, including their age, gender, length of professional service and the level of education at which the subjects worked.

The material that was collected was subsequently subjected to statistical analysis using the MS Office Excel 2016 calculation sheet and Statistica 12 software. The Non-parametric Mann-Whitney U-test was applied with the purpose of evaluating the differences between the analyzed variables. The relations between the analyzed variables were calculated using the Kendall tau correlation. The analysis applied the

significance level to be represented by the effects for which the probability value was lower from the assumed level of significance equal to 0.05 ($p < 0.05$)..

Results

The mean value of the life satisfaction index among the interviewed group of teachers was 24.1 points. The results did not justify the statement regarding statistically significant differentiation between the gender of the subjects. After converting the raw test results into stens, a mean value of 6.72 was obtained for the entire population of the examined subjects, which means that teachers are characterized by a score that shows a level of life satisfaction that is slightly above average. The structure of satisfaction index levels (low, average, high) is summarized in Figure 1. The greatest number of subjects reported a high level of satisfaction (55.6%), whereas a slightly smaller proportion reported a high satisfaction (41.4%) and the smallest ratio of teachers recorded low life satisfaction (3.0%). The differences between the levels of the analyzed variables in both gender groups were found to be statistically significant ($p<0.05$).

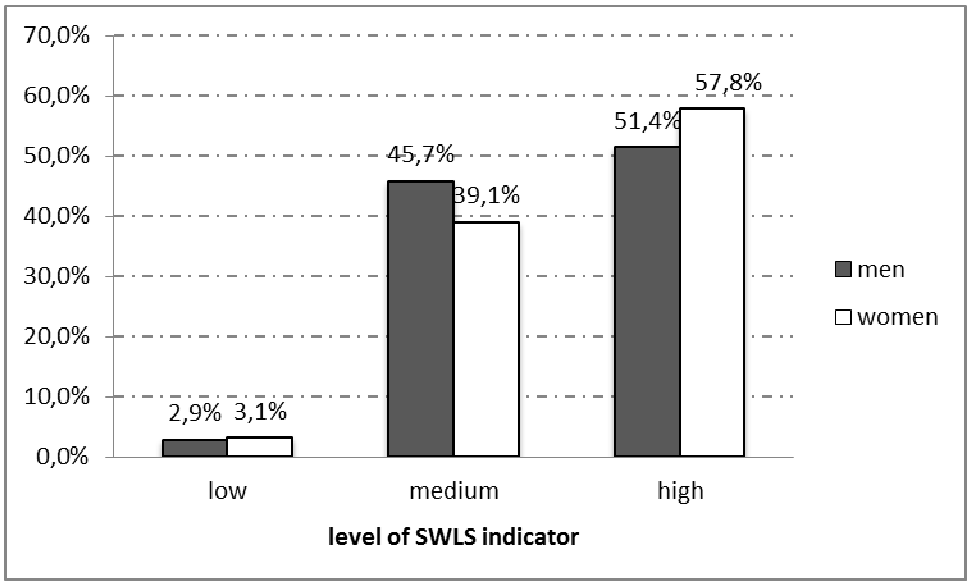

Figure 1. Level of life satisfaction of examined physical education teachers

After a qualitative analysis of the variety of forms and ways of spending free time declared by the surveyed subjects was carried out, two categories of teachers were identified: those representing an active way of spending free time and those reporting a passive way of spending free time. Among men who recognize the role of active recreation (37.1%), the most common activities listed in the questionnaire included: training, physical activity, sports, physical recreation, cycling and running. However, for the majority of them, the availability of more free time would most likely involve spending time on relaxation excluding physical activity (62.9%), such as meeting friends or family. In this respect, the replies from the interviewed women provided different results. On the basis of these replies, we can estimate that the majority of them (51.6%) intend to spend their free time actively, as the list of activities provided by the subjects included: fitness, gym exercises, swimming, running, mountaineering, and bicycle trips. We can note that men expressed their preferences more vaguely, in comparison to more focussed statements by the interviewed women who offered a more specific list physical of activities, and many of them listed several different disciplines, which was unlike the men. Besides, nearly half of the surveyed women (48.4%) declared their intention of spending free time

passively. Most frequently, this list included reading books or relaxing in the spa, as well as travelling. In addition, the surveyed subjects declared that on average they spent 191 minutes a day sitting down in the week preceding study. In this respect, there were no significant statistical differences depending on the gender of the interviewees.

In terms of the manner in which they spend free time (physically active vs. passive) the results of the subjects were not found to vary depending on factors such as the level of education at which they teach, the amount of time that is spent in a sitting position per day nor the level of life satisfaction. The only statistically significant difference was reported in the case of the length of professional service ($Z=2.821$; $p = 0.004$). Teachers who plan to spend their free time passively are characterized by longer years of professional service. Besides, the analysis did not reveal statistically significant correlations between life satisfaction and such variables as: age, length of professional service, the level of education at which the subjects worked nor the time spent in a sitting position per day. However, with age and longer work experience, the amount of time spent in a sitting position tended to increase; however the correlation is statistically not significant, see Table 1.

Table 1. Correlations between the analyzed variables

Variables	age	level of education	professional experience	sedentary lifestyle
age				
level of education	0.0657			
professional experience	0.7982*	0.0514		
sedentary lifestyle	0.1529*	-0.0556	0.1509*	
SWLS	-0.0409	0.0050	-0.0067	-0.0831

Discussion

In Poland, statistics have provided information regarding a systematic increase in life satisfaction for many years. Recent surveys by the public opinion research center CBOS demonstrate a record high ratio of the population in Poland satisfied with their lives (80%). Life satisfaction is mainly determined by the personal assessment of the financial situation [20]. The course of professional experience also plays a significant role in this respect as it is known to affect overall life satisfaction. On the basis of the report published by the JOBHOUSE agency, Poles are moderately satisfied with their work (6.3 points on a scale of 10). As many as 88% of subjects believe that good pay leads to overall happiness, good relations with co-workers play an important role and the opportunities that work can offer in terms of professional development form an important aspect of overall satisfaction [16].

The results of surveys conducted by Lisowska [12] among teachers confirm that life satisfaction increases along with job satisfaction. In both this study as well as in the research reported in this paper, statistically significant dependences between life satisfaction and gender of the interviewees were not established.

The study by Korczyński [11] demonstrated that 62% of teachers with a short length of service (up to 5 years) are characterized by a high level of professional satisfaction, in comparison to 46% of subjects reporting work satisfaction after 20 years of professional experience. According to the study by Cackowska and Szczepańska [1], the professional satisfaction of teachers depends on individual factors related to personality (needs, attitudes) as well as on aspects related to

performance at work in the professional environment (external motivators) including economic factors. We should bear in mind that most teachers in Poland (60%) are dissatisfied with both their level of prestige and with their income [6]. Despite this fact, the teaching profession is well regarded in society, and pedagogy courses are still commonly selected by young people [9]. Research concerned with the prestige of professions conducted in Poland demonstrates that the level of respect for teachers' work is ahead of scores recorded for doctors, attorneys, judges or policemen [15]. It also turns out that low salaries do not discourage teachers from taking up posts in their chosen profession, and this aspect plays an important role for only 7% of them. This willingness to work with young learners definitely determines the selection of this profession [2].

The study by Sekścińska and Maison [17] examined life satisfaction measured by the application of the SWLS test that was performed three times and employed a representative sample of adult Poles, and obtained an average score of 21 points, which is lower than the one that was recorded in the present study (24 points). We can therefore presume that the occupational role determines a higher level of life satisfaction in relation to the general population; however, this hypothesis requires a thorough verification in the study employing a representative sample of physical education teachers.

We can note with appreciation the fact that in this research over half of the surveyed teachers are characterized by a high level of life satisfaction. Some researchers prove that teacher satisfaction is capable of reliably predicting the creativity and organizational skills of an individual at school [4]. Happy teachers tend to work more efficiently, and give out positive energy and optimism, which are extremely important aspects in dealing with students, in particular in the context of the education of youth in order to strive for a healthy lifestyle.

Teachers, and in particular physical education teachers, should be characterized by their optimistic approach to life. Their main task is to prepare for a good working life, to participate independently in physical culture, that is, a field which plays an important role in maintaining overall well-being. Its main domains include numerous challenges related to the body and well-being, including physical fitness and developing health potential. This sphere of free time is aimed at maximizing the ability to rest and regenerate after work. As a part of their social mission, teachers should perform the role of reflexive practitioners who not only pursue their profession, but also spread a passion that is employed to develop authority, and have considerable pedagogical influence [18].

Professional work forms just a single element in the creation of life satisfaction. However, we have to realize the challenges of the variety of ways in which it can be implemented and the sense of efficiency, which can be challenging for teachers in the context of professional work, since tangible effects (permanent changes in personality) can be forecast very often only after the completion of school education. Normally, teaching efforts (i.e. the transfer of knowledge and skills) can lead to progress in a relatively short time from the transfer of knowledge. However, the roles taken on by physical education teachers are concerned with participation in school sport along with their students.

Teachers guide their pupils in taking an active part in sports competitions where the competences obtained during the course of sports training are verified in a short time. From nationwide surveys, we can learn that most teachers display an orientation that promotes sport participation, and this does not necessarily promote health directly, which can be attributed to the search for professional as well as life satisfaction resulting from activity in sports [14]. Health education – which forms an important task imposed on teachers in the light of new legal regulations – does not provide equally easily measurable and objective outcomes of effort compared to involvement in the sports competition system.

The results of the research conducted for the purposes of this work demonstrate that a significant proportion of physical education

teachers, in the event of a potentially increased amount of free time, would spend it passively in a way that is free of considerable physical effort (53.5%). Apparently, the perceived exertion associated with professional activity is due to a known fact – the need to be fit most of the time. We can emphasize, however, that being fit forms a general life philosophy, that is, a way of life that focuses on activity and health, and permeates all dimensions of life, and determines above all the time remaining at the disposal of a person beyond their professional duties. Teachers who potentially plan to participate in physical activity in their free time also need to be supported at work on a daily basis, as they can be described as enthusiasts of the professional experience. The teachers of this course can serve to spread their professional role beyond work and, consequently, to encourage an active and healthy lifestyle in a more effective manner.

Undoubtedly, the lack of significant relationships of life satisfaction with selected occupational and socio-cultural factors found in this study can serve as a motivation for further exploration of other factors that can determine the life satisfaction of physical education teachers.

Conclusion

• The study did not demonstrate statistically significant differences in terms of the gender of the subjects, as well as in the level of education at which the surveyed teachers work in relation to their analyzed parameters. Most teachers demonstrate a high (55.6%) level of life satisfaction, whereas this level is at an average of 41.4%, and a low of 3%.

• There is no statistically significant relationship either between life satisfaction or age, work experience or time spent in a sitting position. Only 46.5% of the surveyed teachers stated that if they had more free time, they would select among others, engaging in some forms of physical activity. People who work longer hours more often state that they are willing to perform various forms of activities excluding physical activity.

• It seems necessary to encourage physical activity among physical education teachers as a way of spending free time. It would also be necessary to look for the factor responsible for life satisfaction among a variety of areas, not only socio-cultural and professional, but also economic, with a note that such research should involve a larger population of interviewees.

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- qualifications entitled to realize the program of physical education at respective levels of school education; qualifications for the realization of the various physical education programmes at all levels of learning/education
- number of didactic classes per week;
- age of retirement;
- results of research projects, as well as the characteristic foci of publications concerning this profession;

2. Studies preparing for the above mentioned profession

- types of schools educating/training physical education teachers;
- structure of educational programmes (names of subjects, the scope of classes realization of such programmes);
- professional titles of graduates;
- results of research and the characteristics of issues concerning the education of physical education teachers;

3. Improvement of professional qualifications for physical education teachers

- normative settlements regarding this problem;
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