

Hortigüela, D.; Salicetti, A. y Hernández, J. (2017) Contraste motivacional en educación física en función del gasto calórico / Motivational Contrast in Physical Education Depending on Caloric Expenditure. Revista Internacional de Medicina y Ciencias de la Actividad Física y el Deporte vol. 18 (72) pp. 621-635 [Http://cdeporte.rediris.es/revista/revista72/artmoverse975.htm](http://cdeporte.rediris.es/revista/revista72/artmoverse975.htm)
DOI: <http://doi.org/10.15366/rimcafd2018.72.002>

ORIGINAL

MOTIVATIONAL CONTRAST IN PHYSICAL EDUCATION DEPENDING ON CALORIC EXPENDITURE

CONTRASTE MOTIVACIONAL EN EDUCACIÓN FÍSICA EN FUNCIÓN DEL GASTO CALÓRICO

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Código UNESCO/ UNESCO code: 5899. Educación Física y Deporte / Physical Education and Sport

Clasificación del Consejo de Europa / Council of Europe classification: 4. Educación Física y Deporte comparado / Compared Sport and Physical Education; 5. Didáctica y metodología / Didactic and methodology.

Recibido 8 de enero de 2017 **Received** January 8, 2017

Aceptado 1 de junio de 2017 **Accepted** June 1, 2017

ABSTRACT

The objective of the research is to contrast the perception of future PE teachers about the motivational strategies employed in the practice of higher and lower caloric expenditure. A total of 126 students participated in the 2nd and 3rd courses of the PE teaching qualifications of the Universities of Burgos (Spain) and of Costa Rica. Eight sessions had high intensity (skipping rope) and other eight low (cooperative challenges), all registering themselves through accelerometers. The questionnaire was used to measure the Motivational Strategies in physical education classes (CMEMEF). The results show that in the most intense classes

there was a positive correlation in the learning factors ($p = .019$), effort ($p = .039$) and explanation and practice time ($p = .030$), while in the less ($p = .010$), effort ($p = .00$), time of explanation and practice ($p = .003$) and responsibility ($p = .037$).

KEYWORDS: motor practice; motivation; physical education; caloric expenditure; methodology.

RESUMEN

El objetivo del estudio es contrastar la percepción de futuros docentes de EF sobre las estrategias motivacionales empleadas en la realización de prácticas con mayor y menor gasto calórico. Participaron 126 alumnos de los cursos de 2º y 3º de las titulaciones de docencia de EF de las Universidades de Burgos (España) y de la de Costa Rica. Ocho sesiones tuvieron alta intensidad (trabajo de combas) y otras ocho baja (retos cooperativos), registrándose todas a través de acelerómetros. Se empleó el cuestionario de medida de las Estrategias Motivacionales en las clases de educación física (MSPEC). Los resultados muestran cómo en las clases más intensas hubo una correlación positiva en los factores de aprendizaje ($p=.019$), esfuerzo ($p=.039$) y tiempo de explicación y práctica ($p=.030$), mientras que en las menos intensas se alcanzó en oportunidad de mejora ($p=.010$), esfuerzo ($p=.00$), tiempo de explicación y práctica ($p=.03$) y responsabilidad ($p=.037$).

PALABRAS CLAVE: práctica motriz; motivación; educación física; gasto calórico; metodología.

INTRODUCTION

One of the main purposes of PE is the achievement of satisfactory experiences in the student that result in the adherence of the practice of physical activity outside the classroom (Hortigüela, Pérez-Pueyo & Calderón, 2016b). For this, it is fundamental that the teacher generates positive attitudes towards the performance of the tasks and that there is a student involvement throughout the teaching process (Howley & Tannehill, 2014; Hortigüela, Pérez-Pueyo & Salicetti, 2015). Therefore, if the development of PE is not structured on the basis of sound learning principles, it is really difficult to acquire skills related to this area. This implies that what is learned cannot translate into actual and meaningful actions in the student's daily life (Garrett & Wrench, 2016). Therefore, it is necessary to think about the teaching approach to be implemented in PE. It has already been shown that open and participatory methodologies, framed in multidisciplinary and interdisciplinary work, favor the acquisition of variables such as learning, responsibility, and satisfaction with achievement and autonomy (Aguado-Gómez, Díaz-Cueto, Hernández-Álvarez & López-Rodríguez, 2016; Webster et al., 2015;).

Regarding the ways of understanding PE, two main opposing approaches coexist with different purposes that give meaning to the subject (López-Pastor & Gea, 2010). The first one is based on the performance and acquisition of motor skills with the fundamental objective of obtaining the best possible results. In this approach, individuality, the development of the physical condition (usually associated to the accomplishment of standardized tests) and the work of the sports emphasize the development of technical aspects on the tactics. The proposals are based on the progression of standardized motor skills and the qualification attends the result obtained in the physical tests raised. However, the second way of understanding PE is based on PE learning. The goals go beyond the achievement of motor results, being the promotion of learning, through the motor field, content with a relational, social, emotional and values what really interests. It addresses a diversity of content blocks such as expressive physical activities, motor cooperation and the development of tasks in a diversity of changing contexts. The social and interactive component is fundamental, emphasizing more the joint reflection throughout the process than a mark and/or end result at the end of it. Finally, the evaluation is understood as a way that facilitates the understanding and the possibility of improvement, being the qualification only a consequence of it. For this reason, it seems appropriate to use and integrate the appropriate didactic approach according to the learning objectives. Faced with this dichotomy, we can ask the following questions: Does there not exist in PE an established idea of "moving around for moving sake"? What type of learning can generate this way of proceeding? As indicated by Silverman (2011), if we want to give some rigor to the subject of PE, we should reflect deeply on this situation. Perhaps, we could rethink what drives that "driving obsession" in PE, when it is demonstrated that the driving should be understood as a means rather than as an end in itself if we want the student to value their learning.

In this line, it is fundamental to evaluate the perception of future PE teachers in their initial training with regards to the motivational strategies received in their practices. Benjamin et al. (2015) demonstrated how the development of motor tasks specifically related to the particular interests of the students resulted in the acquisition of a greater autonomous competence in the performance of physical activity. Likewise, qualitative research in the IFP indicates that, even recognizing more workload, future PE teachers show that subjects that are structured under real reflective cases are more motivating and more learning-generating (Hortigüela, Pérez-Pueyo & Fernández -Rio, 2016). In addition, when the future teacher of PE receives training related to the prospect of group achievement, he recognizes he acquires more autonomy when developing teaching strategies in the classroom in the morning (Hortigüela, Salicetti, Hernando, A, & Perez-Pueyo, 2015). It is therefore interesting to measure concrete variables such as effort, commitment or type of explanation of the tasks, since it is demonstrated that teachers in their early years of professional practice tend to reproduce what they learned throughout their career (Mordal-Moen & Green, 2014). Thus, the responsibility of university

teachers in initial teacher education (ITE) is very high, and it is of special relevance that the effects of our subjects in the acquisition of knowledge and competences of the students are measured and recorded. Only in this way will we be able to guarantee the status and coherence of PE as a subject matter in the future (Del Valle, De la Vega & Rodriguez, 2015, Jung & Choi, 2016).

The objective of this research is to contrast the perception of future PE teachers about the motivational strategies employed in the practice of higher and lower energy expenditure. It is checked if the fact that one practice has a greater intensity than others has a positive evaluation of the student in different variables related to the ego and the task. It is necessary to be aware that the level of motivation that the future teacher has in their initial formation will have repercussions on their understanding of and approaching PE in the future. Therefore, the level of intensity of practice and the relation of the subject with physiological parameters of basic physical abilities evolution becomes key (Spittle & Spittle, 2016). It is not a question of extracting positive or negative conclusions about the intensity, Measured in terms of caloric expenditure, which must be present in PE classes (it may depend to a great extent on the content taught), but rather to reflect on whether this factor has a significant influence on the evaluation of future teachers about their pedagogical practices. This makes a significant contribution to the scientific literature of the subject, throwing new data that encourages the reflection of the faculty on the autotelic purposes of PE and the motor field that constitutes it.

METHOD

PARTICIPANTS

A convenience sampling was used in which the participants were selected taking into account the accessibility and their proximity to the researchers. There were 126 students (36% female and 64% male). The mean age of participants was 20.43 ± 1.43 years. The practical content was developed in the subject of teaching methods in Physical Education, which is taught in the third year of the degree of Human Movement Sciences of the School of Physical Education of the University of Costa Rica (67 students) And in Physical Education and its Didactics, belonging to the second course of the Degree in Master of the University of Burgos (59 students). There were two teachers of the University of Burgos, experts in methodology and didactics of physical education, who gave the sixteen sessions on which the research is framed. They were invited to conduct a research stay at the University of Costa Rica to develop the practices. The same work was done in Costa Rica and Burgos. Both are thirty one years old and have more than seven years of university teaching experience. Teachers and researchers, in addition to having experience in the university field, have made it compatible with teaching of PE in both the primary and secondary stages. Currently one of them is a full-time professor at the university and is accredited as a full professor. The other teacher

is PRAS 6 + 6 and career official in the teachers' corps. The two present a diversity of research in the field of didactics of PE and pedagogical models.

INSTRUMENTS

Accelerometers

Physical activity data were collected using ActiGraph's WACTISLEEP-BT accelerometer, size 4.6 x 3.3 x 1.5 cm and 19 grams in weight. GT1M was designed to monitor physical activity and record energy expenditure, kilo calories (Kcal) used during daily and normal activities of the participants. ActiGraph devices record physical activity in "counts" for up to 120 days. The beads are a measure of movement through an accumulation of acceleration filtered and measured over a period of time previously set, called "epoch". ActiGraph devices measure acceleration changes 30 times per second on the vertical axis (Y). All epochs accumulate and store in the device and are downloaded to the computer, thus taking all recorded physical activity. Obtaining data during lower epochs is especially important with subjects who perform sporadic physical activity with changes in intensity, such as the physical activities performed in the 90-minute workshops of the present research. This data is collected every 15 seconds. For the analysis of the data were used the records obtained of energy expenditure (Kcal during the hours of classes).

Questionnaire

The questionnaire used to measure was the Motivational Strategies in the physical education classes (MSPEC), created by Cervelló, Moreno, Del Villar and Reina (2007). This questionnaire consists of 24 items, 12 to measure the motivational climate involved in the task (i.e. "my teacher encourages us to learn new things", "my teacher encourages us all to strive to progress and improve") And 12 others to measure the motivational climate that implies the ego (i.e. "my teacher does not leave us any responsibility", "my teacher does not encourage me or motivate me"). Responses are collected on a Likert scale ranging from 0 (strongly disagree) to 10 (strongly agree). After analyzing the data in the present study, a reliability was obtained according to Cronbach's alpha of .79 for the motivational climate factor that implies the task and .81 for the motivational climate factor that implies the ego, superior to the lower limit that according Corbetta (2007) is accepted as reliable. A high HR = .92 and an MSV higher than .50 (50.31%) was obtained. A confidence level of 95% is applied. McDonald's Omega reliability was .68.

DESIGN AND PROCEDURE

The subject that composes the sample is of a semiannual character. All students participated in the study, structured in sixteen sessions of approximately 90

minutes each. To do this, and in order to record the activity, participants placed accelerometers (on the wrist of the right hand) for each of the classes. All participants were already familiar with the accelerometers after having used them in other subjects. These accelerometers were collected at the end of the sessions. The first eight sessions were of low intensity, requiring for their participation a moderate effort. The caloric expenditure in these sessions had an average of 256.74 Kcals \pm 118.849, while the METs oscillated between values of 1.3 and 1.5 (very weak intensity). Cooperative physical activities were carried out, namely group challenges aimed at overcoming obstacles, transporting material and developing motor skills. Some of the practices consist of a diversity of jumps over the racks (large mat), covered by mats, passes with rings and resolution of motor challenges through the approach of group problems. In them, dialogue, social consensus and joint decision-making were key to being able to successfully tackle each of the tasks. The other eight sessions involved a greater intensity in the activity. They required a greater effort, since the caloric expenditure had an average of 353.05 Kcals \pm 91.798 and the MET values were between 2 and 2.3 (low / moderate intensity). They were carried out jump jumping exercises, making group progressions in which the fundamental objective was that all achieved the challenges posed by jumping continuously. Jumps were made on the good side, the bad, losing and without losing rope. It was also jumped simultaneously and alternately by itself and on both sides. It jumped doing the eight consecutive and of horizontal way in the rope to finalize all jumping to double combo.

In both the lower intensity and higher intensity sessions, an open and participatory methodology was used based on the Attitudinal Style models (Pérez-Pueyo, 2010) and Sports Education (Siedentop, Hastie & Van Der Mars, 2004). In them, the student was part of the teaching process, was allowed to make decisions in the resolution of tasks and was involved in their evaluation. For this reason, and when using the same didactic approach in the sixteen sessions, we wanted to verify only how the intensity variable of the exercises influenced the motivation of the future teachers, thus guaranteeing the internal validity of the process.

First the data were taken in Burgos and then in Costa Rica. All participants completed the questionnaire at the end of the sixteen sessions. All the students were previously informed individually about the research purposes, as well as the way the accelerometer was placed and in which situations they had to be removed.

STATISTICAL ANALYSIS

A descriptive analysis was performed with the purpose of showing the average Kcal spent in each block of sessions. In addition, a correlation analysis was performed between the variables of the questionnaire and the Kcal expenditure per session, both in more intense and less intense activities.

RESULTS

Table 1 shows the average of Kcal spent in the intense and less intense sessions.

Table 1. Average Kcal per session in each of the groups

	N	Average	Dev.
Kcal per session (more intense activities)	26	353,05	91,798
Kcal per session (less intense activities)	26	256,74	118,849

Descriptive statistics show that by taking into account the Kcal averages spent on work sessions, in the most intense activities students spent 96.31 Kcal more than during sessions with less intense activities.

Table 2 shows the correlations between the variables of the MSPEC questionnaire and the class variables with the Kcal expenditure per session of the more intense and less intense activities.

Table 2. Correlations between the variables of the questionnaire and the expenditure of Kcal per sessions

ITEM	More intense activities	Less intense activities
1. With the tasks I do not learn, nor improve	(R) .455(*) (P) .019	(R) .316 (P) .116
2. It relies on our responsibility to carry out the tasks that are proposed to us	(R) -.063 (P) .760	(R) -.099 (P) .629
3. I do not get excited or motivated	(R) .112 (P) .588	(R) -.192 (P) .347
4. They encourage us to help each other during the tasks	(R) -.334 (P) .095	(R) -.377 (P) .057
5. Only the final result is evaluated, regardless of progress on how it was done before	(R) .303 (P) .133	(R) .371 (P) .062
6. I have enough time to practice my tasks	(R) -.182 (P) .374	(R) .128 (P) .533
7. I have the opportunity to improve what I already knew	(R) -.338 (P) .091	(R) -.493(*) (P) .010
8. They tell us how to organize without making any decision	(R) .169 (P) .409	(R) .136 (P) .506
9. We are encouraged to strive to progress and improve	(R) -.407(*) (P) .039	(R) -.673(*) (P) .000
10. We are always grouped in the same way	(R) -.121 (P) .555	(R) -.208 (P) .307
11. They evaluate us by getting things done better and better	(R) -.051 (P) .805	(R) .226 (P) .266

12. You are explaining and practicing little all the time.	(R) .425(*) (P) .030	(R) .565(*) (P) .003
13. We did few new tasks	(R) -.081 (P) .695	(R) .149 (P) .466
14. They let us take part in the operation of the activity	(R) -.278 (P) .169	(R) -.211 (P) .300
15. They only care about the best students	(R) .088 (P) .670	(R) -.162 (P) .428
16. I practice with both men and women	(R) -.349 (P) .081	(R) -.125 (P) .544
17. They correct me by comparing with my colleagues	(R) .158 (P) .441	(R) .129 (P) .529
18. I have the necessary time to correctly carry out the proposed tasks	(R) -.089 (P) .664	(R) .265 (P) .191
19. I have the possibility to choose between different tasks that I can do	(R) -.235 (P) .248	(R) -.067 (P) .744
20. They leave us no responsibility	(R) .376 (P) .058	(R) .411(*) (P) .037
21. They encourage us to learn new things	(R) -.273 (P) .177	(R) -.364 (P) .068
22. Women and men do not mix in tasks	(R) .024 (P) .907	(R) .040 (P) .846
23. We are asked if we believe we are improving	(R) -.055 (P) .791	(R) -.032 (P) .876
24. We are almost always standing still	(R) .059 (P) .776	(R) .059 (P) .776

* Correlation is significant at .005 level

Climate task: 2, 4, 6, 7, 9, 11, 14, 16, 18, 19, 21, 23

Climate ego: 1, 3, 5, 8, 10, 12, 13, 15, 17, 20, 22, 24

In item 1 referring to the improvement and learning experienced in the sessions, a significant correlation is obtained in the most intense sessions, indicating a positive assessment and involvement of the students in the experience. However, this correlation was not reached in the less intense classes. Regarding item number 7, regarding the opportunity to improve what the students already knew, the results show a significant correlation with the less intense classes, which indicates that the work of cooperative challenges developed stimulated the students to continue learning and to interrelate What I learned from aspects I already knew about PE. In item number 9, referring to the mood received towards progress and improvement, a significant correlation was reached in both the higher and lower classes. This fact indicates that the intensity factor in practice does not affect the improvement perceived by the student for the development of his teaching competences, since in both cases elevated. The significant correlation is also reached in item 12 in the two classes, considering that the time devoted to explanation and practice is sufficient and balanced regardless of the intensity of the session. This is of real

interest, since it is again observed that the students who experienced the less intense sessions did not perceive the time of practice as scarce. Finally, the results in item 20, regarding the responsibility given in the classes, show a significant correlation in the less intense classes, reflecting that the commitment is greater than in the sessions in which there was a higher caloric expenditure.

DISCUSSION

The results have shown how the intensity factor in the classes does not have a unidirectional influence on the motivation perceived by future teachers of PE. Experienced learning, opportunity for improvement, perceived progress, time spent on explanation and responsibility have been the factors in which significant correlations have been found. Having analyzed this, from the training of future teachers in the area of PE in various countries and continents, brings much value on the conception and transformation of the subject in the future. It is necessary to value that the initial training received in the student becomes its main way of seeing and understanding the subject, which results in a responsibility of the university teacher when granting a variety of resources from a critical, reflective and cooperative perspective (Albuquerque, Aranha, Goncalves, Pinheiro & Resende, 2012).

The sessions with greater intensity correlated significantly with the learning and the improvement experienced, something that did not happen in the less intense ones. This is in line with previous studies such as that of Haynes and Miller (2015), which indicate that movement and intrinsic motor practice is a factor that is directly related to student satisfaction. However, it is necessary to clarify that the methodology used in the session and the role of the teacher in the classes are the aspects that most influence this motivation (Spittle & Spittle, 2016; Moreno-Murcia et al., 2014). Therefore, it seems that the intensity of the session is perceived more positively when the tasks present a ludic and strategic character over the individual ones and without cognitive presence in its resolution. Thus, after analyzing the motor conflicts that arose in games performed in physical education classes (Sáez de Ocáriz & Lavega, 2015), these authors highlight the richness of motor play as a laboratory of social relationships where interactions and emotions are strengthened Of the participants. Regarding the finding of improvement and learning, longitudinal experiences such as Howard-Shaughnessy and Sluder (2015) indicate that the global and interdisciplinary treatment of the body generates a more diversified and transferable learning than that only motor that is not associated with A reflection. One of the main aspects that justify this is the inclusion and the pedagogical character that integrates it, since it allows direct influence on the satisfaction of achievement on the part of the student and on the possibility of including PE in medium / long term projects connected with educational centers. In this sense, studies based on the analysis of the perception of support for autonomy through observed reality (Aguado-Gómez, Díaz-Cueto, Hernández-Álvarez & López-

Rodríguez, 2016) show how teachers have large margins of improvement in behaviors such as: quality of communication, functionality of the tasks and promotion of students' thinking so that they can express their opinion about tasks and intrinsic motivation.

On the other hand, the less intense classes correlated significantly with the opportunity to improve what the students already knew, which seems to indicate that the dialogue and explanation in each one of the tasks are perceived positively by the future teachers to connect the learning. Sometimes the PE teacher only focuses on motor and sporting practices as the essence of the pedagogical approach applied, something that is meaningless if we pretend that the student knows what he is doing and for what purpose he does it (Duncan & Bellar, 2015). As Freire and Miranda (2014) indicate, if we want school PE to acquire a positive vision from the educational community, we have to start by asking ourselves what critical sense we give to content to truly imply progress and learning. Johnson (2015) indicates that one of the most determining factors for this to happen is teacher coordination in three senses: a) delimiting the PE approach with which one wants to work; B) sequencing contents coherently throughout the course and c) using evaluation as a means of learning and not only with a qualifying purpose.

In both the intensive and less intense classes, a significant correlation has been obtained with the mood received by teachers towards improvement. This demonstrates the relevance of the methodology applied by the PE teacher to generate a motivation towards the practice. In this case the model of Sports Education and the Attitudinal Style is used, pedagogical approaches that, characterized by the generation of positive attitudes towards the practice, the student's involvement in the evaluation process and the work of interpersonal relationships through group achievement, have already shown positive results towards the classroom climate, autonomy, self-concept and learning (Hortigüela, Fernández-Río & Pérez-Pueyo, 2016a, Hortigüela, Pérez-Pueyo & Calderón, 2016b). In this sense, López-López et al. (2015) indicate that in addition to the generation of motivation towards the practice of physical activity by the students, the subject has to become an ideal tool for acceptance, respect, tolerance, responsibility and self-esteem improvement. It seems therefore that the fact that the driving intensity of the practice is higher or lighter does not affect the moods perceived by future PE teachers, provided the methodologies used are open and participatory.

Another interesting contribution of the study is that in the more intense sessions as well as in the lightest ones a significant correlation is reached with the perception of the future teachers of PE about the time dedicated to the explanation and to the practice. This breaks down an idea that is too common and established in the educational context of the PE school, where it tends to think that practices based on cooperation, problem solving or process reflection are valued by students as

more boring to Time of explanation compared to practice (Casey, 2014). It seems therefore necessary to give a comprehensive and logical character to the tasks developed, relating the motor with the cognitive, social and emotional. This idea clearly links to the demand for many years of increasing PE hours per week and to include driving competence in the curriculum. Pérez-Pueyo, García, Hortigüela, Aznar and Vidal (2016) indicate that it would be of little use to increase PE hours if traditional performance models are still used. In addition, they advocate to include a corporal competence, that like the other "key", is contributed from the totality of the subjects and not univocally from our area.

Closely related to this, the significant correlation was also obtained between the responsibility given to the student and the less intense classes. This reflects that explaining, detailing the tasks and framing them in a logical, sequenced and coherent way in the learning process implies a responsibility towards the proposed motor objectives (Gutiérrez, Ruíz & López, 2011). Therefore, it is again necessary to highlight the idea of approaching PE through interdisciplinary contents that, with a prominent social component, serve to generate in the student an awareness of autonomy, criticism and enjoyment.

CONCLUSIONS

The results of the study have shown that the fact of performing practical sessions in school PE with a lower caloric expenditure does not negatively influence the perception of future teachers who will teach this subject. In fact, reflecting on the contents taught, knowing why and for what they are done and being able to connect them with other tasks, is positively valued to generate learning. This undoubtedly promotes reflection on the obsession, in some cases prevailing, to understand school PE from an anatomical-physiological perspective in order to improve health and reduce levels of obesity. However, these unidirectional approaches can lead to frustration towards the subject and a lack of adherence to the practice of physical activity outside the classroom.

The main contribution of this study has been to reflect the incidence of the intensity of practical sessions in the perceived motivation of future PE teachers in different countries and continents. This contributes in a significant way to the existing scientific literature on the subject, generating a deep reflection in the teaching staff about the pedagogical approach that is more convenient to apply in the classroom. However, the article has some limitations. Firstly, it is only a work of sixteen sessions, so it would be essential to apply more longitudinal processes to check the long-term effects. Secondly, and as a future possibility, one could contrast the experience with more countries, verifying how this perception varies according to the sociocultural context.

We consider that this article may be of interest to all those teachers who work in

the initial formation of the faculty of the PE, since the future treatment of the subject will depend on the approach that we give in the university. Also for teachers who teach the subject in the school environment in the primary and secondary stages, since it can serve as a deliberative point on the space that the body should take in different scenarios. It seems necessary to continue innovating in this thematic axis, since the rigor, the status and the logic that shapes PE, depends to a great extent on the innovation that takes place around it.

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