

What are students thinking in Physical Education classes Qué piensan los estudiantes en las clases de educación física

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Abstract. Attention is also considered an influential mediating variable because it influences the teaching-learning process, as well as the teacher's behavior, the student's behavior, and the learning results. According to this factor, focused attention arises as a fundamental condition of the learning process since the greater the ability to maintain focus on a particular object or task, the better the chance of success. Objective: To know the aspects the students pay attention to during the different moments of the Physical Education class. Methods: The sample consisted of 156 students from the 7th, 8th, and 9th grades of high school, of both genders (84 female and 72 male, $\bar{x} = 14,9 \pm 1,3$). The questionnaire ATEST-EF (Petrica, 2003, 2010) was applied, in which the students signaled their thoughts at certain moments of the Physical Education classes. Results: The results indicate that there are no significant differences because after the application of the "Qui-Square" test to associate the variable "Attention" and the variable "Signal," it verified the value of ($p = .373$). Discussion: From the analysis performed, it was observed that there are no significant differences concerning students' attention profile study. Only a small magnitude of size effect ($d = 0.219$) was observed at the level of the general attention profile. Conclusions: It was concluded that student's attention during the physical education class is mainly focused on the task and with less attention focused on things outside the class regardless of their academic performance.

Keywords: Physical Education; Moments in class; Student's thoughts; Attention; ATEST-EF.

Resumen. La atención también se considera una variable mediadora porque influye en el proceso de aprendizaje de enseñanza, así como el comportamiento del maestro, el comportamiento del alumno y los resultados del aprendizaje. Según este factor, la atención centrada surge como una condición fundamental del proceso de aprendizaje, ya que cuanto mayor sea la capacidad de mantener el enfoque en un objeto o tarea en particular, mayores serán las posibilidades de éxito. Objetivo: conocer los aspectos a los que los estudiantes prestan atención durante los diferentes momentos de la clase de educación física. Métodos: La muestra consistió en 156 estudiantes de los grados setimo, octavo y noveno de la escuela secundaria, de ambos sexos (84 mujeres y 72 hombres, $\bar{x} = 14,9 \pm 1,3$). Se aplicó el cuestionario Atest-Ef (Petrica, 2003), en el que los estudiantes señalaron sus pensamientos en ciertos momentos de las clases de educación física. Resultados: Los resultados indican que no hay diferencias significativas porque después de la aplicación de la prueba "Qui-cuadrado" para asociar la variable "atención" y la "señal" variable, verificó el valor de ($p = .373$). Discusión: del análisis realizado, se observó que no hay diferencias significativas con respecto al estudio de perfil de atención de los estudiantes. Solo se observó una pequeña magnitud del efecto de tamaño ($d = 0.219$) a nivel del perfil de atención general. Conclusiones: se concluyó que la atención de los estudiantes durante la clase de educación física se centra principalmente en la tarea y con menos atención centrada en cosas fuera de la clase, independientemente de su rendimiento académico.

Palabras clave: educación física; Momentos en clase; Pensamientos de los estudiantes; Atención; Atest-EF.

Fecha recepción: 24-03-23. Fecha de aceptación: 16-06-23

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Introduction

The process of acquiring any motor skill is a challenge for students, who need to deal with the multiple information available in their practice environment, in addition to that inherent to the task to be performed or aspired to execute. Learning any motor skill requires selecting information that can be contained in the environment and provided by the teacher or technician. For this information to be retained for later interpretation and possible storage in long-term memory, the attention process and mainly focused attention emerges as a fundamental condition for learning because the greater the capacity to maintain focus on a particular object, the greater will be the chances of success. Investigations in this area of motor learning have sought to investigate the influence of different variables on the learning and knowledge acquisition process (Petrica, 2010). It sought to draw attention to the fact that athletes, in general, and young people developing their learning in a particular sport are strongly influenced by their attentional styles. This investigation arises from the need and interest in studying the relationship between the students' attention

levels and also analyzing if there are differences between the different moments of the class. Currently, the attentional focus is a topic widely discussed in the scientific community, especially concerning learning and motor development, as the development of the teaching/learning process is extremely important for the performance of its practitioners (Emad, Neumann, & Abel, 2017; Camacho, 2019; Santos, Petrica, & Maia 2019).

The research focused on teaching, until a few years ago, almost solely on the analysis of teacher behavior, ignoring the predominant role that the student had in his learning process. Currently, studies have emphasized the active role that students take in this process. Students' attention has been considered one of the variables of cognitive processes that most influence their learning. According to Wittrock (1986), attention is related to the students' greater or lesser learning capacity. Although attention is a topic that has been extensively investigated in the field of pedagogy and psychology, it seems very important to address its concept and its influence in physical education classes. Differences in interest, attitude, and aptitude among students of the same class in relation to the different specialties of Physical

Education are well known. Teachers quickly know these differences in students' skills and attention levels. The relationship between thought and action is crucial, as the teaching-learning process is characterized as an eminently human activity. The theory holds that cognition governs action; therefore, the student is seen as an active individual in building his own knowledge (Lee & Solmon, 1992, Santos, Petrica, & Maia 2019, Asad, Hussain, Wadhwa, Kand & Churi, 2021). Research about students' thinking has been carried out under the relation established between the processes of cognitive nature and the student's behavior in learning situations, not only how students interpret the pedagogical stimuli transmitted by the teacher. Some factors, such as the students' characteristics, their perceptions about the school, the contents to be learned, and many others, constitute schemes through which the students perceive the events that occur in the classroom.

Santos (2009), through his study of the relationship between attention and school performance in Physical Education classes, concluded that, in Physical Education classes, students are substantially concerned with what they are doing, with what they are going to do, or with what they did, although much less, are also paying attention to the information provided by the teacher, or by his colleagues, and are sometimes thinking about what his teacher and his colleagues are doing, representing affective thinking, thinking outside the task and thinking about other things, a much smaller part of your attention. In addition to the different types of attention applied to different sports, it has been studied this phenomenon in children in their transition to puberty, between 10 and 15 years old (particularly in the teaching and learning process during physical education classes (Santos, Petrica, Serrano & Mesquita, 2014; Santos, Petrica & Maia, 2015; Santos, Petrica, Maia & Batista, 2016; Santos, Petrica, & Maia 2019). Sánchez-López, Silva-Pereyra & Fernandez (2016); Dickfuss et al (2019); Bellies, Figueiredo, Aurélio, & Grindstone (2018) also argue that focused attention is essential for sports with open competencies, such as team sports. Also, Januário et al. (2011) found that the retention levels of the transmitted information were lower compared to higher levels of motivation of the athletes. On the other hand, the same authors found that higher levels of attention implied higher levels of information retention. Later, Januário, (2014), mentions that attracting attention, during the instruction process, should be considered by teachers and coaches as one of the fundamental aspects, which should seek the implementation of strategies that enhance the attention of students and athletes for the information transmitted, seeking to reduce distracting activities and situations. The abovementioned processes establish an intimate and complex interrelationship about what will influence the student's behavior, performance, and learning. Teachers invoke the lack of attention in the school context as one of the main difficulties in the classroom. It is also considered that the students who obtain better results in school and attention tests can focus and select infor-

mation. These same students can focus their attention, oblivious to external stimuli caused mainly by "disturbing" colleagues.

Selective or focused attention is when focusing on only one stimulus or part of specific information (Boujon & Quaireau, 2001; Laffere, Dick & Tierney, 2020; Lev-Ann & Gutfreund, 2022). The ability to inhibit attention to irrelevant stimuli or distractions is paramount for the subject to maintain their attention to what is important to them (Diamond, Barnett, Thomas, & Munro, 2007). To evaluate attention can be used, among others, the d2-R test (Brickenkamp, 2010, Dryden, Allen, Henshaw & Henrich, 2017), which determines the individual's ability to concentrate on a concrete situation, aware that he is eliminating distracting factors, the Trail Making Test (Chang & Etnier, 2009; Felows, Dahmen, Cook & Edgcombe 2017) which assesses executive skills, selective attention and the ability to inhibit a habitual response, and in the case of Physical Education, the Atest-EF (Petrica, 2010; Santos et al., 2019). The Student Attention Questionnaire in Physical Education (Atest-EF) is a new instrument to measure attentional focus. It is neither too long nor too short, with a single question or single item, with sixteen response items divided by six attentional variables. The present study aimed to characterize students' attentional focus and general attention profile during physical education classes. Using this questionnaire will allow a characterization of the attention focus in four moments of the class, as well as the general attention profile of students in physical education classes.

Material and Methods

It was intended to analyze what the students were thinking at each moment of the PE class, that is, what aspects they said they are paying attention to so that this knowledge can be used to help and contribute to complement the descriptive study of the teaching process. This is a quantitative cross-sectional study because it views the situation of the population under analysis at a given moment as snapshots of reality (Rouquayrol & Almeida, 2006).

Sample characterization

The study sample included 156 students from a school in the Sertã municipality, in Portugal, aged between 12 and 16 years old ($\bar{x} = 14.7 \pm 1.3$), where 84 are female (53.8%) and the remaining 72 males (46.2%). They all attended high school (7th, 8th, and 9th grades) and were assessed during Physical Education classes. The type of sampling used for the participants' selection in the present study was non-probabilistic, a convenience sample Cubo-Delgado et al. (2011) since it was not based on a probabilistic basis, with data collection being an inherent intentional approach to subjects with certain specific characteristics.

Protocol procedures

Students' attention in Physical Education classes was evaluated using the Atest-EF Questionnaire that Petrica (2010) and Santos (2019) validated. Using an instrument with closed answer alternatives that included all the possibilities of an answer so that it was filled out as quickly as possible, interrupting the normal course of the lesson as little as possible. The investigators provided students'

parents with informed and written consent. However, even with the consent given by the parents, the students were verbally asked if they would like to participate in the study, and if any of them did not want to, they would not participate. Also, an authorization for the Ethics Committee of the faculty was delivered and approved under the number 86/2022.

Table 1.
Variables, scale, and items of the Atest-EF.

Attention Variables	Level	Sub-variable	Item
Attention to the task	5	Performing	What I am going to do
		In performing	On what I am doing
		Performed	What I did
Attention to behavior	4	Behavior of:	
		Teacher;	What my teacher has done.
Attention to information	3	Colleagues.	On what my colleagues were doing
		Listen	What my teacher was saying
		Relate.	What my colleagues were saying
Affective attention	2	Understanding	
		Colleagues	On my colleague
		Teachers	On my teacher
		Friends	On my friends
Attention outsider of the task	1	Family	On my family
		In class	What my colleague did to me
		Outside of class	On what I will do to my colleague.
			What I am going to do in my pause
Attention to other things	0	Others	On a computer game
			On other things? What?

As presented in table 1, the Atest-EF is an instrument that lets us know what students think about during Physical Education classes. It is a single-question questionnaire with 16 answer items, subdivided into six variables with the respective levels: (5) attention to the task; (4) attention to behavior; (3) attention to information; (2) affective attention; (1) attention outside the task and (0) attention to other things. The student's attention was recorded in questionnaires distributed and explained to the students at the beginning of the class. With a sound signal previously known, they would register their option of a set of possible answers to the question. What were you thinking about when you heard the signal? When choosing this level of education, psychological facts were decisive, as these students already have an excellent capacity for verbalization and written expression of their thoughts and attitudes. For data collection, Atest-EF was applied in four moments of

the class (initial part, central part, and final part). At certain times, it was emitted by a non-participating element in the class, a sound signal previously known to the students (Fox whistle). Immediately after hearing the signal, the students would have to go to a predetermined location where they would have to signal (x) the option that faithfully cataloged what they were thinking about when they heard the signal and immediately returned to their regular activity.

Results

Based on the response frequencies obtained for each of the items, combining the interrogation moments, it was elaborated the following table (table 2), which exposes the frequencies per item, the percentage of occurrence for each of the items, and the cumulative percentage for the variables to which these items belong.

Table 2.
Response frequencies by attentional category.

Variable	Sub-variable	What were you thinking at the time when did you hear the signal?	Individual sport		
			N	%	%
Attention to the task	Teacher	What my teacher was doing.	133	10,7	
	Colleagues	On what my colleague was doing.	93	7,5	18,2
Attention to behavior	Listen	What my teacher was saying	139	11,1	
	Relating	What my colleague said	71	5,7	16,8
Attention to information	Performing	What i am going to do	185	14,8	
	In performing	On what I am doing	295	23,6	48,3
	Performed	What I did	123	9,9	
Affective attention	Colleagues	On my colleague	51	4,1	
	Teachers	On my teacher	47	3,8	
	Friends	On my friends	17	1,4	9,8
	Family	On my family	6	,5	
Attention outsider of the task	In class	What my colleague did to me	20	1,6	
		On what I will do to my colleague.	13	1,0	
Attention to other things	Outside of class	What I am going to do in my pause	17	1,4	4,6
		On a computer game	7	,6	
Attention to other things	Others	On another thing?	31	2,5	2,5

From this table analysis, it was found that students in Physical Education class say they are thinking (attentive) in

decreasing order: On what I am doing (23.6%), followed by what I am going to do (14.8%), on what my teacher was saying (11.1%), what my teacher was doing (10.7%), what I did (9.9%), on what my colleague was doing (7.5%), on what my colleague said (5.7%), on my colleague (4.1%), on my teacher (3.8%), on what my colleague did to me (1.6%), on what I will do in my pause and with my friends (1.4%), what I will do to my colleague (1%), on a computer game (0.6%) and on my family (0.5%). This indicates that the highest frequency of responses concerns attention to the task being performed, followed by attention to the task to be performed, attention to the teacher's information, attention to the teacher's behavior, the task performed, information from colleagues, to the affective attention of colleagues and teacher, and the lower frequency of responses corresponds to aspects outside the class, whether of an affective order or those related to aspects little related to the class. The combination of the percentage values of the items related to each subcategory, in the respective, by an accumulated percentage calculation, allowed us to know the relative percentage of each of the main categories defined for this instrument, similar to the procedures adopted for the profile of the teacher's behavior (Petrica, 2010), of its main categories, which is called the profile of students' attention.

Comparing the moments of the class, only significant differences were observed in the students' attention when approaching sports, in the first ($p = 0.035$) and fourth ($p = 0.019$) moments of the class, as well as in the general attention profile ($p = 0.008$), with significantly higher values in the approach to team sports. Only a small magnitude of the size effect ($d = 0.219$) was observed at the level of the general attention profile.

Table 3.
T test for independent samples in comparing class periods and general attention profile of students in Physical Education classes.

	Individual sport	SD	Team sport	SD	Sig.	d-cohen	Effect-size (95% IC)
1 st Moment	3,76	1,25	3,96	1,17	.035*	0.165	(-0.151-0.482)
2 nd Moment	4.07	1.30	4.17	0.99	.30	0.087	(-0.229-0.403)
3 rd Moment	4.12	1.19	4.18	1.11	.58	0.052	(-0.264-0.368)
4 th Moment	3.57	1.39	3.85	1.55	.019*	0.19	(-0.126-0.507)
General attention profile	3.88	0.74	4.04	0.72	.008**	0.219	(-0.098-0.536)

*Sig $\alpha \leq 0.05$ **Sig $\alpha \leq 0.01$.

Discussion

The main objective was to characterize the students' attentional focus and attentional profile during physical education classes. This study confirmed that the focus of attention addresses primary attention to the task and attention to information (internal focus). These data agree with the studies by Petrica (2003) and Santos (2009), which found profiles similar to those in this study. Other investigations also sought to find strategies to enhance orientation whose effect was to focus the subject on the effects of movement (internal attentional focus), noting that this orientation was beneficial for learning, studies such as those carried out in golf by Brocken, Kal and Van der Kamp

(2016), in gymnastics by Abdollahipour, Wulf, Psotta & Palomo (2015) and in the javelin by Tse and Ginneken (2017). Regarding the parts of the class, it highlighted the central part, where students show more attention to the task and attention to behavior. These results do not agree with those found by Sánchez and Sebastián (2015), highlighting the importance of attention focused on tasks for open competence sports, such as team sports, rather than attention to information.

It should be noted that in all classes there are, in the final part, higher percentage values of affective attention than in the rest of the class, but even so, with low values. The appreciation of the results obtained for each group under analysis showed no significant differences. However, it identified the existence of differences in relation to attention in the Physical Education classes.

The changes that occur in humans can be structural or behavioral. These can be observed in changes such as behavior, action, thought, and taste, which the human being achieves throughout his evolutionary process. Attention, enabling learning retention, facilitates the response to different or similar stimuli or already learned. It concluded that students' attention during physical education classes is mainly focused on the task and with less attention centered on things outside the class regardless of their school performance. However, it stated that students with satisfactory/good performance have a more attentional profile aimed at improving the teaching/learning process.

Conclusions and Perspectives

Some conjectures allow us to make considerations regarding the process in which teaching/learning models are designed for Physical Education classes, insofar as there seems to be a fluctuation in profiles attention at different moments of the class, as well as one cannot forget the relevance of the attentional profiles of each student throughout the learning process, development, and consolidation of the practice of a sport (Ardoy et al., 2013).

This perspective is reinforced by Gallota et al. (2014); perceptions, expectations, attention, motivations, attributions, memory, understandings, beliefs, attitudes, learning strategies, and meta-cognitive processes have been some of the privileged themes within the scope of studies carried out on student thinking processes (Garcia -Hermoso et al. 2020).

From a developmental perspective, children should engage in activities stimulate their sensorimotor system. Subsequently, there is an evolution where coordination and motor control already allow a better development for learning more complex motor skills. Therefore, children need to be stimulated with appropriate/adapted exercises, where the practice has numerous positive effects. In terms of motor skills, these are acquired and support the learning of more complex skills in exercises/situations whose attentional levels make the difference in the acquisition, success, and reduction of assimilation time (Jaakkola et al., 2019).

In terms of future investigations, it is recommended that other collective and individual modalities, as well as the comparison between them, can be compared in terms of attention. As mentioned earlier, attention is an important mediating variable in the teaching process, teachers must find diversified strategies that capture attention, so it is believed that different teaching styles may influence students' attention. It has also suggested a comparison between student attention and academic performance in different sports, in which more attentive students are expected to have better academic performance. Finally, it is recommended that an increase in the sample for better statistical processing and more investigations on this topic are necessary to develop better teaching/learning processes.

Acknowledgments

The authors have nothing to declare.

References

- Abdollahipour, R., Wulf, G., Psotta, R., Palomo, M (2015).: Performance of gymnastics skill benefits from an external focus of attention. *Journal Sports Science* 33(17), 1807–1813. <https://doi.org/10.1080/02640414.2015.1012102>
- Aeron Laffere, Fred Dick, Adam Tierney, Effects of auditory selective attention on neural phase: individual differences and short-term training, *NeuroImage*, 213, (116717), (2020). <https://doi.org/10.1016/j.neuroimage.2020.116717>
- Arday, D. Jiménez-Pavón, R., Castillo, J., Ruiz, F. & Ortega, B. (2013). A Physical Education trial improves adolescents' cognitive performance and academic achievement: the EDUFIT study. *Scandinavian Journal of Medicine & Science in Sports*, 24(1):. 52-61. <https://doi.org/10.1111/sms.12093>
- Asad, M.M., Hussain, N., Wadho, M., Khand, Z.H. & Churi, P.P. (2021), "Integration of e-learning technologies for interactive teaching and learning process: an empirical study on higher education institutes of Pakistan", *Journal of Applied Research in Higher Education*, Vol. 13 No. 3, pp. 649-663. <https://doi.org/10.1108/JARHE-04-2020-0103>
- Bellies, C., Figueiredo, N., Aurelio H, & Grindstone, A. (January / July 2018). Physical Education, Physical Fitness and Academic Performance. Newsletter Portuguese Society of Physical Education 41(1), 67-82.
- Boujon, C., Quaireau, C.:(2001) *Atenção e Sucesso Escolar*: Rés-Editora.
- Brickenkamp, R.:(2010) *Teste de Atenção d2*. Investigação e Publicações Psicológicas. Hogrefe Editora
- Brocken, J., Kal, E., Van der Kamp, J.(2016): Focus of attention in children's motor learning: examining the role of age and working memory. *Journal Motion Behavior*. 48(6), 527–534. <https://doi.org/10.1080/00222895.2016.1152224>
- Chang, Y., Etnier, J.(2009): Effects of an acute bout of localized resistance exercise on cognitive performance in middle-aged adults: a randomized controlled trial study. *Psychology Sport Exercise* 10, 19–24. <https://doi.org/10.1016/j.psychsport.2008.05.004>
- Cubo Delgado, S., Martín Marin, B., Ramos Sanchez, J.(2011): Métodos de Investigación y Análisis de Datos en *Ciências Sociais y de la Salud*. Pirâmide. ISBN: 978-84-368-2462-9
- Diamond, A., Barnett, W., Thomas, J. & Munro, S. (2007): Preschool program improves cognitive control. *Science* 318(1), 1387–1388. <https://doi.org/10.1126%2Fscience.1151148>
- Diekfuss, J., Rhea, C., Schmitz, R., Grooms, D., Wilkins, R., Slutsky, A. & Raisbeck, L. (2019). The Influence of Attentional Focus on Balance Control over Seven Days of Training. *Journal of Motor Behavior*, 51(3), 281-292. <https://doi.org/10.1080/00222895.2018.1468312>
- Dryden, A., Allen, H. A., Henshaw, H., and Heinrich, A. (2017). "The association between cognitive performance and speech-in-noise perception for adult listeners: A systematic literature review and meta-analysis," *Trends Hear.* 21(1), 1–21. <https://doi.org/10.1177/2331216517744675>
- Emad, M., Neumann, D. & Abel, L. (2017). Attentional focus strategies used by regular exercisers and their relationship with perceived exertion, enjoyment, and satisfaction. *Journal Human Sport Exercise* 12(1), 106–118. doi:10.14198/jhse.2017.121.09
- Robert P. Fellows, Jessamyn Dahmen, Diane Cook & Maureen Schmitter-Edgecombe (2017) Multicomponent analysis of a digital Trail Making Test, *The Clinical Neuropsychologist*, 31:1, 154-167, DOI: 10.1080/13854046.2016.1238510
- Gallota, G., Emerenziani, E., Franciosi, M., Meucci, L., Guidetti, C. & Baldari, C. (2014). Acute physical activity and delayed attention in primary school students. *Scandinavian Journal of Medicine & Science in Sports*, 25(3): 331-8
- García-Hermoso, A., Hormazábal-Aguayo, I., Fernández-Vergara, O., Izquierdo, M., Alonso-Martínez, A., Johana, K., Bonilla-Vargas, A., González-Ruiz, K. & Ramírez-Vélez, R. (2020). Physical fitness components in relation to attention capacity in Latin American youth with overweight and obesity. *Scandinavian Journal of Medicine & Science in Sports*, 30(7): 1188-1193. doi: 10.1111/sms.13649
- Lev-Ari T, Beerli H and Gutfreund Y (2022) The Ecological View of Selective Attention. *Frontiers Integral Neuroscience*. 16:856207. doi: 10.3389/fnint.2022.856207
- Jaakkola, T., Huhtiniemi, M., Salin, K., Seppälä, S., Lahti, J., Hakonen, H., Stodden, F. (2019). Motor competence, perceived physical competence, physical fitness, and physical activity within Finnish children, *Scandinavian Journal of Medicine & Science in Sports*,

- 29(7):1013-1021.doi: 10.1111/sms.13412
- Januário, N. (2014) - Determinantes da retenção da informação no ensino de tarefas desportivas. Tese de Doutoramento. Universidade de Lisboa. Faculdade de Motricidade Humana.
- Januário, N., Rosado, A., & Mesquita, I. (2011). Determinants of Feedback Retention in Football players. Book of Abstracts of the 7 th World Congress on Science & Football. Nagoya, Japan, 172.
- Camacho, P. (2019).: Efecto del foco atencional sobre el aprendizaje de las habilidades deportivas individuales. *Retos* 36, 451-457. <https://doi.org/10.47197/retos.v36i36.64428>
- Lee, A. M., & Solmon, M. A. (1992). Cognitive conceptions of teaching and learning motor skills. *Quest*, Champaign, 44, 57-71. <https://doi.org/10.1080/00336297.1992.10484041>
- Petrica, J. (2003). The formation of Physical Education teachers: Analysis of visible and invisible dimension of education due to different models of preparation for practice. University of Tras-os-Montes and Alto Douro.
- Petrica, J. (2010). ATEST-EF: Una Herramienta para Estudiar la Atención de los Alumnos en la Clase de EF, Actas do III Congreso Internacional de Ciencias del Deporte y Educación Física. Editora Altorendimiento, pp. 675-694.
- Rouquayrol, M., & Almeida Filho, N.:(2006) Epidemiologia e saúde 6a edição. Rio de Janeiro: Guanabara Koogan.
- Sánchez-López, J., Silva-Pereyra, J. & Fernandez, T. (2016). Sustained attention in skilled and novice martial arts athletes: a study of event-related potentials and current sources. *PeerJ*. 2016; 4: e1614. Published online 2016 Jan 26. <https://doi.org/10.7717/peerj.1614>
- Sánchez, R., & Sebastián, M. (2015): Attention alters appearances and solves the « many-many problem» : implications for research in skill acquisition and execution. *European Journal Humam Movement*. 34, 156-179. <https://www.eurjhm.com/index.php/eurjhm/article/view/345>
- Santos, J. (2009): The attention and school performance in physical education. Master's thesis, not published, University of Minho
- Santos, J.M., Petrica, J., Serrano, J. & Mesquita, H. (2014) – O perfil de atenção dos alunos nas aulas de educação física: diferenças entre os distintos momentos da aula na leccionação de modalidades desportivas diferenciadas. *Revista Internacional de Deportes Colectivos*, 9: 105-118. <https://doi.org/10.14198/jhse.2019.14.Proc1.05>
- Santos, J., Petrica, J. & Maia, L. (2015). O perfil de atenção dos alunos nas aulas de educação física: diferenças entre os distintos momentos da aula na leccionação de modalidades desportivas individuais. *E-balonmano.com: Revista de Ciencias del Deporte*, 11(1): 103-104. <http://ojs.e-balonmano.com/index.php/revista/article/view/234>
- Santos, J, Petrica, J., Maia, L. & Batista, M. (2016) The profile attention of students in physical education classes: differences between the different sports. Atención Primaria. Parallel Sessions: Oral Communications, 3rd World Congress of Health Research Viseu – Portugal, 29-30 September 2016; 48(Espec Cong 1):25-120. p. 79.
- Santos, J., Petrica, J. & Maia, L. (2019): Study of the attention and its importance in teaching/learning sports. *Retos. Nuevas tendencias en Educación Física, Deporte y Recreación*, 36, 457-460. <https://doi.org/10.47197/retos.v36i36.54318>
- Tse, A. & Ginneken, W.(2017): Children's conscious control propensity moderates the role of attentional focus in motor skill acquisition. *Psychology Sport Exercise* 31, 35-39. <http://dx.doi.org/10.1016/j.psychsport.2017.03.015>
- Wittrock, M. (1986). Student's thought processes. In M. Wittrock (Ed.), Handbook of research on teaching (3aed). New York: Macmillan Publishing Company.