

## Level of motivation and physical activity in primary education students

MYRIAM ALVARIÑAS-VILLAVERDE , IAGO PORTELA-PINO, JORGE SOTO-CARBALLO

Faculty of Education and Sport Sciences, University of Vigo, Spain

### ABSTRACT

The study is aimed at determining the relationship between the index of physical activity and the motivation toward school tasks of Primary Education students. To this end, a descriptive, quasi-experimental design was employed. The instruments used for the study included PAQ-C and the Questionnaire on students' motivation toward their studies. Among the results, it should be noted that Primary Education students' motivation toward their studies is high, although the level of physical activity is relatively low for this age group. The level of physical activity is higher in boys than girls. The level of motivation, as well as achievement motivation, and causal attributions of achievement are higher in girls, but self-efficacy is higher in boys. The higher the level of physical activity practice, the higher the level of motivation toward their studies, but also the higher the achievement motivation, causal attribution and self-efficacy. Children with greater obesity levels have less motivation. According to these results, it is important to design actions that encourage the regular practice of physical activity, especially among girls. This should be done in different contexts, beyond the subject of Physical Education and in different populations. Interventions should take into account family and environmental factors, or the local environment and its resources. **Key words:** ACADEMIC MOTIVATION, HEALTH, PRIMARY SCHOOL, PHYSICAL ACTIVITY INDEX.

#### Cite this article as:

Alvariñas-Villaverde, M., Portela-Pino, I., & Soto-Carballo, J. (2018). Level of motivation and physical activity in primary education students. *Journal of Human Sport and Exercise*, 13(2proc), S467-S476. doi:<https://doi.org/10.14198/jhse.2018.13.Proc2.30>



**Corresponding author.** Facultad de Ciencias de la Educación y del Deporte. Campus A Xunqueira s/n 36005 Pontevedra, Spain.

E-mail: [myalva@uvigo.es](mailto:myalva@uvigo.es)

Supplementary Issue: Spring Conferences of Sports Science. Costa Blanca Sports Science Week, 26-28 April 2018. Calpe. Alicante, Spain.

JOURNAL OF HUMAN SPORT & EXERCISE ISSN 1988-5202

© Faculty of Education. University of Alicante

doi: [10.14198/jhse.2018.13.Proc2.30](https://doi.org/10.14198/jhse.2018.13.Proc2.30)

## INTRODUCTION

There is abundant scientific evidence on the benefits of physical activity on health. However, the relationship or association between regular physical activity and learning or motivation toward school tasks has been ignored by educational research.

Still, in recent years, a relationship between regular physical activity (mainly aerobic exercise) and learning seems to have been proven. Physical activity promotes neuroplasticity and neurogenesis in the hippocampus, facilitates long-term memory and more efficient learning (Berchtold et al., 2010; Van Praag, 2009). In addition, it supplies oxygen to the brain and generates a noradrenaline and dopamine response, influencing the attention and motivation processes (Åberg et al., 2009). It also improves mood, as dopamine is associated with reward and reduces stress that negatively affects the learning process (Best, 2010; Budde et al., 2008; Carlson et al., 2008; Elleberg and St. Louis-Deschênes, 2010; Gallotta et al., 2012).

Motivation is a complex and multifactorial term. Pintrich and Schunk (2006) has distinguished three constructs relevant to motivation in educational contexts: academic self-efficacy, achievement motivation, and causal attribution of achievement. The first construct refers to students' beliefs about their ability to perform a task. The second refers to students' goal and beliefs about the importance and interest of carrying it out. The third covers the consequences derived from completing the task, as well as the results of success or failure at an academic level.

With respect to these constructs, it seems that integrated regulation and intrinsic motivation correlate more strongly with moderate to vigorous physical activity (Aelterman et al., 2012; Jaakkola et al., 2013; Praxedes et al., 2016; Zhang, 2009; Zhang et al., 2011). In the study conducted by Dishman et al. (2015), these results have been independent of biological maturity. In addition, no difference has been found between boys and girls, Hispanic or non-Hispanic, and students of normal weight and overweight students. On the other hand, Gao and Podlog (2012) have pointed out that participants who set higher goals achieve a greater improvement in physical activity levels than participants with lower goals.

Regarding the subject of Physical Education, Trites and Elgar (2010), and Chen et al. (2014) have shown that students attending these classes are more physically active and more intrinsically motivated than those who do not attend.

Another fact to consider is that proposed by Bronikowski et al. (2015), who have pointed out that the level of emotional and social support from teachers and peers are important factors in stimulating physical activity. Boys with normal weight who receive high support are more physically active than girls with the same characteristics (Bronikowski et al., 2015). These results have also been corroborated by Torrado et al. (2016) who have stated that students receiving greater support presented higher formal, informal and total levels of physical activity practice, as well as a higher level of motivation.

## METHODS

The research is based on a descriptive, quasi experimental design. The main objective is to determine whether there is a relationship between the level of physical activity and Primary Education students' motivation.

**Participants**

The study sample consisted of 405 children aged between 9 and 11 years old, who were enrolled in Primary Education schools in the Autonomous Community of Galicia (Spain). 50% of them are boys ( $n = 202$ ) and 50% girls ( $n = 203$ ).

**Instrument**

The scale used to measure motivation is the Academic Motivation Scale (AMS). The original scale was developed in 2008 by Thornberry. Originally, the test was made up of 20 items, consisting of statements to evaluate students' motivation by means of a Likert scale. The purpose of the instrument is to measure academic self-efficacy, internal attributions of achievement, and achievement-oriented actions. However, Barrientos-Chuqui's adaptation (2011) was employed herein, which has the same characteristics as the original instrument, except for the reduction from 20 to 18 items.

To measure the level of physical activity PAQ-C was used, which is a self-administered questionnaire. It was designed to measure moderate to vigorous physical activity in children and adolescents, performed over the past 7 days (Kowalski et al., 2004). It consists of ten items, nine of which are used to calculate the level of activity. The tenth item assesses whether an illness or another event prevented the child from performing their regular activities over the past week. The overall result of the test is a score of 1 to 5, so that higher scores prove a higher level of activity.

PAQ-C was validated for the Spanish population (Manchola-González et al., 2017; Martínez-Gómez et al., 2009).

**Procedure**

The study was conducted according to the ethical standards established by the Declaration of Helsinki (revised by the Declaration of Hong Kong, September 1989) and in agreement with the recommendations of EEC - Good Clinical Practice (Document 111/3976/88, July 1990) and with the Spanish legislation in force governing research.

The questionnaire was collectively administered to students enrolled in the third cycle of Primary Education during regular school hours, during the academic year 2016-2017. After communicating the appropriate instructions and once the informed consent form was signed (by school and families), all students voluntarily completed the requested information.

**Statistical Analysis**

First, a descriptive analysis was carried out for the items, mean, standard deviation, as well as the asymmetry and kurtosis indices used to assess the normal behaviour of variables.

Next, t-tests were performed to compare independent means with a significance level of  $p < .05$ . Subsequently, the relationship between the different factors affecting students' motivation and the grade average obtained in different subjects were analyzed using Pearson's correlation coefficients.

The reliability of AMS and PAQ-C was estimated using Cronbach's alpha coefficient in order to determine the internal consistency of this scale. The results showed an alpha coefficient of  $\alpha = .791$ , which implies a moderate reliability; for PAQ-C,  $\alpha = .805$ , which implies a high reliability (Gliem and Gliem, 2003; Eisinga et al., 2013; Sijtsma, 2009).

The confidence level used was .05. Data analysis was performed using the SPSS 23.0 statistical package.

## RESULTS

Among the most important results, the following should be considered:

Table 1. Descriptive statistics for the sample (n = 405)

	<i>n</i>	Minimum	Maximum	Mean	SD	Asymmetry	Kurtosis
Age	405	9	12	10.62	595	.151	-.503
Weight	405	26	85	41.42	8.523	1.064	2.314
Height	405	120	175	148.21	8.108	.083	.709
BMI	405	14.70	33.62	18.74	315.878	.512	4.773
PAQ-C	405	1.40	4.72	29.715	.69118	.199	-.577
Total Motivation	405	.39	2.00	14.952	.29551	-.521	-.259
Achievement Motivation	405	.57	2.00	14.423	.29621	-.386	-.286
Causal Attribution	405	.33	2.00	16.260	.35706	-.916	.170
Self-efficacy	405	.00	2.00	14.327	.42749	-.432	-.544

Primary Education students' motivation toward their studies is high, approaching in all its factors the maximum score. However, the level of physical activity is low.

In addition, asymmetry is negative for the motivation variables and positive for the level of physical activity, whereas kurtosis is negative for all the variables, except for causal attribution.

When the distribution has an asymmetric tail extending toward negative values, the values cluster more at levels above the arithmetic mean, except in the case of the index of physical activity. In addition, kurtosis is platykurtic, since, being negative, there is a lower concentration of data around the mean, except in the case of the distribution of the causal attribution variable, where this concentration is higher.

Table 2. Analysis of the difference between means by gender for each variable

	Sample (n = 405)		Student's <i>t</i> -test	
	Boys (n = 202)	Girls (n = 203)	<i>t</i>	Sig. (bilateral)
PAQ-A (score)	3.053±.695	2.889±.678	2.409	.016
Total Motivation	1.4791±.30579	1.5112±.28477	1.094	.275
Achievement Motivation	1.4187±.30338	1.4659±.28768	1.607	.109
Causal Attribution	1.5887±.37462	1.6634±.33537	-2.117	.035
Self-efficacy	1.4475±.42709	1.4178±.42844	.698	.486

Note. Values are presented as mean ± standard deviation.

\*The mean difference is significant at the level of 0.05.

The level of physical activity and self-efficacy were both higher in boys than girls. However, the level of total motivation, as well as achievement motivation, and causal attributions were higher in girls.

As shown, the correlations are all significant. It should be noted that the higher the body mass index, the lower the level of physical activity. However, there were also significant correlations between students' level of physical activity and their level of total motivation toward studies. The higher the level of physical activity practice, the higher the level of motivation toward their studies, but also the higher the achievement

motivation, causal attribution and self-efficacy. However, motivation correlates negatively with body mass index. In this sense, it should be inferred that children with greater obesity levels have less motivation. The correlations between the factors of the motivation construct are all positive and significant.

Table 3. Correlations between the variables analysed

		BMI	PAQ-C	Total Motivation	Achievement Motivation	Causal Attribution
PAQ-C	Pearson's correlation	-.163**				
	Sig. (bilateral)	.001				
Total Motivation	Pearson's correlation	-.175**	.210**			
	Sig. (bilateral)	.0001	.0001			
Achievement Motivation	Pearson's correlation	-.157**	.216**	.776**		
	Sig. (bilateral)	.002	.0001	.0001		
Causal Attribution	Pearson's correlation	-.163**	.131**	.847**	.504**	
	Sig. (bilateral)	.001	.009	.0001	.0001	
Self-efficacy	Pearson's correlation	-.129**	.174**	.805**	.463**	.565**
	Sig. (bilateral)	.010	.0001	.0001	.0001	.0001

\*\*  $p < .01$ .

## DISCUSSION AND CONCLUSIONS

Despite the evidence of the usefulness of the self-determination theory in the area of Physical Education, few studies have revealed the relationship between motivation toward studies and the index of physical activity (Jaakkola et al., 2013).

Our study shows that Primary Education students' motivation toward their studies is high, but the level of physical activity is relatively low for children of this age group. As expected, this level is higher in boys than girls. The data are consistent with those obtained in other studies on children, carried out in Spain (Laguna et al., 2011; Aznar et al., 2011). Besides, the study conducted by Laguna et al. (2011) demonstrated that the performance of AFMV was more related to gender than to BMI (overweight/obese versus normal weight).

The level of total motivation, as well as achievement motivation, and causal attributions are higher in girls. These findings match those obtained in other studies, which showed that female students exhibited the greatest academic motivation. Martin (2007) found that girls scored significantly higher than boys in many adaptive aspects of motivation. Bugler, McGeown and St Clair-Thompson (2015) determined that girls reported higher levels of academic motivation, in particular in the positive dimensions of valuing, learning focus, task management and persistence. In addition, in the study conducted by Sevil et al. (2015) girls have a higher self-determined motivation, greater enjoyment and a greater cognitive attitude. Similarly, Martin (2004) pointed out that women have significantly higher values in the approach concerning learning, planning, study management and persistence. Nevertheless, in the current study, it is concluded that, despite the fact that girls have higher levels of motivation than boys in a series of dimensions, the fundamental motivational orientations of both groups are not qualitatively different.

On the other hand, self-efficacy, understood as a person's conviction that they can successfully perform a certain task, is higher in boys. This result is different to that obtained by Galicia-Moyeda et al. (2013), who did not find significant differences according to gender in terms of self-efficacy. Finally, with respect to specific subjects, Fan (2011) showed that girls expressed greater confidence in their English language ability, whereas boys displayed greater confidence in their math skills.

In any case, it is important to not lose sight of the fact that, although boys have a greater sense of competence and girls show more interest in school work, these differences are small in most studies. In addition, gender patterns vary depending on the culture and the different grade levels (Yeung et al., 2012).

As a more relevant conclusion, it should be emphasized that the higher the level of physical activity practice, the higher the level of motivation toward their studies, but also the higher the achievement motivation, causal attribution and self-efficacy. In addition, children with greater obesity levels have less motivation. This conclusion may be explained by the fact that schoolchildren with low perceived motor competence are not able to perform many of the tasks that their peers perform without difficulty (Ruíz et al., 2007). On the same line, it was also shown that overweight and obese subjects have low motivation, which leads to greater frustration and difficulties in reaching their goals (Aguilar et al., 2012). In addition, they show less motivation toward the practice of physical and sports activities. This may lead to relationship difficulties with their peers, triggering episodes of loneliness, isolation, rejection and ridicule on the playground or in moments of play (Bucco and Zubiatur, 2013). Therefore, additional motivational support (Olaya-Contreras et al., 2015) is necessary in the school setting, aimed at improving their physical condition and, therefore, their health.

In fact, the report conducted by Drobnic (2013) described the advantages of daily and regular physical activity at a cognitive level, as it improves children's mood and emotional state. It also enhances academic performance and attention span. In the same vein, studies such as those carried out by Vazou et al. (2012) showed the positive impact that physical activity along with academic subjects could have on academic motivation.

Based on these results, it is important to implement actions that encourage the regular practice of physical activity in different contexts, beyond the subject of Physical Education, and in different populations (Gao et al., 2017; How et al., 2013; Praxedes et al., 2016; Tian et al., 2017), taking into account a gender perspective.

Moreover, interventions should be established to increase physical activity before adolescence, in order to consolidate healthy habits at an early age. Authors such as Kahn et al. (2008) demonstrated that these activities were more effective if they were multimodal and focused on a specific target group. The authors also mentioned family and environmental factors, or the local environment and its resources. Ideally, the city should have an urban design that facilitates its sustainability and accessibility. It should encourage people to take healthy walks, and visit perfectly maintained urban circuits and outdoor fitness complexes. The presence of qualified personnel who provide information on the different use of available resources would be of great interest. Another option, already studied, is the revitalization of school playgrounds involving the entire educational community, favoring the diversity of game options, and giving special attention to the aesthetics of these spaces.

## REFERENCES

- Åberg, M. A. I., Pedersen, N. L., Torén, K., Svartengren, M., Bäckstrand, B., Johnsson, T., ...Kunhn, H. G. (2009). Cardiovascular fitness is associated with cognition in young adulthood. *Proceedings of*

- the National Academy of Science of the USA, 106(49), 20906-20911. <https://doi.org/10.1073/pnas.0905307106>
- Aelterman, N., Vansteenkiste, M., Van Keer, H., Van den Berghe, L., De Meyer, J., & Haerens, L. (2012). Students' Objectively measured physical activity levels and engagement as a function of between-class and between-student differences in motivation toward Physical Education. *Journal of Sport & Exercise Psychology*, 34(4), 457-480. <https://doi.org/10.1123/jsep.34.4.457>
- Aguilar, M. J., González-Jiménez, E., Padilla, C. A., Guisado, R., & Sánchez-López, A. M. (2012). Overweight and obesity as a prognosis factor of desmotivation in children and adolescents. *Nutrición hospitalaria*, 27(4), 1166-1169. <https://doi.org/10.3305/nh.2012.27.4.5853>
- Aznar, S., Naylor, P., Silva, P., Pérez, M., Angulo, T., Laguna, M., ...Lopez-Chicharro, J. (2011). Patterns of physical activity in Spanish children: a descriptive pilot study. *Child: Care, Health and Development*, 37(3), 322-328. <https://doi.org/10.1111/j.1365-2214.2010.01175.x>
- Barrientos-Chuqui, L. L. (2011). Motivación escolar y rendimiento académico en alumnos del cuarto año de secundaria de una institución educativa estatal de ventanilla. (Master's thesis unpublished). Universidad San Ignacio de Loyola, Lima-Perú.
- Berchtold N. C., Castello N., & Cotman C. W. (2010). Exercise and time-dependent benefits to learning and memory. *Neuroscience*, 167(3), 588-97. <https://doi.org/10.1016/j.neuroscience.2010.02.050>
- Best, J. R. (2010). Effects of physical activity on children's executive function: Contributions of experimental research on aerobic exercise. *Developmental Review*, 30(4), 331-351. <https://doi.org/10.1016/j.dr.2010.08.001>
- Bronikowski, M., Bronikowska, M., Laudańska-Krzemińska, I., Kantanista, A., Morina, B., & Vehapi, S. (2015). PE teacher and classmate support in level of physical activity: The role of sex and BMI status in adolescents from Kosovo. *Biomed Research International*, Article ID 290349, 1-8. <https://doi.org/10.1155/2015/290349>
- Bucco, L., & Zubiaur, M. (2013). Desarrollo de las habilidades motoras fundamentales en función del sexo y del índice de masa corporal en escolares. *Cuadernos Psicología del Deporte*, 13(2), 63-72. <https://doi.org/10.4321/S1578-84232013000200007>
- Budde, H., Voelcker-Rehage, C., Pietrabyk-Kendziorra, S., Ribeiro, P., & Tidow, G. (2008). Acute coordinative exercise improves attentional performance in adolescents. *Neuroscience Letters*, 441(2), 219-223. <https://doi.org/10.1016/j.neulet.2008.06.024>
- Bugler, M., McGeown, S. P., St Clair-Thompson, H. (2015). Gender differences in adolescents' academic motivation and classroom behaviour. *Educational Psychology*, 35(5), 541-556. <https://doi.org/10.1080/01443410.2013.849325>
- Carlson, S. A., Fulton, J. E., Lee, S. M., Maynard, L. M., Brown, D. R., Kohl III, H. R., & Dietz, W. H. (2008). Physical Education and academic achievement in elementary school: Data from the early childhood longitudinal study. *American Journal of Public Health*, 98(4), 721-727. <https://doi.org/10.2105/AJPH.2007.117176>
- Chen, S. L., Sun, H. C., Zhu, X. H., & Chen, A. (2014). Relationship between motivation and learning in Physical Education and after-school physical activity. *Research Quarterly for Exercise and Sport*, 82(4), 468-477. <https://doi.org/10.1080/02701367.2014.961054>
- Dishman, R. K., Mciver, K. L., Dowda, M., Saunders, R. P., & Pate, R. R. (2015). Motivation and behavioral regulation of physical activity in middle school students. *Medicine and Science in Sports and Exercise*, 47(9), 1913-1921. <https://doi.org/10.1249/MSS.0000000000000616>
- Drobnic, F. (Coord.) (2013). La actividad física mejora el aprendizaje y el rendimiento escolar. Los beneficios del ejercicio en la salud integral del niño a nivel físico, mental y en la generación de valores. Barcelona: Hospital Sant Joan de Déu.

- Eisinga, R., Grotenhuis, M., & Pelzer, B. (2013). The reliability of a two-item scale: Pearson, Cronbach or Spearman-Brown? *International Journal of Public Health*, 58(4), 637-642. <https://doi.org/10.1007/s00038-012-0416-3>
- Elleberg, D., & St. Louis-Deschênes, M. (2010). The effect of acute physical activity on cognitive function during development. *Psychology of Sport and Exercise*, 11(2), 122-126. <https://doi.org/10.1016/j.psychsport.2009.09.006>
- Fan, W. (2011). Social influences, school motivation and gender differences: an application of the expectancy-value theory. *Educational Psychology*, 31(2), 157-175. <https://doi.org/10.1080/01443410.2010.536525>
- Galicia-Moyeda, I. X., Sánchez-Velasco, A., & Robles-Ojeda, F. J. (2013). Autoeficacia en escolares adolescentes: su relación con la depresión, el rendimiento académico y las relaciones familiares. *Anales de psicología*, 29(2), 491-500. <https://doi.org/10.6018/analesps.29.2.124691>
- Gallotta, M. C., Guidetti, L., Franciosi, E., Emerenziani, G. P., Bonavolontà, V., & Baldari, C. (2012). Effects of varying type of exertion on children's attention capacity. *Medicine and Science in Sport and Exercise*, 44(3), 550-555. <https://doi.org/10.1249/MSS.0b013e3182305552>
- Gao, Z., & Podlog, L. (2012). Urban latino children's physical activity levels and performance in interactive dance video games effects of goal difficulty and goal specificity. *Archives of Pediatrics & Adolescent Medicine*, 166(10), 933-937. <https://doi.org/10.1001/archpediatrics.2012.649>
- Gao, Z., Pope, Z., Lee, J. E., Stodden, D., Roncesvalles, N., Pasco, D., Huang, C. C., & Feng, D. (2017). Impact of exergaming on young children's school day energy expenditure and moderate-to-vigorous physical activity levels. *Journal of Sport and Health Science*, 6(1), 11-16. <https://doi.org/10.1016/j.jshs.2016.11.008>
- Gliem, J., & Gliem, R. (2003). Calculating, interpreting, and reporting Cronbach's alpha reliability coefficient for likert-type scales. Conference in adult, continuing and community education. Midwest research to practice. The Ohio State University, Columbus. Retrieved from <http://www.ssnpstudents.com/wp/wp-content/uploads/2015/02/Gliem-Gliem.pdf>
- How, Y. M., Whipp, P., Dimmock, J., & Jackson, B. (2013). The effects of choice on autonomous motivation, perceived autonomy support, and physical activity levels in high school Physical Education. *Journal of Teaching in Physical Education*, 23(2), 131-148. <https://doi.org/10.1123/jtpe.32.2.131>
- Kahn, J. A., Huang, B., Gillman, M. W., Field, A. E., Austin, S. B., Colditz, G. A., & Frazier, A. L. (2008). Patterns and determinants of physical activity in U.S. adolescents. *Journal of Adolescent Health*, 42, 369-377. <https://doi.org/10.1016/j.jadohealth.2007.11.143>
- Jaakkola, T., Washington, T., & Yli-Piipari, S. (2013). The association between motivation in school physical education and self-reported physical activity during Finnish junior high school: A self-determination theory approach. *European Physical Education Review*, 19, 1127-1141. <https://doi.org/10.1177/1356336X12465514>
- Kowalski, C. K., Croker P. R., & Donem, R. M. (2004). The physical activity questionnaire for older children (PAQ-C) and adolescents (PAQ-A) manual. Saskatchewan, Canada: College of Kinesiology, University of Saskatchewan.
- Laguna, M., Lara, M. T., & Aznar, S. (2011). Patrones de Actividad Física en función del género y los niveles de obesidad en población infantil española. Estudio EYHS. *Revista de Psicología del Deporte*, 20(2), 621-636.
- Manchola-González, J., Bagur-Calafat, C., & Girabent-Farrés, M. (2017). Fiabilidad de la versión española del cuestionario de actividad física PAQ-C / Reliability Spanish Version of Questionnaire of Physical Activity PAQ-C. *Revista Internacional de Medicina y Ciencias de la Actividad Física y el Deporte*, 17(65), 139-152. <https://doi.org/10.15366/rimcafd2017.65.008>



- Martin, A. J. (2004). School motivation of boys and girls: Differences of degree, differences of kind, or both? *Australian Journal of Psychology*, 56(3), 133-146. <https://doi.org/10.1080/00049530412331283363>
- Martin, A. J. (2007). Examining a multi-dimensional model of student motivation and engagement using a construct validation approach. *British Journal of Educational Psychology*, 77, 412-440. <https://doi.org/10.1348/000709906X118036>
- Martínez-Gómez, D., Martínez-de-Haro, V., Pozo, T., Gregory, J., Villagra, A., Calle, M. E., Ascensión, M., & Veiga, O. L. (2009). Fiabilidad y validez del cuestionario de actividad física PAQ-A en adolescentes españoles. *Revista Española de Salud Pública*, 83(3), 427-439. <https://doi.org/10.1590/S1135-57272009000300008>
- Olaya-Contreras, P., Bastidas, M., & Arvidsson, D. (2015). Colombian children with overweight and obesity need additional motivational support at school to perform health-enhancing physical activity. *Journal of Physical Activity and Health*, 12, 604-609. <https://doi.org/10.1123/jpah.2014-0024>
- Pintrich, P. R., & Schunk, D. H. (2006). *Motivación en contextos educativos*. Madrid: Pearson.
- Praxedes, A., Sevil, J., Moreno, A., del Villar, F., & García-González, L. (2016). Levels of physical activity and motivation in University students. Differences in terms of academic discipline linked to physical-sports practice. *Journal of Sport and Health Research*, 8(3), 191-204.
- Ruíz, L. M., Mata, E., & Moreno, J. A. (2007). Los problemas evolutivos de coordinación motriz y su tratamiento en la edad escolar: estado de la cuestión. *Motricidad: European Journal of Human Movement*, 18(4), 1-17.
- Sevil, J., Abós, Á., Julián, J. A., Murillo, B., & García-González, L. (2015). Gender and situational motivation in physical education: The key to the development of intervention strategies. *RICYDE: Revista Internacional de Ciencias del Deporte*, 41(11), 281-296.
- Sijtsma, K. (2009). On the use, the misuse and the very limited of the Cronbach's alpha. *Psychometrika*, 74(1), 107-120. <https://doi.org/10.1007/s11336-008-9101-0>
- Thornberry, G. (2008). Estrategias metacognitivas, motivación académica y rendimiento académico en alumnos ingresantes a una universidad de Lima Metropolitana. *Revista Persona*, 11, 177-193. <https://doi.org/10.26439/persona2008.n011>
- Tian, H. L., du Toit, D., & Toriola, A. L. (2017). The effects of an enhanced quality Physical Education programme on the physical activity levels of Grade 7 learners in Potchefstroom, South Africa. *Physical Education and Sport Pedagogy*, 22(1), 35-50. <https://doi.org/10.1080/17408989.2015.1072509>
- Torrado, P., Martins, J., Rendeiro, P., Marques, A., & Da Costa, F. C. (2016). Physical activity in adolescence: The importance of friends' support and physical activity levels. *Revista Iberoamericana de Psicología del Ejercicio y el Deporte*, 11(2), 297-303.
- Trites S. J., & Elgar F. J. (2010). Making time to exercise: an analysis of the impact of motivation and elective high school physical education on adolescent physical activity level. *Proceedings of the 2nd International Conference on Education and New Learning Technologies (EDULEARN10 Proceedings)*, Spain, 5644-5652. Retrieved from <https://library.iated.org/publications/EDULEARN10>
- Van Praag, H. (2009). Exercise and the brain: something to chew on. *Trends in Neurosciences*, 32(5), 283-90. <https://doi.org/10.1016/j.tins.2008.12.007>
- Vazou, S., Gavrilou, P., Mamalaki, E., Papanastasiou, A., & Sioumala, N. (2012). Does integrating physical activity in the elementary school classroom influence academic motivation? *International Journal of Sport and Exercise Psychology*, 10(4), 251-263. <https://doi.org/10.1080/1612197X.2012.682368>

- Yeung, A. S., Craven, R., & Kaur, G. (2012). Gender differences in achievement motivation: grade and cultural considerations. In S. P. McGeown (Ed.), *Psychology of Gender Differences* (pp. 59-79). UK: Nova Science Publishers.
- Zhang, T. (2009). Relations among school students' self-determined motivation, perceived enjoyment, effort, and physical activity behaviors. *Perceptual and Motor Skills*, 109(3), 783-790. <https://doi.org/10.2466/pms.109.3.783-790>
- Zhang, T., Solmon, M. A., Kosma, M., Carson, R. L., & Gu, X. L. (2011). Need support, need satisfaction, intrinsic motivation, and physical activity participation among middle school students. *Journal of Teaching in Physical Education*, 31(1), 51-68. <https://doi.org/10.1123/jtpe.30.1.51>



This title is licensed under a [Creative Commons Attribution-NonCommercial-NoDerivs 4.0 Unported License](https://creativecommons.org/licenses/by-nc-nd/4.0/).