



Development and Aging

Effect of autonomy support and dialogic learning on school children's physical activity and sport

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This study applies an intervention based on autonomy support through dialogic learning to examine effects on motivation and the promotion of physical activity and sport involvement during schoolchildren's leisure time. One hundred and two primary school students, aged 11–13 years, participated ($M = 10.93$, $SD = 0.75$). The sample was divided into two groups: an experimental group (49 students) and a control group (53 students). A quasi-experimental study was conducted in physical education classes over the course of 9 months. Assessments of autonomy support from teachers, family, and peers; basic psychological needs; self-determined motivation in physical education and during leisure time; planned behavior variables; physical activity intention; and estimated and actual physical exercise behavior time were included in the model. Following the intervention, the results revealed that greater autonomy support by the teacher, the family and peers, satisfaction of the basic psychological needs, self-determined motivation during physical education class and during free time, greater perceived control, favorable attitude and intention to engage in physical activity contributed to the explanation of student physical activity involvement. These results suggest that when students receive extensive social support from diverse social agents that essential precursors to physical activity are strengthened and contribute to increased motivation and actual physical activity involvement. Efforts to promote effective communications with students and other pedagogical efforts, such as providing dialogic learning opportunities, should be considered in order to strengthen physical activity motivation and involvement in students.

Key words: Basic psychological needs, family, interactive groups, planned behavior, self-determined motivation.

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INTRODUCTION

For more than a decade, researchers have asserted that regular engagement in physical activity and sport involvement that contribute to satisfying and stimulating experiences within the social environment will contribute to an active and healthy lifestyle (Cantú, Castillo, López-Walle, Tristán & Balaguer, 2016; Murillo, Sevil, Abós & García-González, 2018). The World Health Organization (WHO, 2010) advocates that physical activity is a fundamental tool for promoting physical and psychological health. However, although we are now at the beginning of the 21st century, obesity has become a serious problem, which is a concern in the spheres of both health and education. Data from the National Statistics Institute (Spain) confirm that this disease has increased from 7.4% to 17% of the Spanish population in the last 25 years (INE, 2016). At the same time, the development of technology in western societies is contributing to a growing sedentary lifestyle associated with various illnesses that are not only linked to the adult population (diabetes, high blood pressure, sleep disorders or arthritis, among others), but are also now present in the child and adolescent populations (Chacón, Zurita, Castro, Espejo, Martínez-Martínez & Linares, 2016; Galíndez & Carmona, 2016). In this regard, awareness of the benefits that physical activity and sport can provide at the physical, psychological, and social level (American College of Sports Medicine, 2000), research-based knowledge indicates that an active lifestyle should be adopted before reaching adolescence, since this stage is considered a critical period associated with individuals' adherence and commitment to doing physical activity and sport

(Kocken, Scholten, Westhoff, De Kok, Taal & Goldbohm, 2016; Wood & Hall, 2015).

In response to this situation, a growing concern for promoting greater adherence to exercise in an educational context has been emphasized contribute to consolidating healthy lifestyle habits in young people (Gunnell, Bélanger & Brunet, 2016; Moreno-Murcia & Huéscar, 2013). For this purpose, self-determination theory (SDT, Deci & Ryan, 1985, 2000) is one of the contemporary motivational theories most frequently employed for understanding the role of motivation in physical activity and sport. From this perspective, individual motivational characteristics can be conceptualized as existing along a motivational continuum which extends from intrinsic motivation (greater level of self-determination, related to a greater level of adherence and commitment) to extrinsic motivation (based on external incentives and punishment) to amotivation (lowest level of self-determination, lack of motivation and interest in committing to an activity). According to the SDT, the satisfaction of basic psychological needs (BPN, Deci & Ryan, 2000), autonomy (feeling of initiative), competence (feeling of effectiveness in one's environment), and relatedness (feeling connected with others) is related to greater levels of self-determination and adaptive behaviors (Ryan & Deci, 2017; Wang, Liu, Kee & Chian, 2019; Yu, Levesque & Maeda, 2018), while their frustration would approach the lowest levels of self-determination and discomfort (Cheon, Reeve & Ntoumanis, 2018; Nishimura & Suzuki, 2016). So, these three innate psychological needs are central concepts within SDT in order to understand the initiation and regulation of behavior.

The antecedents and outcomes of different types of motivation have been outlined by Vallerand (2001) in his hierarchical model of motivation, which was developed based on the SDT's theoretical framework. Specifically, this process includes social environmental factors, basic psychological need satisfaction, the various types of motivation, and motivational consequences. Social environmental factors, such as teachers, parents, or peers participate in motivation through students' satisfaction or frustration of the BPN, triggering different consequences on behavioral, cognitive, and emotional levels (Basson & Rothmann, 2018; Wing, Bélanger & Brunet, 2016).

From the theoretical framework of the SDT, the interpersonal style of autonomy support by other significant people (parents, teachers, peers) satisfies the BPN, generating positive outcomes on student motivation, which is essential to free time physical activity involvement (Aelterman, Vansteenkiste, Van Keer & Haerens, 2016; Haerens, Aelterman, Van den Berghe, De Meyer, Soenens & Vansteenkiste, 2013). Autonomy support characteristically nurtures students' internal motivational resources by providing them with alternatives to choose from, encouraging them to take the initiative, as well as giving them regular positive feedback which enables them to structure activities both before and during their implementation (Reeve, 2009). In the educational environment, this pattern focuses on the students as the active agent of the teaching–learning process, there being a positive relationship between the teacher's motivational style of autonomy support and positive results for the students (Gillet, Huyghebaert, Barrault *et al.*, 2017; Schneider, Nebel, Beege & Rey, 2018). Although research is still scarce, various studies have emerged that demonstrate the effectiveness of training teachers to adopt a style in which they provide autonomy support (Su & Reeve, 2011). For example, Aelterman, Vansteenkiste, Van den Berghe, De Meyer and Haerens (2014) demonstrated in a large sample of physical education teachers and adolescents students that providing increased autonomy support was possible and beneficial.

Students' contextual motivation in physical education (PE) lessons can have positive transfer to students' motivation at the global level and can shape their likelihood of participation in extracurricular activities that are similar to those practiced in the school environment. To date, research that has initiated from the theoretical framework of the SDT, have focused on the perceived motivational style of the teacher in physical education classes trying to improve physical activity and sport engagement, but most have assessed the variable of intention to be physically active (Cheon, Reeve & Moon, 2012; Trigueros, Aguilar-Parra, Cangas, López-Liria & Álvarez, 2019), being very few intervention studies that include the real behavioral engagement in terms of accelerometry-assessed (Escriva-Boulley, Tessier, Ntoumanis & Sarrazin, 2017).

Thus, although the intention is conceptualized as the immediate precursor of behavior (theory of planned behavior, TPB; Ajzen, 1985), having found different authors a positive relation between the intention to do physical activity and an increase in the rate of exercise by students (Hagger & Chatzisarantis, 2014), probably, the association with the real rate of practice represents a stronger and more objective measure as a criterion for knowing the real frequency of practice of the young population and above all, to

know if the intervention has been effective (Escriva-Boulley *et al.*, 2017).

Parallel to benefits shown by the empirical evidence of recent years regarding teacher's autonomy support, the role of family support as a socializing agent of the person has also been extendedly considered in recent research for its contribution to optimizing adolescent development (Feng, Xie, Gong, Gao, and Cao, 2019). Research has shown that dialogic learning (Flecha, 1997) is a pedagogical approach that could contribute also to a positive development of students. This educational perspective is based on dialogue and positive interaction as fundamental elements of effective learning, so that the inter-subjective and social level on which relations and communication with others are established acquires a central role, which develops into a personal construction (Elboj, Puigdemívol, Soler & Valls, 2002). The dialogic concept is also characterized by using all the pedagogical resources available in the educational community, whether they are material or human. Therefore, social agents that are not usually part of the teaching–learning processes in the educational context, such as the family, can have an active participation. However, although these approaches seem to share common aspects with respect to their potential contribution to the positive development of students, there are still some relevant aspects to better understand. It is still unknown whether an educational intervention oriented toward autonomy support through dialogic learning and family participation can improve student motivation in PE and contribute to physical activity and sport involvement during student free time.

In relation to these considerations, and aware of the merits of interventions based on autonomy support (Cheon, Reeve, Lee & Lee, 2018), and because it is still necessary to focus on the factors that participate in the cognitive and social processes that precede the occurrence of physical activity behavior, mainly because the majority of research based on the support to autonomy focuses only on the figure of the teacher as a source of influence, and because the number of investigations that include the family and the peer group is smaller, despite their demonstrated influence on the practice of physical activity. Specifically, parental influence is the least studied in current literature (Chu & Zhang, 2019). The aim of this study was to verify the effect of an educational program implemented with autonomy support and dialogic learning. We are unaware of any research that has been implemented for the purpose of simultaneously providing autonomy support and dialogic learning in students. It was expected that in the quasi-experimental group, this pedagogical approach would trigger greater satisfaction of the BPN, an increase in self-determined motivation in PE and in free time, an improvement in the variables of planned behavior, and finally an increase in intention and in real and perceived behavior.

METHOD

Participants

The initial sample of the study comprised 133 students, although it finally consisted of 102 students from fifth and sixth grade in primary school education with ages ranging from 10 to 13 ($M = 10.93$, $SD = 0.75$). Out of the whole group of participants, 50 were boys and 52 were girls. These students were from state schools which were close to each other and with

similar sociocultural characteristics. The sample was divided into two groups: intervention group ($n = 49$) and control group ($n = 53$).

Eligibility criteria and recruitment. Participants were recruited through purposeful sampling from two public schools. The eligibility criteria were: that the participants were between 10 and 13 years of age and that they had parental or guardian permission to participate. Of the 133 eligible participants, 102 completed the intervention.

Measures

Autonomy support. We used the autonomy support questionnaire translated into the Spanish language (Moreno, Parra & González-Cutre, 2008) from the *Perceived Autonomy Support Scale in Exercise Settings (PASSES)* by Hagger, Chatzisarantis, Hein, Pihu, Soós, and Karsai (2007). Three different factors were considered: teacher, family, and peer autonomy support. This scale contains 12 items for each dimension (e.g., "I feel that my teacher/ my classmates/ my parents provide me with different options on how to do physical activity in my free time"). The scale has a common stem question that uses the phrase "In my physical education classes..." responses were given on a Likert scale from 1 (*Totally disagree*) to 7 (*Totally agree*). Internal consistency for the scale in the pre-test and post-test was calculated with Cronbach's alpha, which was 0.83 and 0.94 for the teacher, 0.85 and 0.93 for peers, and 0.86 and 0.93 for family.

Basic psychological needs. We used the *Psychological Need Satisfaction in Exercise Scale (PNSE)* by Wilson, Rogers, Rodgers, and Wild (2006) adapted to the Spanish language and cultural context by Moreno-Murcia, Marzo, Martínez, and Conte (2011). The instrument includes 18 items grouped into three factors, each consisting of six items: (1) competence (e.g., "I believe I can complete the exercises which are a personal challenge"); (2) autonomy (e.g., "I believe that I can make decisions about my exercises"); (3) relatedness (e.g., "I believe I get on well with my classmates when we do exercise"). The questions are preceded by the phrase "In my physical education classes..." and responses were given on a Likert scale from 1 (*False*) to 7 (*True*). The internal consistency values obtained in the pre-test and post-test were 0.75 and 0.80 for competence, 0.70 and 0.81 for autonomy, and 0.74 and 0.72 for relatedness.

Motivation in physical education. The *Perceived Locus of Causality Scale (PLOC)* developed by Goudas, Biddle, and Fox (1994) and validated for the Spanish language and cultural context by Moreno, González-Cutre, and Chillón (2009) was used to assess this variable. This scale of 20 items measured motivation in PE lessons in five dimensions, each with four items: (1) intrinsic motivation (e.g., "because physical education is fun"); (2) identified motivation (e.g., "because I want to learn sports skills"); (3) introjected motivation (e.g., "because I would feel bad about myself if I didn't do it"); (4) external motivation (e.g., "because I'll have problems if I don't do it"); (5) amotivation (e.g., "I feel I'm wasting time in physical education lessons"). The scale opened with the sentence "I participate in physical education lessons..." and responses were given on a Likert scale from 1 (*Totally disagree*) to 7 (*Totally agree*). The total value of the self-determination index in PE was calculated by applying the following formula: $(2 \times (\text{Intrinsic Motivation}) + (\text{Identified Motivation}) - ((\text{External Motivation} + \text{Introjected Motivation})/2) - (2 \times \text{Amotivation}))$. Internal consistency in the pre-test and post-test was 0.80 and 0.77, 0.67 and 0.72, 0.67 and 0.69, 0.72 and 0.64, 0.66 and 0.81 respectively.

Motivation in exercise during free time. To measure motivation toward doing physical activity in free time, we used the *Scale of Behavioral Regulation in Exercise (BREQ-3)*, González-Cutre, Sicilia & Fernández-Balboa, 2010). The instrument was preceded by the phrase "I do exercise outside school..." and consisted of 24 items: (1) Four for intrinsic regulation (e.g., "because I enjoy it"); (2) Four for integrated regulation (e.g., "because it suits my life style"); (3) Three for identified regulation (e.g., "because it's important for me to do it regularly"); (4) Four for introjected regulation (e.g., "because I feel I've failed when I

haven't done it"); (5) Four for external regulation (e.g., "because they tell me I must do it"); (6) Four for amotivation (e.g., "I think it's a waste of time"). Responses were given on a Likert scale from 0 (*Not at all true*) to 4 (*Totally true*). The total value of the self-determination in free time index was calculated by applying the following formula: $(2 \times (\text{Intrinsic Motivation}) + ((\text{Identified Motivation} + \text{Integrated Motivation})/2) - ((\text{External Motivation} + \text{Introjected Motivation})/2) - (2 \times \text{amotivation}))$. Internal consistency of the dimensions in the pre and the post-test was 0.65 and 0.79, 0.74 and 0.80, 0.73 and 0.71, 0.65 and 0.73, 0.64 and 0.75, 0.71 and 0.82 respectively.

Planned behavior. The variables of planned action were measured with the questionnaire created by Tirado, Neipp, Quiles, and Rodríguez-Marín (2012). Sixteen items were chosen and grouped into three factors: (1) seven for attitude (e.g., "For me, doing exercise at least six times in the next two weeks would be..."); (2) for subjective norm (e.g., "The majority of people who are important to me think that I should do exercise at least six times in the next two weeks"); (3) five for behavioral control (e.g., "If I wanted to I could do exercise at least six times in the next two weeks"). The responses for the attitude factors were given by presenting two opposite adjectives for each item (e.g., "very bad-very good"), and answered on a Likert scale with a score from 1 for the most negative attitude (e.g., "Very unpleasant") to 7 for the most positive attitude (e.g., "Very pleasant"). For subjective norm and control factors all the questions were valued on a Likert scale with values between 1 (*Totally disagree*) and 7 (*Totally agree*), except for 1 item from the control factor, whose scale ranged between 1 (*No control at all*) and 7 (*A lot of control*). Internal consistency obtained for each variable in the pre-test and the post-test was 0.85 and 0.90, 0.72 and 0.87, 0.62 and 0.70, respectively.

Intention to be physically active. We used the *Intention to be Physically Active Scale* by Hein, Mür, and Koka (2004), translated into Spanish (MIFA; Moreno, Moreno & Cervelló, 2007). It comprised five items grouped into one variable: intention (e.g., "I regularly do sport in my free time"), and was preceded by the sentence "I respect your intention to do physical activity and sport..." The responses were given on a Likert scale from 0 (*Totally disagree*) to 5 (*Totally agree*). Internal consistency was 0.73 in the pre-test and 0.84 in the post-test.

Accelerometry. We also used the ActiGraph GT3X-plus accelerometer to measure the rate of exercise done by students. The accelerometer (ACL) stored the different levels of intensity of exercise following the recommendations by Evenson, Cattellier, Gill, Ondrak and McMurray (2008) to measure physical activity in schoolchildren. The ACL was programmed with the cut-off points: < 100 (sedentary activity); from 100 to 2295 (light); from 2296 to 4012 (moderate); > 4013 (vigorous). The levels of physical activity were shown in two ways: (1) mean physical activity, expressed as mean counts per minutes a day for each one of the intensities; and (2) the amount of time of light to vigorous activity (LV).

Procedure and research design

The research consisted of a quasi-experimental study with an intervention group and a control group. Two measures were carried out over time for both groups (pre-test and post-test) through questionnaires and accelerometry. The independent variables established for the study were based on an educational program in PE, entailing the implementation of an action called *interactive groups* (INCLUD-ED, 2012) through which autonomy support was developed by applying the principles of dialogic learning (Flecha, 1997). This program was completed by teaching family members and students about the different issues linked to physical activity and sport (González-Cutre, Ferriz & Beltrán-Carrillo, 2014). The intervention was directed at improving motivation in PE and promoting physical activity and sport in leisure time.

The teacher and the family members participating in the intervention were instructed according to the models proposed in the literature regarding autonomy support (Adapts instructions according to the students' progress, AISP) (Cheon *et al.*, 2018) and dialogic learning in PE (Capllonch & Figueras, 2012; Castro, 2015).

The study proposal was presented at two schools, and obtained the legal and administrative permits from the school counsel as well as from the families and the Project Evaluation Committee of the University Miguel Hernández of Elche (DPS/JMM.01.14). The students completed the questionnaires before and after the intervention.

The study took place in the schools over the course of 9 months from September to May 2017. The PE lessons for the groups consisted of a 10-minute warm-up, 40 minutes activity, and 10 minutes return to calm (two lessons a week). The two groups followed the same didactic units. During this time the intervention group received two PE lessons which lasted an hour each: a normal lesson with autonomy support and another lesson involving interactive groups with autonomy support. In both lessons the principles of dialogic learning were applied.

The lessons with interactive groups followed the structure of the Hellison model (1995): (1) *warm-up*: presentation of contents, reflection on desired behaviors, and tasks directed at the selected contents. The organization of the students varied according to the type of activity. The teacher guided the warm-up; (2) *main part*: the group-lesson was organized into four heterogeneous groups of 5–7 students. Four different activities were done simultaneously. The activities were guided by a different family-volunteer. The tasks lasted the same time, approximately 8–10 minutes. Once the activity finished, each group went to another space in an established order until all the activities were done; (3) *return to calm*: the groups made a self-evaluation guided by the last family-volunteer they had interacted with. They completed a record sheet directed at compliance with the principles of dialogic learning (e.g., cultural intelligence: “Do we find solutions by making the most of our classmates’ abilities?”). One student read the questions and a response was agreed on according to compliance with the principle indicated.

The *teacher’s role* was to coordinate the PE lessons and with the volunteers introduce strategies based on autonomy support from a dialogic learning perspective: handing over responsibility for learning to students, offering pupils the freedom to choose and to make decisions about what they were doing, using positive and affective communication or encouraging positive and interrogative feedback among others (Reeve & Cheon, 2016). This proposal was related to curriculum design based on physical-cognitive tasks and on cooperative work.

The *family-volunteers’ role* was focused on guiding the activity. To do this, tasks were introduced through questions, allowing space for equal dialogue oriented towards consensual decisions. The volunteers only intervened to offer help and to manage interactions: encouraging the participation of students with difficulties in social relations and regulating excessive influence from some students on the agreements reached.

Throughout the school year, five and three instructional sessions were also carried out for students and families from the intervention group, respectively. These sessions were supported by videos produced by a team of researchers who are experts in motivation and adherence to physical activity (González-Cutre *et al.*, 2014). The topics of these sessions addressed the negative effects of sedentary life; suggestions for engaging in physical activity; learning healthy habits through physical activity; identifying influential social agents for doing exercise; and sociocultural and media influences that affect physical activity and sport engagement. In accordance with the BCT protocol of Michie and colleagues (2013), the intervention focused on behavioral feedback, social support, tangible rewards, and incentives and demonstrations. These approaches were utilized in a combined way during the intervention. The reason for this selection was that these were consistent with the characteristics of an intervention with autonomy support.

These sessions consisted of 3 minutes’ introduction, 5 minutes’ projection and 15 minutes’ discussion. The discussions were developed through questions about the subjects presented (e.g., healthy habits: “What are the benefits of doing physical activity and sport?”). The students answered the researcher’s questions and had a discussion about them. The subjects dealt with in the talks with the families were those mentioned above and were grouped into one session. The same procedure was followed as in the sessions with the students.

In order to corroborate the effect of the intervention with respect to the perception of autonomy support generated by the teacher, family and peers as the trigger variables of the research model, a non-parametric test for

related samples was made (Wilcoxon). After the intervention, the results showed differences in the quasi-experimental group in autonomy support: teacher ($M_{\text{Test 1}} = 5.31$ and $M_{\text{Test 2}} = 5.87$; $p < 0.05$), family ($M_{\text{Test 1}} = 5.64$ and $M_{\text{Test 2}} = 5.99$; $p < 0.05$) and peers ($M_{\text{Test 1}} = 4.71$ y $M_{\text{Test 2}} = 5.27$; $p < 0.05$). In the control group no changes were observed in autonomy support by the teacher ($M_{\text{Test 1}} = 4.44$ and $M_{\text{Test 2}} = 4.61$; $p > 0.05$) and by the family ($M_{\text{Test 1}} = 4.97$ and $M_{\text{Test 2}} = 5.36$; $p > 0.05$), while differences were apparent in autonomy support by peers ($M_{\text{Test 1}} = 3.84$ and $M_{\text{Test 2}} = 4.35$; $p < 0.05$).

Data analysis

To verify the normal distribution of the sample a Kolmogorov–Smirnov (K-S) was performed. To observe the effect of the intervention (intra-group differences), a parametric test for related samples was conducted. The filtering of the data stored by the ACL was done using Actigraph software. The recorded raw data were processed through a digital filter which detected normal movement and filtered the high frequency accelerations (vibrations). The data linked to uninterrupted periods of 20 minutes of intensity 0 were excluded (Martínez-Gómez, *et al.*, 2010), duration of sedentary behavior was estimated as the time accumulated below 100 counts/minute (Matthews *et al.*, 2008). Each digitalized signal was accumulated over a 15-second interval of time (“epoch”), and at the end of each period the activity count was stored. The data analysis was carried out using the statistical program SPSS 21.0.

RESULTS

Preliminary analysis

According to the Kolmogorov–Smirnov test (K-S), the data showed a normal distribution in all the variables, except in the attitude variable, where significant differences appeared ($p < 0.05$) (Table 1).

Effects of the intervention. After the intervention, the parametric test (repeated measurement ANOVA) (Table 2) showed higher scores in the intervention group in: the basic psychological needs

Table 1. Preliminary data (intervention group and control group)

	Intervention group		Control group	
	M	SD	M	SD
Competence	3.75	1.00	4.54	0.94
Autonomy	2.65	0.75	2.92	0.91
Relatedness	3.87	0.57	3.98	0.91
Index of Self-determination (EF)	8.6	3.05	7.13	3.61
Index of Self-determination (Free T.)	10.31	3.30	8.69	3.79
Planned behavior				
Control	5.02	1.04	4.91	1.02
Attitude	5.78	1.13	6.12	1.05
Subjective norm	3.67	1.35	3.37	1.49
Intention	4.76	1.23	4.18	0.73
Rate of physical activity (Accelerometry)				
Time of sedentary activity	5092.63	501.20	5275.57	485.32
Time of light activity	4337.31	518.21	4098.28	470.05
Time of moderate activity	578.36	233.39	569.35	273.53
Time of vigorous activity	118.50	124.19	136.78	138.08
Time of global activity (LV)	4878.27	769.83	4804.42	485.32

Note: M = Mean; SD = Standard Deviation.

Table 2. Effects of the intervention for all variables (intervention group and control group)

		Intervention group					Control group				
		M	SD	Cohen's d	IC 95%	p	M	SD	Cohen's d	IC 95%	p
Competence	Pre	3.75	1.00	-1.35	(-1.54, -1.86)	0.001	4.54	0.94	0.07	(-0.09, 0.24)	0.378
	Post	4.98*	0.80				4.47	0.92			
Autonomy	Pre	2.65	0.75	-2.50	(-2.07, -1.50)	0.001	2.92	0.91	0	(-0.17, 0.18)	0.974
	Post	4.42*	0.66				2.92	1.03			
Relatedness	Pre	3.87	0.57	-0.78	(-1.11, -0.69)	0.001	3.98	0.91	-0.35	(-1.17, 0.17)	0.974
	Post	4.45*	0.87				4.40	1.43			
Index of Self-determination (EF)	Pre	8.61	3.05	-0.44	(-2.7, -0.09)	0.036	7.13	3.61	-0.02	(-1.7, 1.6)	0.948
	Post	10.21*	4.06				7.28	6.35			
Index of Self-determination (Free T.)	Pre	10.31	3.30	-0.32	(-1.75, 0.20)	0.049	8.69	3.79	0.13	(-0.93, 0.82)	0.411
	Post	11.34*	2.99				8.03	5.95			
Planned behavior		<i>M</i>	<i>SD</i>	<i>Cohen's d</i>			<i>M</i>	<i>SD</i>	<i>Cohen's d</i>		
Control	Pre	5.02	1.04	-0.38	(-0.58, 0.00)	0.049	4.91	1.02	-0.09	(-0.48, 0.16)	0.331
	Post	5.37*	0.77				5.01	1.11			
Attitude	Pre	5.78	1.13	-0.30	(-0.61, 0.01)	0.062	6.12	1.05	0.08	(-0.38, 0.51)	0.773
	Post	6.10	0.94				6.02	1.29			
Subjective norm	Pre	3.67*	1.35	-0.44	(-0.77, -0.02)	0.036	3.37	1.49	-0.04	(-0.64, 0.36)	0.576
	Post	4.11	0.32				3.45	1.75			
Intention	Pre	4.19	0.68	-0.67	(-0.40, 0.21)	0.535	4.18	0.73	0.10	(-0.28, 0.58)	0.560
	Post	4.58	0.46				4.09	1.04			
Rate of physical activity (Accelerometry)		<i>M</i>	<i>SD</i>	<i>Cohen's d</i>			<i>M</i>	<i>DT</i>	<i>Cohen's d</i>		
Time of sedentary activity	Pre	5092.63	501.20	0.56	(22.17, 564.78)	0.035	5275.57	485.32	-0.24	(-613.43, 330.43)	0.528
	Post	4765.68*	648.85				5417.07	643.32			
Time of light activity	Pre	4337.31	518.21	-0.51	(-477.35, -22.30)	0.033	4098.28	470.05	0.32	(-359.10, 909.95)	0.365
	Post	4623.54*	594.35				3822.85	1098.48			
Time of moderate activity	Pre	578.36	233.39	-0.25	(-144.16, 21.64)	0.140	569.35	273.53	0.27	(-170.27, 330.55)	0.501
	Post	639.68	247.10				489.21	313.05			
Time of vigorous activity	Pre	118.50	124.19	0.22	(-37.29, 77.03)	0.479	136.78	138.08	0.47	(-754.97, 326.54)	0.408
	Post	95.50	67.77				81.00	93.03			
Time of global activity (LV)	Pre	4878.27	769.83	-0.36	(-546.38, -2.04)	0.050	4804.42	485.32	0.24	(-330.43, 613.43)	0.528
	Post	5185.09	922.66				4662.92	643.32			

Note: ***n* < 0.01; **n* < 0.05; *M* = Mean; *SD* = Standard Deviation.

of competence ($p < 0.01$), autonomy ($p < 0.01$) and relatedness ($p < 0.01$), self-determined motivation in PE ($p < 0.01$) and in free time ($p < 0.01$), in factors of planned behavior of control ($p < 0.05$), attitude ($p < 0.05$) and intention ($p < 0.01$), in the rate of exercise measured by the accelerometer ($p < 0.05$): light, moderate and global, and lower scores in time of sedentary activity ($p < 0.05$).

DISCUSSION

In consideration of knowledge about the importance of teacher and parent support to contribute to beneficial learning outcomes in students, we tested the effects of an educational intervention based on a pedagogical approach that utilized autonomy support through dialogic learning in physical education lessons based and grounded in STD. The results revealed that the perception of autonomy support was positively associated with actual physical activity behavior and satisfaction of the basic psychological needs as well as students' physical activity motivation of students in PE

and in their free time. The variables of planned behavior and physical activity intention were mediators of these relationships. These findings suggest that support from teachers and dialogic learning opportunities involving the family are beneficial to the promotion of motivation in students and contributes to increased actual physical activity.

Therefore, the results of this study are in line with recent research studies that corroborated the effectiveness of interventions based on autonomy support (Cheon *et al.*, 2018; Escrivá-Bouley *et al.*, 2017). To be exact, after the intervention, the experimental group showed a positive relation between the perception of autonomy support and the satisfaction of the basic psychological needs, coinciding with previous studies in this field (Aelterman *et al.*, 2016; Férriz, González-Cutre, Sicilia & Hagger, 2015). In this way, the students from the intervention group felt more competent, autonomous and maintained a better relationship with the people they interacted with. Likewise, coinciding with other studies based on the SDT, satisfaction of the BPN was related to a greater self-determined motivation in PE lessons

(Leptokaridou, Vlachopoulos & Papaioannou, 2015; Wang, Betsy, Chia & Ryan, 2016) and a higher rate of exercise (Owen, Smith, Lubans, Ng & Lonsdale, 2014; Perlman, 2013; Van den Berghe, Vansteenkiste, Cardon, Kirk & Haerens, 2014).

Besides this, the results revealed a positive transference between self-determined motivation in PE and what the pupils manifested in extra-curricular activities linked to exercise (Vallerand, 2007). Apart from enhancing teaching actions through dialogic learning, the intervention also established a motivational nexus between contexts through the family, which was developed from the active participation of this agent in PE to instruction directed at socialization in beliefs and role models (González-Pienda *et al.*, 2002). In this same line of argument, due to the nature of dialogic learning, the feeling of acceptance and the valuation of the social interactions generated between peers could also be constituted as decisive to facilitating the promotion of physical activity and sport brought about by self-determined motivation (Ntoumanis, 2012). Therefore, a relevant result from this study is the positive effect of the active participation of family members, emphasizing the importance of the link between experiences of autonomy support in daily family life and an adaptive educational context (Duineveld, Parker, Ryan, Ciarroch & Salmela-Aro, 2017). To be exact, in this line, some longitudinal studies have demonstrated that there is a positive relation between the satisfaction of the BPN and adaptive adjustment in personal, social, and academic environments from the throughout academic life (Ratelle & Duchesne, 2014). For example, when parents support their children's feelings, children feel more capable of thinking independently and use more effort on tasks, which increases their sense of control (Feng *et al.*, 2019). In turn, actual behavioral tendencies should be strengthened.

Related to this, the study ratified that self-determination motivation in leisure time had a positive relation with the variables of planned behavior, since they triggered a greater intention to do physical activity and sport as indicated in previous research (Hagger & Chatzisarantis, 2009, 2016). In this sense, students who presented this motivational disposition showed a better *attitude*, a greater behavioral control regarding physical activity and sport, and greater intention to continue being active. As a result, the students from the intervention group decreased the time of sedentary activity and increased the time of light, moderate, and global activity. It is for this reason that the intervention carried out could favor the development of self-regulation habits related to an active lifestyle, as indicated in different studies (Fuchs, Seelig, Göhner, Schlatterer & Ntoumanis, 2016; Huéscar, Rodríguez-Marín, Cervelló & Moreno-Murcia, 2014).

To sum up, this study highlights the importance of integrating the constructs of autonomy support with those of dialogic learning in the design of interventions oriented toward the promotion of physical activity and sport at school age (Chatzisarantis, Kamarova, Kamabata, Wang & Hagger, 2015). However, the study presents some limitations. In the first place, the preliminary analysis showed between-group differences ($p < 0.05$) in some variables, which could influence the effect of the intervention. In future studies it would be interesting to standardize the initial conditions of the participating groups.

Another aspect to be considered is the use of qualitative techniques (e.g., discussion groups, interviews or observational methodology) in order to qualify the quantitative results obtained in this study. Finally, it would be interesting to include web-based solutions so that they can be cost-effective, convenient, and easily accessible while also affording attendees anonymity (Murray, 2012). In relation to new information technologies, a recent study has demonstrated the benefits of a web-based intervention program to enhance physical education teachers' autonomy-supportive behaviors and to minimize their controlling behaviors and further explorations of these approaches might be beneficial (Tilga, Hein & Koka, 2019).

We suspect that future research could identify additional benefits of greater autonomy support through dialogic learning, including areas such as prosocial behavior and student motivation to learn, or have implications for teacher's motivation to teach and experience well-being (Bartholomew, Ntoumanis, Cuevas-Campos & Lonsdale, 2014; Cheon *et al.*, 2018).

CONCLUSION

In sum, this study has examined for the first time the influence of autonomy support from the full spectrum of social agents (family, teacher, peers) including the benefits of dialogic learning approach in an experimental methodology, on the extent of physical activity and sport involvement in students through the satisfaction of basic psychological needs and intentionality toward practice, both within the educational context and in students' leisure time. The results from the experimental group in relation to the actual extent of sport and physical activity involvement are consistent with efforts to coordinate autonomy-supportive strategies within the family. The construction of an autonomous and cooperative learning space through *equitable dialogue* may be essential in contributing to greater perception of autonomy support in PE.

REFERENCES

- Aelterman, N., Vansteenkiste, M., Van den Berghe, L., De Meyer, J. & Haerens, L. (2014). Fostering a need-supportive teaching style: Intervention effects on physical education teachers' beliefs and teaching behaviors. *Journal of Sport & Exercise Psychology*, *36*, 595–609.
- Aelterman, N., Vansteenkiste, M., Van Keer, H. & Haerens, L. (2016). Changing teachers' beliefs regarding autonomy support and structure: The role of experienced psychological need satisfaction in teacher training. *Psychology of Sport and Exercise*, *23*, 64–72.
- Ajzen, I. (1985). From intentions to actions: A theory of planned behavior. In J. Kuhl & J. Beckman (Eds.), *Action-control: from cognition to behavior* (pp. 11–39). Heidelberg: Springer.
- American College of Sports Medicine (2000). *ACSM's guidelines for exercise testing and prescription* (6th ed). Philadelphia, PA: Lippincott, Williams & Wilkins.
- Bartholomew, K., Ntoumanis, N., Cuevas-Campos, R. & Lonsdale, C. (2014). Job pressure and ill-health in physical education teachers: The mediating role of psychological need thwarting. *Teaching and Teacher Education*, *37*, 101–107.
- Basson, M. & Rothmann, S. (2018). Antecedents of basic psychological need satisfaction of pharmacy students. The role of peers, family, lecturers and workload. *Research in social and Administrative Pharmacy*, *14*, 372–381.

- Cantú A., Castillo, I., López-Walle, J., Tristán, J. & Balaguer I. (2016). Estilo interpersonal del entrenador, necesidades psicológicas básicas y motivación: Un estudio en futbolistas universitarios mexicanos [Coach interpersonal style, basic psychological needs and motivation: A study in Mexican university soccer players.]. *Revista Iberoamericana de Psicología del Ejercicio y el Deporte*, *11*, 263–270.
- Capllonch, M. & Figueras, S. (2012). Educación física y comunidades de aprendizaje [Physical education and learning communities]. *Estudios Pedagógicos*, *38*, 231–247.
- Castro, M. (2015). Aprendizaje dialógico y educación física: Hacia una educación física y un deporte escolar promotores de salud, éxito escolar y cohesión social [Dialogic learning and physical education: Towards a physical education and a school sport promoting health, school success and social cohesion]. *Omnia Science*, *11*, 393–417.
- Chacón, R., Zurita, F., Castro, M., Espejo, T., Martínez-Martínez, A. & Linares, M. (2016). Estudio sobre la aplicabilidad de exámenes para la mejora de los índices de obesidad y la imagen corporal [Study on the applicability of exams to improve obesity rates and body image]. *Revista Iberoamericana de Psicología del Ejercicio y el Deporte*, *11*, 97–105.
- Chatzisarantis, N.L., Kamarova, S., Kamabata, M., Wang, J. & Hagger, M.S. (2015). Developing and evaluating utility of school-based intervention programs in promoting leisure-time physical activity: An application of the theory of planned behavior. *International Journal of Sport Psychology*, *46*, 95–116.
- Cheon, S.H., Reeve, J., Lee, Y. & Lee, J.W. (2018). Why autonomy-supportive interventions work: Explaining the professional development of teachers' motivating style. *Teaching and Teacher Education*, *69*, 43–51.
- Cheon, S.H., Reeve, J.M. & Moon, I.S. (2012). Experimentally based, longitudinally designed, teacher-focused intervention to help physical education teachers be more autonomy supportive toward their students. *Journal of Sport and Exercise Psychology*, *34*, 365–396.
- Cheon, S.H., Reeve, J. & Ntoumanis, N. (2018). A needs-based intervention to help PE teachers enhance student's prosocial behavior and diminish antisocial behavior. *Psychology of Sport and Exercise*, *35*, 74–88.
- Chu, A. & Zhang, T. (2019). The roles of coaches, peers, and parents in athletes' basic psychological needs: A mixed-studies review. *International Journal of Sports Science & Coaching*, *14*, 569–588.
- Deci, E.L. & Ryan, R.M. (1985). *Intrinsic motivation and self-determination in human behavior*. New York: Plenum.
- Deci, E.L. & Ryan, R.M. (2000). The "what" and "why" of goal pursuits: Human needs and the self-determination of behaviour. *Psychological Inquiry*, *11*, 227–268.
- Duineveld, J.J., Parker, P.D., Ryan, R.M., Ciarrochi, J. & Salmela-Aro, K. (2017). The link between perceived maternal and paternal autonomy support and adolescent well-being across three major educational transitions. *Developmental Psychology*, *53*, 1978–1994.
- Elboj, C., Puigdemívol, I., Soler, M., Valls, R. (2002). *Comunidades de aprendizaje. Transformar la educación [Learning communities Transform education.]*. Barcelona: Graó.
- Escriba-Boulley, G., Tessier, D., Ntoumanis, N. & Sarrazin, P. (2017). Need-supportive professional development in elementary school physical education: Effects of a cluster-randomized control trial on teachers' motivating style and student physical activity. *Sport, Exercise and Performance Psychology*, *7*, 228–234.
- Evenson, K.R., Cattellier, D., Gill, K., Ondrak, K.S. & McMurray, R.G. (2008). Calibration of two objective measures of physical activity for children. *Journal of Sports Sciences*, *26*, 1557–1565.
- Feng, X., Xie, K., Gong, S., Gao, L. & Cao, Y. (2019). Effects of parental autonomy support and teacher support on middle school students' homework effort: Homework autonomous motivation as mediator. *Frontiers in psychology*, *10*, 612.
- Férriz, R., González-Cutre, D., Sicilia, A. & Hagger, M.S. (2015). Predicting healthy and unhealthy behaviors through physical education: A self-determination theory-based longitudinal approach. *Scandinavian Journal of Medicine & Science in Sports*, *26*, 579–592.
- Flecha, R. (1997). *Compartiendo palabras [Sharing words]*. Barcelona: Paidós.
- Fuchs, R., Seelig, H., Göhner, W., Schlatterer, M. & Ntoumanis, N. (2016). The two sides of goal intentions: Intention self-concordance and intention strength as predictors of physical activity. *Psychology & Health*, *32*, 110–126. <https://doi.org/10.1080/08870446.2016.1247840>.
- Galíndez, E. & Carmona, L. (2016). ¿Se asocia la obesidad en la artritis psoriásica a una menor respuesta terapéutica y más efectos adversos con el tratamiento de fondo? [Is obesity in psoriatic arthritis associated with a lower therapeutic response and more adverse effects with background treatment?]. *Reumatología Clínica*, *12*, 307–312.
- Gillet, N., Huyghebaert, T., Barrault, S., Bucourt, E., Gimenes, G., Maillot, A. et al (2017). Autonomous and controlled reasons underlying self-approach and self-avoidance goals and educational outcomes. *Social Psychology of Education*, *20*, 179–193.
- González-Cutre, D., Férriz, R., Beltrán-Carrillo, V.J., Andrés-Fabra, J.A., Montero-Cartero, C., Cervelló, E. et al (2014). Promotion of autonomy for participation in physical activity: A study based on the trans-contextual model of motivation. *Educational Psychology*, *34*, 367–384.
- González-Cutre, D., Sicilia, A. & Fernández-Balboa, A. (2010). Hacia una mayor comprensión de la motivación en el ejercicio físico: medición de la regulación integrada en el contexto español [Towards a greater understanding of motivation in physical exercise: measurement of integrated regulation in the Spanish context]. *Psicothema*, *22*, 841–847.
- González-Piñeda, J.A., Núñez, J.C., González-Pumariega, S., Alvarez, L., Rocas, C., & García, M. (2002). A structural equation model of parental involvement, motivational and aptitudinal characteristic, and academia achievement. *The Journal of Experimental Education*, *70*, 257–287.
- Goudas, M., Biddle, S.J. & Fox, K. (1994). Perceived locus of causality, goal orientations and perceived competence in school physical education classes. *British Journal of Educational Psychology*, *64*, 453–463.
- Gunnell, K., Bélanger, M. & Brunet, J. (2016). A tale of two models: Changes in psychological need satisfaction and physical activity over 3 years. *Health Psychology*, *35*, 167–177.
- Haerens, L., Aelterman, N., Van den Berghe, L., De Meyer, J., Soenens, B. & Vansteenkiste, M. (2013). Observing physical education teachers' need-supportive interactions in classroom settings. *Journal of Sport and Exercise Psychology*, *35*, 3–17.
- Hagger, M.S. & Chatzisarantis, N.L.D. (2009). Integrating the theory of planned behaviour and self-determination theory in health behaviour: A meta-analysis. *British Journal of Health Psychology*, *14*, 275–302.
- Hagger, M.S. & Chatzisarantis, N.L. (2014). An integrated behavior change model for physical activity. *Exercise and Sports Sciences Reviews*, *42*, 62–69.
- Hagger, M.S. & Chatzisarantis, N.L. (2016). The trans-contextual model of autonomous motivation in education conceptual and empirical issues and meta-analysis. *Review of Educational Research*, *86*(2), 360–407.
- Hagger, M.S., Chatzisarantis, N.L., Hein, V., Pihu, M., Soós, I. & Karsai, I. (2007). The perceived autonomy support scale for exercise settings (PASSES): Development, validity and cross-cultural invariance in young people. *Psychology of Sport and Exercise*, *8*, 632–653.
- Hein, V., Müür, M. & Koka, A. (2004). Intention to be physically active after school graduation and its relationship to three types of intrinsic motivation. *European Physical Education Review*, *10*, 5–19.
- Hellison, D. (1995). *Teaching responsibility through physical activity*. Champaign, IL: Human Kinetics.
- Huésca, E., Rodríguez-Marín, J., Cervelló, E. & Moreno-Murcia, J.A. (2014). Teoría de la acción planeada y tasa de ejercicio percibida: Un modelo predictivo en estudiantes adolescentes de educación física [Theory of planned action and perceived exercise rate: A predictive model in teenage physical education students]. *Anales de Psicología*, *30*, 738–744.
- INCLUD-ED Consortium (2012) *Final Report. Strategies for inclusion and social cohesion in Europe from education*. Brussels: European Commission.

- INE (2016). *España en cifras*. Madrid: INE. Retrieved from <http://publicacionesoficiales.boe.es>.
- Kocken, P.L., Scholten, A.M., Westhoff, E., De Kok, B.P., Taal, E.M. & Goldbohm, R.A. (2016). Effects of a theory-based education program to prevent overweightness in primary school children. *Nutrients*, 8, 12–20.
- Leptokaridou, E., Vlachopoulos, S. & Papaioannou, A. (2015). Associations of autonomy competence and relatedness with enjoyment and effort in elementary school physical education: The mediating role of self-determined motivation. *Hellenic Journal of Psychology*, 12, 105–128.
- Martínez-Gómez, D., Ruiz, J.R., Ortega, F.B. et al (2010). Recommended levels of physical activity to avoid an excess of body fat in European adolescents: The HELENA Study. *American Journal of Preventive Medicine*, 39, 203–211.
- Matthews, C.E., Chen, K.Y., Freedson, P.S. et al (2008). Amount of time spent in sedentary behaviors in the United States, 2003–2004. *American Journal of Epidemiology*, 167, 875–881.
- Michie, S., Richardson, M., Johnston, M. et al (2013). The behavior change technique taxonomy (v1) of 93 hierarchically clustered techniques: Building an international consensus for the reporting of behavior change interventions. *Annals of Behavioral Medicine*, 46, 81–95.
- Moreno, J.A., González-Cutre, D. & Chillón, M. (2009). Preliminary validation in Spanish of a scale designed to measure motivation in physical education classes: The Perceived Locus of Causality (PLOC) Scale. *The Spanish Journal of Psychology*, 12, 327–337.
- Moreno, J.A., Moreno, R. & Cervelló, E. (2007). El autoconcepto físico como predictor de la intención de ser físicamente activo [The physical self-concept as a predictor of the intention to be physically active]. *Psicología y Salud*, 17, 261–267.
- Moreno, J.A., Parra, N. & González-Cutre, D. (2008). Influencia del apoyo a la autonomía, las metas sociales y la relación con los demás sobre la desmotivación en educación física [Influence of autonomy support, social goals and the relationship with others on demotivation in physical education]. *Psicothema*, 20, 636–641.
- Moreno-Murcia, J.A. & Huéscar, E. (2013). The importance of supporting adolescents' autonomy in promoting physical-sport exercise. *The Spanish Journal of Psychology*, 16, 9.
- Moreno-Murcia, J.A., Marzo, J.C., Martínez-Galindo, C. & Marín, L.C. (2011). Validación de la Escala de "Satisfacción de las Necesidades Psicológicas Básicas" y del Cuestionario de la "Regulación Conductual en el Deporte" al contexto español [Validation of the "Satisfaction of Basic Psychological Needs" Scale and the "Behavioral Regulation in Sport" Questionnaire in the Spanish context]. *RICYDE: Revista Internacional de Ciencias del Deporte*, 26, 355–369.
- Murillo, M., Sevil, J., Abós, A. & García-González, L. (2018). Análisis del compromiso deportivo de jóvenes waterpolistas: Un estudio basado en la teoría de la autodeterminación [Analysis of the sports commitment of young water polo players: A study based on the theory of self-determination]. *Revista Iberoamericana de Psicología del Ejercicio y el Deporte*, 13, 111–119.
- Murray, E. (2012). Web-based interventions for behavior change and self-management: Potential, pitfalls, and progress. *Medicine* 2.0, 1, e3.
- Nishimura, T. & Suzuki, T. (2016). Basic psychological need satisfaction and frustration in Japan: Controlling for the big five personality traits. *Japanese Psychological Research*, 58, 320–331.
- Ntoumanis, N. (2012). A review of self-determination theory in sport and physical education. In G. C. Roberts, & D. C. Treasure (Eds.), *Advances in Motivation in sport and exercise* (3rd ed., pp. 91–128). Champaign, IL: Human Kinetics.
- Owen, K.B., Smith, J., Lubans, D.R., Ng, J.Y. & Lonsdale, C. (2014). Self-determined motivation and physical activity in children and adolescents: A systematic review and metaanalysis. *Preventive medicine*, 67, 270–279.
- Perlman, D.J. (2013). The influence of the social context on students' in-class physical activity. *Journal of Teaching in Physical Education*, 34, 46–60.
- Ratelle, C. F. & Duchesne, S. (2014). Trajectories of psychological need satisfaction from early to late adolescence as a predictor of adjustment in school. *Contemporary Educational Psychology*, 39 (4), 388–400.
- Reeve, J. (2009). Why teachers adopt a controlling motivating style toward students and how they can become more autonomy supportive. *Educational Psychologist*, 44, 159–175.
- Reeve, J. & Cheon, S.H. (2016). Teachers become more autonomy supportive after they believe it is easy to do. *Psychology of Sport and Exercise*, 22, 178–189.
- Ryan, R.M. & Deci, E.L. (2017). *Self-determination theory: Basic psychological needs in motivation, development, and wellness*. New York: Guilford Publishing.
- Schneider, S., Nebel, S., Beege, M. & Rey, G. D. (2018). The autonomy-enhancing effects of choice on cognitive load, motivation and learning with digital media. *Learning and Instruction*, 58, 161–172.
- Su, Y.L. & Reeve, J. (2011). A meta-analysis of the effectiveness of intervention programs designed to support autonomy. *Educational Psychology Review*, 23, 159–188.
- Tilga, H., Hein, V. & Koka, A. (2019). Effects of a web-based intervention for PE teachers on students' perceptions of teacher behaviors, psychological needs, and intrinsic motivation. *Perceptual and Motor Skills*, 126, 559–580.
- Tirado, S., Neipp, M.C., Quiles, Y. & Rodríguez-Marín, J. (2012). Development and validation of the theory of planned behaviour questionnaire in physical activity. *Spanish Journal of Psychology*, 15, 801–816.
- Trigueros, R., Aguilar-Parra, J. M., Cangas, A. J., López-Liria, R. & Álvarez, J. F. (2019). Influence of physical education teachers on motivation, embarrassment and the intention of being physically active during adolescence. *International Journal of Environmental Research and Public Health*, 16, 2295.
- Vallerand, R.J. (2001). A hierarchical model of intrinsic and extrinsic motivation in sport and exercise. In G.C. Roberts (Ed.), *Advances in motivation in sport and exercise* (pp. 263–319). Champaign, IL: Human Kinetics.
- Vallerand, R.J. (2007) Intrinsic and extrinsic motivation in sport and physical activity. A review and a look at the future. In G. G. Tenenbaum & R.C. Eklund (eds), *Handbook of sport psychology* (3th ed; pp. 59–83) New York: John Wiley.
- Van den Berghe, L., Vansteenkiste, M., Cardon, G. Kirk, D. & Haerens, L. (2014). Research on self-determination in physical education: Key findings and proposals for future research. *Physical Education and Sport Pedagogy*, 19, 97–121.
- Wang, C.K., Liu, W.C., Kee, Y.H. & Chian, L.K. (2019). Competence, autonomy, and relatedness in the classroom: understanding student's motivational processes using the self-determination theory. *Heliyon*, 5, e01983.
- Wang, J.C.K., Ng, B.L., Liu, W.C. & Ryan, R.M. (2016). Can Being autonomy-supportive in teaching improve students' self-regulation and performance?. In W. C. Liu , J. C. K. Wang & R. M. Ryan(Eds.), *Building autonomous learners: Perspectives from research and practice using self-determination theory* (pp. 227–243). Singapore: Springer.
- WHO (2010) *Recomendaciones mundiales sobre actividad física para la salud [Global recommendations on physical activity for health]*. Retrieved from http://whqlibdoc.who.int/publications/2010/9789243599977_spa.pdf.
- Wilson, P.M., Rogers, W.T., Rodgers, W.M. & Wild, T.C. (2006). The psychological need satisfaction in exercise scale. *Journal of Sport and Exercise Psychology*, 28, 231–251.
- Wing, E., Bélanger, M. & Brunet, J. (2016). Linking Parental influences and youth participation in physical activity in and out of school: The mediating role of self-efficacy and enjoyment. *American Journal of Health Behavior*, 40, 31–37.
- Wood, C. & Hall, K. (2015). Physical education or playtime: Which is more effective at promoting physical activity in primary school children? *BMC Research Notes*, 8, 1–5.
- Yu, S., Levesque, C.S. & Maeda, Y. (2018). General need for autonomy and subjective well-being: A Meta-analysis of studies in the US and East Asia. *Journal of Happiness Studies*, 19, 1863–1882.

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