

Self-efficacy, self-regulation and cooperative learning in Secondary Education Spanish and Portuguese students

Autoeficacia, autorregulación y aprendizaje cooperativo en estudiantes españoles y portugueses de Educación Secundaria

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ABSTRACT

International reports show better academic results and less drop-out in the in the neighboring Portugal than in Spain, but these comparisons should be considered carefully. Data which reflect students' own perceptions on significant pedagogical and psychological variables for learning are needed. The goal of this study was to compare two similar groups of Portuguese and Spanish students concerning their academic self-efficacy, self-regulated learning, and cooperative learning, through an ex post facto research design. A total of 1619 students (816 Portuguese, 795 Spanish), enrolled in 27 different schools, in Spain and Portugal, participated in this study. Age ranged from 12 to 17 years old. Inclusion criteria for participation in the study included nationality, age, academic degree and having had, in the last six months, cooperative learning. The multivariate linear general model showed significant differences based on country, sex and age. Portuguese students scored significantly higher in interpersonal skills, group processing and positive interdependence, while Spanish students scored higher in individual accountability, academic self-efficacy and self-regulated learning prior, during and after. Women scored significantly higher in all the variables except academic self-efficacy. Regarding age, as it increases the scores decrease in promotiveinteraction, academic self-efficacy and self-regulated learning prior, during and after. Finally, the generalized linear model showed that group processing and the three dimensions of self-regulated learning predicted academic self-efficacy. In conclusion, Portuguese students perceived that cooperative learning was more intensely promoted in their classes and the Spanish students showed stronger academic self-efficacy and self-regulated learning, which contradicts the worst results obtained in the latest PISA reports. These students could suffer the "Dunning-Kruger" effect and not be aware of the knowledge they lack.

Keywords: self-regulation, self-efficacy, cooperative learning, performance

RESUMEN

Los informes internacionales muestran resultados académicos y de abandono escolar mucho más positivos en la vecina Portugal que en España, pero las comparaciones deben tomarse con precaución. Son necesarios datos que reflejen las percepciones de los propios estudiantes sobre variables pedagógicas y psicológicas significativas para el aprendizaje. El objetivo de esta investigación fue comparar dos poblaciones similares de estudiantes de Portugal y de España en relación a la autoeficacia académica, el aprendizaje autorregulado y el aprendizaje cooperativo. Se siguió un diseño de investigación ex post facto prospectivo. Un total de 1619 estudiantes (816 portugueses, 795 españoles), enrolados en 27 centros educativos distintos de España y Portugal participaron. Sus edades oscilaron entre los 12 y los 17 años. El único requisito para participar era que hubieran experimentado en sus clases aprendizaje cooperativo en los últimos seis meses. El modelo lineal general multivariante mostró diferencias en función del país, sexo y edad. Los estudiantes portugueses puntuaron más alto en habilidades sociales, procesamiento grupal e interdependencia positiva,

mientras que los españoles lo hicieron en responsabilidad individual, autoeficacia académica y autorregulación antes, durante y después. Las mujeres puntuaron significativamente más alto en todas las variables, salvo en autoeficacia académica en la que no hubo diferencias. Respecto a la edad, según aumenta esta más disminuyen las puntuaciones en interacción promotora, autoeficacia académica y autorregulación antes, durante y después. Finalmente, el modelo lineal generalizado mostró que el procesamiento grupal y las tres dimensiones de autorregulación del aprendizaje predijeron la autoeficacia académica. En conclusión, los estudiantes portugueses percibieron que en sus clases se trabajaba de una manera más intensa el aprendizaje cooperativo. Los españoles presentaron una mayor autoeficacia académica y una mayor autorregulación del aprendizaje, lo que contradice los peores resultados obtenidos en los últimos informes PISA. Estos estudiantes podrían sufrir el efecto “Dunning-Kruger” y no ser conscientes de los conocimientos que les faltan.

Palabras clave: autorregulación, autoeficacia, aprendizaje cooperativo, rendimiento

INTRODUCTION

Currently, cooperative learning is one of the most widely used methodological approaches concerning educational context in many countries. Despite this success, this pedagogical model is much more complex than simply putting a group of students to work together in solving a task (Khun, 2015). There are five elements that mediate the effectiveness of cooperative learning in any educational context (Johnson & Johnson, 2018): a) Positive interdependence: the members of a group achieve the group's goal only if all of them achieve it; b) Individual accountability: each component of a group must be responsible for at least part of the group's work; c) Face-to-face promotive interaction: group members should support each other during task accomplishment; d) Group processing: the group should evaluate its functioning to decide which elements should remain and which should be changed; and e) Social skills: group members learn skills such as sharing, encouraging, taking turns or debating. In recent years, different reviews and meta-analyses have shown the effectiveness of this methodological approach to promote student learning in different contexts, educational levels and subjects around the world, which shows its goodness (Kumar, 2017). However, in cooperative learning groups, interactions give rise to co-regulation processes, which can range from one person adopting a leading role to a shared leadership situation where several regulate interactions in an equitable manner (Hadwin et al., 2018). Thus, there appears to be a connection between cooperative learning and self-regulation in learning, as those students in classes where effective cooperative learning contexts were identified showed higher levels of self-regulation and motivation (Rowntree, 2018).

Zimmerman (2002) defines self-regulation of learning as a self-directed process through which individuals transform their cognitive abilities into academic skills.

A well self-regulated learner will use many strategies to effectively solve different problems in order to learn, while restructuring their thoughts, feelings, and behaviors to optimize learning (Colthorpe et al., 2015). In a recent review, Cousins et al. (2022) pointed out the benefits of interventions based on self-regulation of learning in all grades of primary and secondary education, with positive results of school performance even in the long term. Different authors have put forward different explanatory theories of self-regulation of learning, but the most widely used is that of Zimmerman based on socio-cognitive models that conceptualize effective learning as a cyclical process of evaluation and cognition during academic activities. Thus, this process is driven by metacognition, adaptability and motivation (Panadero, 2017). In the cognitive-social perspective of Zimmerman's Self-Regulation Theory, three cyclical phases are discussed: 1. Foresight (Forethought): analysis of the task, setting goals and planning strategies to achieve them; 2. Performance (Performance): performance of the task, observation of performance and use of self-monitoring strategies to achieve goals (focus of attention, visualization); and 3. Self-reflection: self-evaluation (the individual compares his performance with a standard: previous experiences, his peers; and causal attribution: the causes of his successes or failures) and self-reaction: how satisfied he is with the outcome (self-satisfaction) and how he decides to adapt his learning strategies. The forecasting phase includes self-efficacy, as it contributes to analyze the degree of expected effort and difficulty, but self-efficacy is not only part of self-regulation but also an important motivational construct.

Self-efficacy can be defined as the personal belief in one's abilities to perform a task (Bandura, 1999). It develops from four main sources (Artino, 2012): a) one's performance over time, b) comparison of one's own performance with that of others, c) social support from others, d) affective and physiological state. Its development seems necessary, as research has shown a positive correlation between high self-efficacy and academic performance (Komarraju & Nadler, 2013), but much stronger and negative correlation between low self-efficacy and academic performance (Burgoon et al., 2012). In a recent review conducted in educational contexts, Patricio-Gamboa et al. (2022) found that self-efficacy is positively related to students' motivation, attitudes, and academic performance. Educators can develop it by providing multiple opportunities for successful educational experiences among their students in different subjects, since self-efficacy is not general, but related to a specific content/context and is associated with student engagement, learning style, study habits (related to self-regulation) and even personality (Khine & Nielsen, 2022).

The latest international reports point out that the Spanish student population must improve its academic results in language and math skills (OECD, 2016). International tests such as the PISA reports aim to make comparisons between

countries and what better than to make this comparison between two “brother” countries, such as Portugal and Spain, which have geographical, cultural and linguistic proximity. In a recent analysis of the evolution of the international indicators of both countries in the last 10 years, López and García (2020) point out that while Portugal is below in wealth and socioeconomic and cultural status, it is well above in spending per student, in all indicators of educational results and in educational policies, while Spain is once again clearly outstanding in school dropout, NiNis (Neither study nor work rate and risk of poverty and social exclusion. However, results and comparisons should be taken with caution when making changes (Rutkowski & Rutkowski, 2016), since models that work in one context must be adapted to the conditions of the context where they are to be implemented in order to have a chance of success (Caballero-García, 2010). For this, other types of data are needed that reflect the perceptions of the students themselves on methodological approaches and psychological and pedagogical variables that are significant for learning, such as those reviewed above. Moreover, sometimes the results of certain studies can be misleading, because many students overestimate their performance because they are unaware of their limitations. This discrepancy between perceived and actual performance is called the “Dunning-Kruger effect” (Kruger & Dunning, 1999) and those who suffer from it are characterized by being unaware of their missing knowledge or miscalibrate their abilities (Jansen et al., 2021).

Based on the above, the main objective of the present research was to compare two similar populations of students from Portugal and Spain in relation to their academic self-efficacy, self-regulated learning and cooperative learning. The second objective was to test whether gender or age influenced these interactions. The third and last objective was to check how the three variables under study interacted in the overall sample. Based on these objectives, the following hypotheses were established: H1: the Portuguese population will present higher values in academic self-efficacy, self-regulated learning and cooperative learning; H2: the values of the variables under study will decrease with age, but will be similar in men and women; and H3: cooperative learning and self-regulation will influence academic self-efficacy.

METHOD

Participants

A total of 1619 students (816 Portuguese and 795 Spanish), enrolled in 29 different educational centers in Spain and Portugal, agreed to participate (Table 1). All the participating schools were public and were distributed from north to south of the geography of both countries: north: 6 Portugal, 4 Spain; center: 4 Portugal, 3 Spain; south: 3 Portugal, 3 Spain; islands: 4 Portugal, 2 Spain. The ages of the participants ranged from 12 to 17 years ($M = 14.96$, $SD = 1.49$). Inclusion criteria for participation in the study included nationality, age, academic degree and having had, in the last six months, cooperative learning. The type of sampling used was non-probability sampling by convenience and with voluntary inclusion (Cohen et al., 2011).

Table 1
Sample Distribution by Country, Age and Gender

Age	Spain			Portugal		
	Total	Male	Woman	Total	Male	Woman
12 years	39	22	17	39	22	17
13 years	107	56	51	112	57	55
14 years	132	71	61	143	72	71
15 years	216	92	124	206	94	112
16 years	187	87	100	192	83	109
17 years	114	58	56	124	68	56

The analyses carried out showed that the samples from both countries were homogeneous regarding age: $\chi^2(1, 1619) = .324$, sex: $\chi^2(1, 1619) = .415$, type of school: all were public schools and participating grades: from 1st year of Secondary Education to 2nd year of Baccalaureate (as can be seen in Table 1).

Instruments

Cooperative Learning. The 15 items (three per factor) of the Cooperative Learning Questionnaire (Fernandez-Río et al., 2017b) were used. The scale consists of five dimensions: Social Skills (SS; e.g. "We work on dialogue, listening skills and/

or debate”), Group Processing (PG; e.g., “We make common postings so that the whole group knows what is being done”), Positive Interdependence (PI; e.g. “It is important to have help from my peers to complete tasks”), Promotive Interaction (PI; e.g. “Group mates interact and interact during tasks”), and Individual Accountability (RI; e.g. “Each group member should participate in group tasks”). The response format selected was the 5-point Likert scale (from one = strongly disagree, to five = strongly agree). A common text was added to all items at the beginning of the questionnaire: “In class...”. To the best of our knowledge, this is the first work aiming to validate this instrument to Portuguese, having the guidelines of Muñiz et al. (2013) been followed. Two bilingual experts worked independently to perform a double translation process with reconciliation. Subsequently, a mixed committee evaluated the suitability of both versions. Finally, a pilot test was conducted with a small sample of Portuguese students to identify any irregularities in comprehension. Cronbach’s alphas for the Spanish population (in parentheses, the Portuguese) were all acceptable as follows: HS = .72 (.73), PG = .71 (.70), IP = .71 (.72), INP = .73 (.74), and RI = .72 (.73). *Self-regulated learning*. The Study Control Strategies Questionnaire (ECE, Hernández & García, 1995) was used to assess learning self-regulation and includes three subscales: before the study period or learning task (seven items, e.g. “Before I start studying I usually consider what I have to study, what activities I have to do and how much time I have to dedicate”), during the study period or the learning task (six items, e.g. “If there is something I don’t understand or I don’t know how to do it I try not to continue until I can solve it”), and after the study period or learning task (four items, e.g. “When I have finished studying, I have the habit of doing a review of everything to see if I have any failures”). The response format selected was a 5-point Likert scale (from one = strongly disagree, to five = strongly agree). As no study was found to have validated this instrument, the same process described in the previous one was performed (Muñiz et al., 2013). Cronbach’s alphas for the Spanish population (Portuguese in parentheses) were acceptable as follows: before: .84 (.83), during: .74 (.76) and after: .75 (.80). *Academic self-efficacy*. The five items of the General Academic Self-Efficacy Scale, created by Torre (2006), were used. This scale has a unidimensional structure that directly assesses the construct (e.g. “I consider myself with sufficient ability to pass the subjects of this course without difficulty”). The response format selected was the five-point Likert scale (from one = strongly disagree to five = strongly agree). As happened in the previous instruments, since no study was found to have validated this instrument for these age groups in Portuguese, the procedure described above was followed (Muñiz et al., 2013). Cronbach’s alpha for the Spanish population (in parentheses, the Portuguese) was both acceptable as follows: .85 (.84).

With all the data obtained, a confirmatory factor analysis (CFA) was performed on all the instruments used in both languages. Multivariate normality was

previously examined and the kurtosis coefficients indicated that the samples had a non-normal distribution (Mardia, 1974). For this reason, the EQS 6.2 program was used and an analysis based on the use of the Satorra-Bentler chi-square statistic ($S-B\chi^2$; Satorra and Bentler, 1994) and robust standard estimators, instead of the usual maximum likelihood chi-square statistic ($ML\chi^2$), was performed, as it serves as a correction for χ^2 when distributional assumptions are violated. Thus, research has shown that kurtosis severely affects tests of variances and covariances (DeCarlo, 1997). In particular, multivariate kurtosis is exceptionally detrimental to parameter estimation in SEM analysis (Byrne, 2008). The assessment of the goodness of fit of the data was determined based on multiple criteria (Byrne, 2008): the *CFI (Comparative Fit Index) was used as an incremental fit index and the *RMSEA (Root Mean Square Error Approximation; Browne and Cudeck, 1993) and the SRMR (Standardized Root Mean Square Residual) were used as measures of the absolute fit indices that determine the degree to which the model predicts the covariance matrix. The *CFI represents the robust version of the CFI, which is calculated based on the $S-B\chi^2$ statistic. Hu and Bentler (1999) suggest a value of .95 as indicative of good fit. The *RMSEA is a robust version of the RMSEA as it takes into account the approximation error in the population. This discrepancy is expressed per degree of freedom, so it is sensitive to the complexity of the model; values below .05 indicate a good fit and values as high as .08 represent reasonable approximation errors. The 90% confidence interval provided by the *RMSEA was also included to complete the analysis. Finally, the SRMR was provided, with a value below .08 indicating a good fit (Hu & Bentler, 1999). All the fit indices showed that the scales were well adjusted to the data obtained, so that the instruments used presented adequate psychometric properties, both in Spanish and Portuguese (Table 2).

Procedimiento

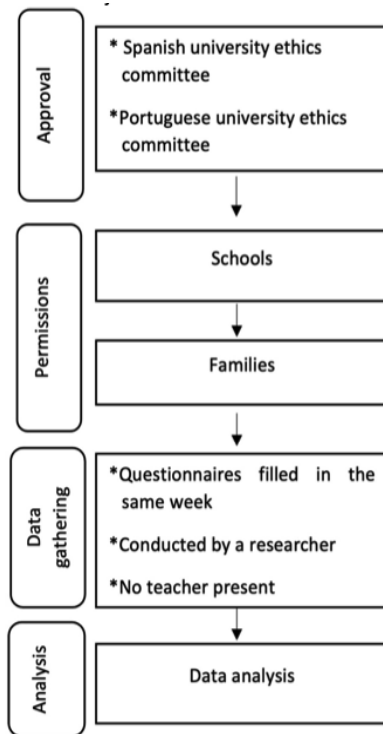
The present study followed a prospective ex post facto research design (Akinlua, 2019). This type of study includes those in which the independent variable cannot be manipulated and cause-effect relationships cannot be derived, because there are no pretest data. In the present case, a group of participants who possess a common characteristic, having experienced cooperative learning techniques, are evaluated taking into consideration other variables. All data were obtained at a single point in the academic year, during the second evaluation, to ensure that students would have had enough time to generate a stable opinion about their classes (Figure 1). First, the project obtained approval from the first author's university ethics committee in Spain (23/2021) and the third author's university ethics committee in Portugal (12/2021). Secondly, the researchers contacted different schools in their geography to explain the work to be carried out and to obtain their permission to

contact the families. Finally, in those schools that gave their approval, the project was explained to the students and families, and those interested completed and signed an informed consent form before beginning their participation in the study. All participants were treated following the ethical considerations of the American Psychological Association (2010): voluntary participation, anonymity in the responses, total confidentiality, freedom to leave the study at any time, and no influence of the responses on the students' grades. A data collection protocol was designed so that data collection would be similar in all schools and would be carried out in the same week. A member of the research team directed the data collection in each school, in which no teacher from the group-class was present (so as not to influence the participants).

Table 2
Questionnaire Adjustment Ratios

	S-B χ^2	d.f.	*CFI	*RMSEA (95% IC)	SRMR
Cooperative learning (Spanish)	240.77***	80	.945	.050 (.043-.058)	.041
Cooperative learning (Portuguese)	153.67*	80	.963	.034 (.025-.041)	.035
Self-regulated learning (Spanish)	27.03***	5	.975	.074 (.048-.103)	.032
Self-regulated learning (Portuguese)	14.79*	5	.991	.049 (.021-.079)	.021
Academic Self-Efficacy (Spanish)	233.66***	116	.968	.036 (.029-.042)	.035
Academic self-efficacy (Portuguese)	324.04***	116	.950	.042 (.035-.048)	.035

Note. S-B χ^2 : Satorra-Bentler chi-square; d.f.: degrees of freedom; CFI: Comparative Fit Index; RMSEA: Root Mean Square Error Approximation; CI: Interval Confidence; SRMR: Standardized Root Mean Square Residual; * $p < 0.05$; *** $p < 0.001$.

Figure 1*Procedures' flowchart*

Data analysis

First, descriptive and inferential analyses (independent samples *t*-test) were performed to compare the results of both countries (H1). Second, in order to determine the differences in the variables analyzed according to country, sex and age of the students (H2), a general multivariate analysis was performed, taking the variables explaining cooperative learning, academic self-efficacy and self-regulation of learning as dependent variables, sex and country as factors and age as a covariate. Finally, to determine the variables explaining academic self-efficacy (H3), a generalized linear model was tested taking academic self-efficacy as the dependent variable and the rest as independent variables. Covariates were incorporated until no further improvement of the model was obtained. Non-significant variables were eliminated to avoid over-parameterization (Hocking, 1976), which could dilute other effects. The model that minimized the variance of the residuals was chosen as the most appropriate and was considered a robust estimate when there was suspicion

of heteroscedasticity. The Omnibus test was then used to interpret the results. The results were considered significant at $p < .05$.

RESULTS

Descriptive statistics

Responding to H1, in Portuguese students, the highest scores are observed in social skills and positive interdependence scales, while the lowest scores appear in academic self-efficacy and in the three dimensions of self-regulation of learning. In Spanish students, the highest scores are observed in the responsibility and academic self-efficacy scales and the lowest scores in positive interdependence (Table 3).

Table 3
Descriptive Statistics

	Portugal		Spain		ES
	M	DT	M	DT	
Social skills	3.92***	.62	3.58	.81	.47
Group processing	3.71***	.61	3.54	.79	.24
Positive interdependence	3.87***	.62	3.36	.89	.66
Promotive interaction	3.62	.66	3.61	.82	.01
Individual accountability	3.71	.60	3.96***	.88	-.33
Academic self-efficacy	3.24	.68	3.77***	.74	-.75
Self-regulation before	3.53	.76	3.70***	.83	-.21
Self-regulation during	3.49	.60	3.64***	.69	-.23
Self-regulation after	3.49	.78	3.63***	.85	-.17

Note. M: Mean; SD: Standard deviation; ES: Effect size.

*** $p < 0.001$.

General multivariate analysis

Responding to H2, the multivariate general linear model showed differences as a function of country: Wilks' Lambda = .648, $F(9, 1598) = 96.39$, $p < .001$, $\eta^2 = .35$, sex: Wilks' Lambda = .920, $F(9, 1598) = 15.47$, $p < .001$, $\eta^2 = .08$, age: Wilks' Lambda = .980, $F(9, 1598) = 3.64$, $p < .001$, $\eta^2 = .02$ and country*sex interaction: Wilks' Lambda = .956, $F(9, 1598) = 8.27$, $p < .001$, $\eta^2 = .04$.

The following univariate analyses showed significant differences, as a function of country, in all variables except positive interdependence: $F(1, 1606) = .029$, $p = .429$, $\eta^2 = .000$ (Figures 2 and 3). Portuguese students scored higher in social skills: $F(1, 1606) = 82.95$, $p < .001$, $\eta^2 = .049$, group processing: $F(1, 1606) = 23.78$, $p < .001$, $\eta^2 = .015$ and positive interdependence, $F(1, 1606) = 178.65$, $p < .001$, $\eta^2 = .100$ while Spanish students did so in individual accountability: $F(1, 1606) = 43.33$, $p < .001$, $\eta^2 = .026$, academic self-efficacy: $F(1, 1606) = 216.94$, $p < .001$, $\eta^2 = .119$, self-regulation before: $F(1, 1606) = .21.03$, $p < .001$, $\eta^2 = .013$, self-regulation during: $F(1, 1606) = 20.99$, $p < .002$, $\eta^2 = .013$ and self-regulation after: $F(1, 1606) = 13.63$, $p < .001$, $\eta^2 = .008$ (Table 4).

Figure 2

Dimensions of Cooperative Learning in Portugal and Spain

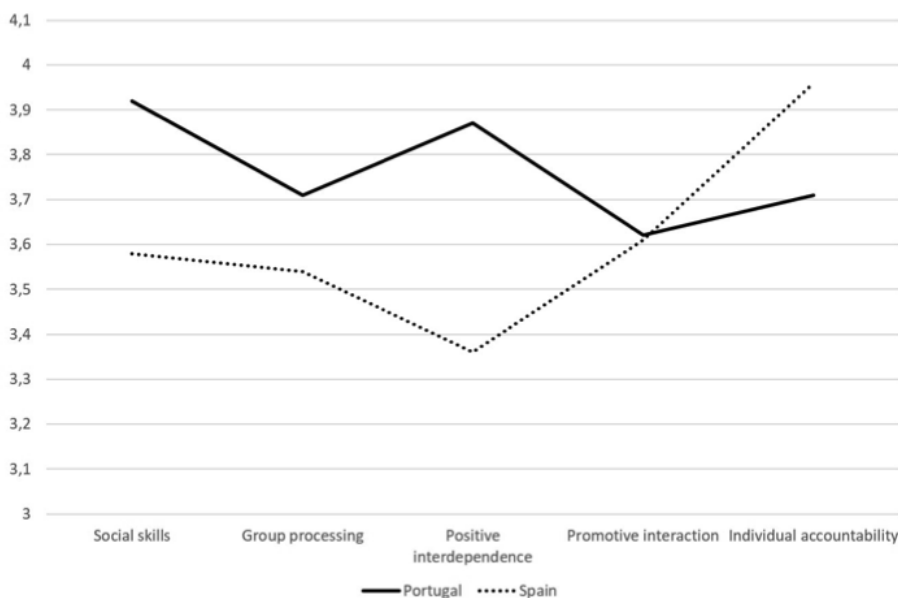
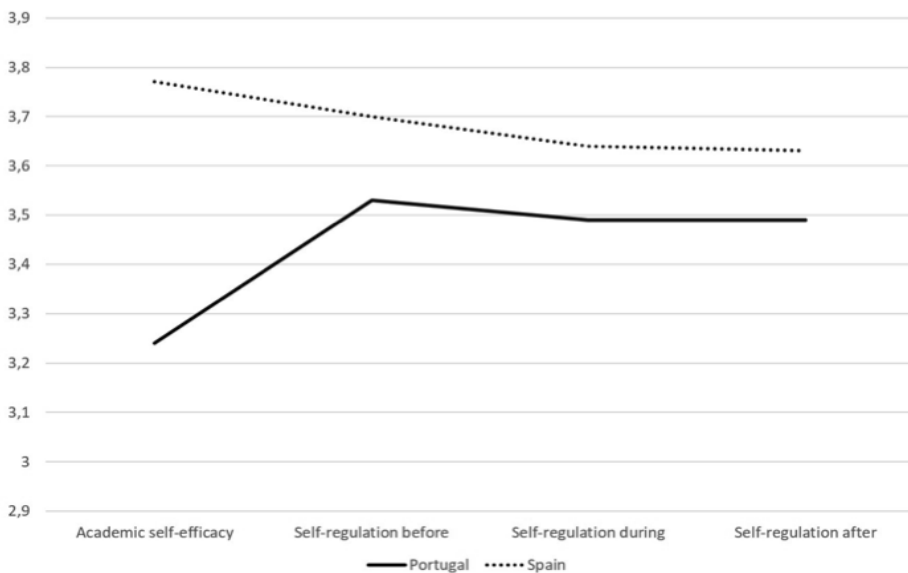


Table 4
General Multivariate Analysis. Mean Scores and Standard Errors of the Variables under Study in Relation to the Variables Used as Factors

	Country				Sex				Age											
	Portugal		Spain		Male		Woman		12	13	14	15	16	17						
	M	EE	M	EE	M	EE	M	EE	M	EE	M	EE	M	EE						
Social Skills	3.93	.02	3.60	.03	3.71	.02	3.82	.03	3.86	.08	3.76	.04	3.66	.04	3.79	.03	3.68	.03	3.83	.04
Group Processing	3.73	.02	3.55	.02	3.59	.02	3.69	.03	3.78	.08	3.67	.04	3.54	.04	3.68	.03	3.52	.03	3.65	.04
Positive interdependence	3.88	.03	3.41	.03	3.59	.03	3.69	.03	3.81	.08	3.65	.05	3.58	.04	3.61	.03	3.53	.03	3.67	.05
Promotive interaction	3.64	.03	3.63	.03	3.58	.03	3.69	.03	3.73	.08	3.69	.05	3.62	.04	3.64	.03	3.51	.03	3.62	.04
Individual accountability	3.72	.03	4.01	.03	3.80	.03	3.93	.03	4.03	.08	3.87	.05	3.79	.04	3.81	.03	3.79	.03	3.90	.04
Academic self-efficacy	3.28	.02	3.81	.02	3.56	.02	3.53	.03	3.75	.08	3.57	.04	3.53	.04	3.46	.03	3.47	.03	3.47	.04
Self-regulation before	3.50	.03	3.78	.03	3.45	.03	3.82	.03	3.88	.08	3.75	.05	3.55	.04	3.62	.03	3.57	.04	3.46	.05
Self-regulation during	3.46	.02	3.69	.02	3.50	.02	3.64	.02	3.66	.07	3.65	.04	3.57	.03	3.57	.03	3.53	.03	3.46	.04
Self-regulation after	3.45	.03	3.70	.03	3.42	.03	3.73	.03	3.77	.09	3.61	.05	3.55	.04	3.60	.03	3.55	.04	3.39	.05

Figure 3*Academic Self-Efficacy and Self-Regulated Learning in Portugal and Spain*

As a function of gender, it is observed that females scored significantly higher on all variables except academic self-efficacy, where no differences are observed: social skills: $F(1, 1606) = 9.78, p < .01, \eta^2 = .006$, group processing: $F(1, 1606) = 12.01, p < .01, \eta^2 = .007$, positive interdependence: $F(1, 1606) = 6.93, p < .01, \eta^2 = .004$, promotive interaction: $F(1, 1606) = 10.38, p < .01, \eta^2 = .006$ individual accountability: $F(1, 1606) = 13.46, p < .001, \eta^2 = .008$, self-regulation before: $F(1, 1606) = 87.98, p < .001, \eta^2 = .052$, self-regulation during: $F(1, 1606) = 20.14, p < .001, \eta^2 = .012$ and self-regulation after: $F(1, 1606) = 53.66, p < .001, \eta^2 = .032$.

Regarding age, it is observed that as students get older, scores on promotive interaction decrease: $F(1, 1606) = 6.14, p < .05, \eta^2 = .004$, academic self-efficacy: $F(1, 1606) = 9.35, p < .001, \eta^2 = .006$, self-regulation before: $F(1, 1606) = 21.19, p < .001, \eta^2 = .013$, self-regulation during: $F(1, 1606) = 11.56, p < .01, \eta^2 = .007$ and self-regulation after: $F(1, 1606) = 11.75, p < .01, \eta^2 = .007$.

Generalized linear model

Responding to H3, Table 5 presents the analysis of generalized linear models taking academic self-efficacy as the dependent variable. The omnibus test was significant: $\chi^2 = 600.29(6), p < .001$. The model showed that group processing

and the three dimensions of self-regulation of learning predicted academic self-efficacy, after controlling for country (Spanish scored higher) and gender (females scored higher). Finally, Table 6 shows the percentage of variance explained by the established generalized linear model.

Table 5

Generalized Linear Model Taking Academic Self-Efficacy as a Dependent Variable

	B	DE	Wald	p	Exp (B)	95% IC	
						Inferior	Superior
Country	-.483	.032	225.56	.000	.617	.580	.657
Sex	.181	.032	31.18	.000	1.198	1.125	1.277
Group processing	.140	.023	35.50	.000	1.151	1.099	1.205
Self-regulation before	.101	.029	11.54	.001	1.107	1.044	1.174
Self-regulation during	.165	.036	21.05	.000	1.180	1.099	1.266
Self-regulation after	.170	.028	34.90	.000	1.185	1.120	1.254

Table 6

Explained Variance

	B	DE	Wald	p	Exp (B)	95% IC		Eta square
						Inferior	Superior	
Country	-.483	.032	225.56	.000	.617	.580	.657	.121
Sex	.181	.032	31.18	.000	1.198	1.125	1.277	.020
Group processing	.140	.023	35.50	.000	1.151	1.099	1.205	.021
Self-regulation before	.101	.029	11.54	.001	1.107	1.044	1.174	.008
Self-regulation during	.165	.036	21.05	.000	1.180	1.099	1.266	.012
Self-regulation after	.170	.028	34.90	.000	1.185	1.120	1.254	.023

DISCUSSION AND CONCLUSIONS

The main objective of the present research was to compare two similar populations of Secondary Education students from Portugal and Spain concerning their academic self-efficacy, self-regulated learning and cooperative learning. The results showed that Portuguese students scored higher in social skills, group processing and positive interdependence, while Spanish students scored higher in individual responsibility, academic self-efficacy and self-regulation before, during and after. Women scored significantly higher in all variables, except in academic self-efficacy where no differences were observed. With respect to age, as students grew older a decrease was observed in the scores for promotive interaction, academic self-efficacy, and self-regulation before, during and after. Finally, the generalized linear model showed that group processing and the three dimensions of self-regulation of learning predicted academic self-efficacy.

H1 proposed that the Portuguese population would present higher values in academic self-efficacy, self-regulated learning and cooperative learning, and the results only partially corroborated this hypothesis. The results compared between Portuguese and Spanish students showed the former as much more convinced of the use of cooperative learning in their classes, as three of the five variables that mediate the effectiveness of cooperative learning in any educational context (Johnson & Johnson, 2018) were higher in students from Portugal. This seems to indicate that this methodological approach is more settled among this group of Portuguese students than in the Spanish respondents. We are not aware of any similar published comparative study (with the three variables evaluated), so we can only compare the results of the present study with previous ones that have evaluated, separately, any of the variables studied. For example, Carvalho and Santos (2021) or Catarino et al. (2019) showed the benefits of the use of cooperative-based projects in several primary, secondary and higher education centers in Portugal to improve academic performance, so it seems a well-implemented methodology in this country. In Spain, networks of educational centers that use cooperative learning in their classes in a systematic way have been described (Miquel & Durán, 2017). However, a recent study points out difficulties in the context, teachers and students for an effective implementation of cooperative learning (Martínez, 2022). The results of the present study seem to reflect these difficulties more in Spain than in Portugal. Previous reviews and meta-analyses have shown the effectiveness of cooperative learning in promoting student learning in different contexts, educational levels and subjects around the world (Kumar, 2017). If, as the results of this study seem to indicate, this pedagogical model is more strongly implemented in Portugal than in Spain, this could explain the better results in different international achievement tests of students in Portugal compared to those in Spain (López & García, 2020; OECD, 2016). Of course, this is speculative and more research is needed

to corroborate or rule out this idea. On the contrary, Spanish students showed higher levels of academic self-efficacy and self-regulation of learning, which is not consistent with the worse results obtained by them in the last decade and reflected in the PISA reports (Lopez & García, 2020; OECD, 2016). Authors such as Ainscough et al. (2016) reflect that high levels of self-efficacy did not necessarily correlate with high academic performance, although recent reviews do point out that self-efficacy is positively related to students' motivation, attitudes and academic performance (Patricio-Gamboa et al., 2022). In this sense, research has shown that many students (especially those with low abilities) overestimate their performance, as they lack the skills to make more adjusted and accurate self-judgments and, as a consequence, are unaware of their limitations and reflect higher expectations of themselves that are not matched by the results. This discrepancy between perceived and actual performance is called the "Dunning-Kruger effect" (Kruger & Dunning, 1999) and those who suffer from it are unaware of the knowledge they lack (Jansen et al., 2021). An excessive dependence on the teacher has been pointed out as one of the possible factors responsible for this effect (Vilchez, 2020) and the results of this study point to lower levels of cooperative learning (and possibly higher directivity/teacher dependence) among Spanish students. Again, this is highly speculative and more research is needed to corroborate or rule out this hypothesis. One possible solution proposed to correct this Dunning-Kruger effect is to teach these students to reason and be reflective so that they can recognize their limitations and lower performance and make the necessary changes. Perhaps this strategy is necessary among the Spanish student population to improve their poor performance in the different international tests (López & García, 2020).

H2 proposed that the values of the different variables under study would decrease with age, but would be similar in men and women. With respect to gender, women showed higher levels in all the variables analyzed except academic self-efficacy. Therefore, they were higher in the five variables that mediate the effectiveness of cooperative learning and in the three variables that measure self-regulation. Recent studies of the evolution of the results of the latest international reports indicate that there is a gender gap in favor of girls in, for example, reading comprehension (Fuentes and Renobell, 2020), which could be explained based on the positive results observed in the present study in self-regulation or cooperative learning. Again, more research is needed to delve deeper into these ideas. Nevertheless, high levels in these two variables have been associated with high values of academic achievement (Colthorpe et al., 2015; Kumar, 2017) and in the present study, females presented higher values. Therefore, the traditional gender gap in favor of males in international test performance results seems to have been "flipped" in the present study and it is males who are currently at a (slight) disadvantage in Spain, so they are the ones who need help. Regarding age,

the results have shown that as students grow older, scores in promotive interaction, academic self-efficacy and self-regulation before, during and after decrease. Adolescence is a stage characterized by multiple physical, psychological, emotional and/or social changes that lead to a period of uncertainty with negative effects (in many cases) on different elements, including academic results (Bustamante et al., 2022). Therefore, it is more necessary to work on aspects such as self-regulation in learning in the higher grades of secondary school, where the worst statistics of educational dropout, NiNis rates and risk of poverty and social exclusion are reflected (López and García, 2020; OECD, 2016). Authorities should concentrate efforts at the secondary education stage to tackle the decline in students' academic performance that, unfortunately, affects society as a whole.

Finally, H3 posited that cooperative learning and self-regulation would influence academic self-efficacy and the results showed that only group processing and the three dimensions of self-regulation of learning predicted students' academic self-efficacy. In a recent study with Portuguese and Spanish students, Barca et al. (2020) found direct relationships between self-regulation/self-efficacy and performance/achievement in both populations (unfortunately they did not compare them with each other). Previous global studies have shown how is directly associated to academic self-efficacy (Zimmerman, 2002), besides, self-regulation of learning is an essential factor in academic success (Winne, 2005) and students' academic goals (Covarrubias-Apablaza et al., 2019). Learning to organize information and engage in goal-based tasks, concentrate and sustain attention, and reflect on information definitely helps in academic self-efficacy, as well as preventing school failure (Blair & Raver, 2015). Regarding group processing, it is one of the five variables that mediate the effectiveness of cooperative learning (Johnson & Johnson, 2018), but it more directly reflects the functioning (or not) of the group, which can range from one student adopting a leading role to a shared leadership situation where several regulate interactions (Hadwin et al., 2018). In any case, the results of the present study point out that cooperative group functioning (group processing) predicts students' academic self-efficacy. Previous studies have pointed it out as one of the most influential variables of cooperative learning on academic achievement (León et al., 2021). However, other research found that self-regulation of learning was a more influential variable in academic self-efficacy than cooperative learning itself (Fernandez-Río et al., 2017a) and the results of this study support this idea, since only group processing, among the five variables that mediate the effectiveness of cooperative learning in educational contexts, appeared in the model developed, while the three of self-regulation did appear.

The present study is not free of limitations. The first and most important is its cross-sectional nature, which prevents us from deriving cause-effect relationships from the results obtained. Therefore, the results obtained should be taken with

caution. Future studies should address experimental or quasi-experimental designs to delve deeper into the relationships found. Secondly, the sample, although large, could be further increased to achieve greater representativeness. New studies should use larger samples of participants in both Spain and Portugal. Likewise, the type of sampling used was non-probabilistic by convenience and with voluntary inclusion, so it may present some type of proximity bias. Future studies should further randomize the sample selection. Finally, the characteristics of the classes experienced by the participants are not perfectly defined, being limited to having experienced cooperative learning. Further studies should more precisely delimit the school context of the participants in order to understand in greater depth the reality of these classrooms.

In conclusion, comparative studies between the Spanish and Portuguese educational systems seem to be limited to contextual variables, inputs, outputs and policies, but do not include pedagogical and psychological variables that allow us to understand the previous variables. Therefore, to the best of our knowledge, this is the first study that jointly analyzes three variables of this second type in a joint and interrelated manner. The results showed that Portuguese students presented higher levels in three of the five variables that mediate the effectiveness of cooperative learning, so it seems that they perceive that in their classes they work more intensively on cooperative learning. Spanish students presented higher academic self-efficacy and greater self-regulation of learning, which contradicts the worse results obtained in the last PISA reports. They could suffer from the “Dunning-Kruger effect” and not be aware of the knowledge they lack. Finally, self-regulation of learning before, during and after tasks, together with group processing (cooperative learning), predicts academic self-efficacy. Therefore, learning to organize information, concentrate and sustain attention and reflect on it definitely helps in academic self-efficacy.

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