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# The Mediating Role Played by Perceived Motor Competence in the Relationship between Motor Competence and Physical Activity in Spanish Adolescents

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**Abstract:** The promotion of regular physical activity (PA) is becoming one of the main tools applied in developed countries to address health and obesity problems, particularly in view of the proven benefits of PA on a physical, psychological, and social level. Indeed, childhood and adolescence are crucial periods for an active lifestyle can be established, with the prospect of prolonging it in adulthood. The conceptual model propounded by Stodden provides a theoretical underpinning for the relationship between motor competence (MC) and PA. This study's objective was to explore the predictive value of motor competence (MC) regarding physical activity (PA), along with the mediating role played by self-perceived motor competence (SPMC) and comparatively perceived motor competence (CPMC), with the purpose of confirming the theoretical model propounded by Stodden, as well as the relationships among variables in our own conceptual model. To this end, we tested a random sample of 925 adolescents (53.6% males; 46.3% females, age 13.75 years, SD = 1.28). Participants completed the Multidimensional Sportcomp Battery to evaluate MC and the Achievement Motivation in Physical Education test (AMPET4) to evaluate their perception of their competence; moreover, to evaluate PA, we used three indicators from the WHO Health Behaviour in Schoolchildren survey in the Spanish version. Our final theoretical model explains 19.9% of the variance of sport practice in boys and 24.2% in girls; moreover, it ascribes an important role to self-perceived motor competence (SPMC) and to comparatively perceived motor competence (CPMC) as mediating variables in the relationship between MC and PA in both sexes. Notably, we found a direct relationship between motor coordination/control tests and PA. Overall, this study underscores the degree to which adolescents' perceived motor competence affects their actual motor competence.

**Keywords:** motor competence; physical activity; perceived motor competence; comparatively perceived motor competence; adolescents

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**Citation:** Royo, E.; Latorre-Peña, J.; Denoni, M.; Orejudo, S. The Mediating Role Played by Perceived Motor Competence in the Relationship between Motor Competence and Physical Activity in Spanish Adolescents. *Sustainability* **2023**, *15*, 16327. https://doi.org/10.3390/su152316327

Academic Editor: Gianpiero Greco

Received: 14 October 2023
Revised: 17 November 2023
Accepted: 20 November 2023
Published: 27 November 2023



## 1. Introduction

The promotion of regular physical activity (PA) is becoming one of the main tools applied in developed countries to address health and obesity problems [1,2], particularly in view of the proven benefits of PA on a physical, psychological, and social level [3]. Indeed, childhood and adolescence are the crucial periods when an active lifestyle can be established, with the prospect of prolonging it in adulthood. In the same way, it has been shown that physically active lifestyles begin to develop very early in childhood and that PA stability is moderate to high throughout life from youth to adulthood [4].

One of the most promising strategies to avoid common health risks is to increase the level and frequency of PA [5]. It is thus important to identify the corresponding correlates, along with underlying mechanisms, that encourage PA in childhood and adolescence.

The conceptual model propounded by Stodden et al. [6] provides a theoretical underpinning for the relationship between motor competence (MC), understood as an individual's abilities and capacities in a wide range of fundamental motor skills (FMS), and PA; this model has been corroborated by a wide range of studies on children and adolescents [1,7–10]. In their model, Stodden et al. [6] hypothesized that perceived motor competence (PMC), which is the view an individual has of their MC [11], should appear as an important mediator between MC and PA. Indeed, as a psychosocial factor of motivation, PMC is considered an important predictor of the acquisition of motor abilities [12], as well as of PA [7–9,13,14]. However, few studies have analysed the model's predictive value regarding the three variables proposed by Stodden et al. [6]: PMC, MC, and PA. Izaskun et al. [8] found a significant correlation between PMC and MC, on the one hand, and between PMC and PA, on the other; moreover, by applying mediation analysis, they confirmed the mediating role played by PMC in the relationship between MC and PA. Barnett et al. [15] found that, in adolescence, regular schedule periods devoted to moderate-to-vigorous physical activity are positively associated with former object control proficiency in childhood. Their models explained 12.7% and 18.2% of the variance they observed.

Information obtained by studying the connections among these three variables (PMC, MC, PA) is fundamental in gaining an understanding of how those relationships function; moreover, such information should help to indicate the recommendable tendency of future interventions on school-age students with the aim of promoting their participation in PA.

For people of all age groups, MC is an indispensable prerequisite for participation in PA [9,16,17]; an individual needs to acquire MC at an early age in order to ensure an active, healthy lifestyle along developmental time [18], whereas PA stability is high or moderate in adulthood when an active lifestyle has been acquired in childhood and youth [4]. In a meta-analysis of MC and PA, Holfelder and Schott [19] confirmed the existence of a strong reciprocal relationship between those two variables. A series of studies on children and adolescents showed that youth with low MC levels are less active than those who have higher MC levels [15,20]. Regarding the link between PMC and PA, most research articles in the literature have found that PMC plays an important role in an individual's motivation to participate in PA, both in children and adolescents [9,13]. Children with lower MC and lower PMC tend to be less physically active [14]; moreover, adolescents with low MC but high PMC have higher PA than those with low MC and low PMC [20]. Davison et al. [21] examined the relationship between PMC in girls aged 9 to 11 and their self-reported degree of physical activity; they found that MC explained 27% of the variance in PA. Meanwhile, the relationship between MC and PMC has been the focus of several studies that sought to confirm the role of PMC as a factor explaining the influence of MC on PA [22]. That relationship appears to be less pronounced in childhood but tends to grow stronger with age [23]: it is particularly reinforced when the individual reaches adolescence [6]. But here, once more, literature on the predictive value of MC regarding PMC is scarce.

When analysing these three variables and the relationships among them, it is likewise important to take gender differences into account. Regarding the MC variable, several studies have found differences in boys'favour, mainly in coordination and gross motor skill tests [24,25]. Those differences are partially explained by a more significant increase in relative and absolute strength in boys. However, social reasons were also put forward, since it is suggested that boys are allowed more opportunities than girls to participate in physical activities in their free time [26]. Regarding PA, schoolchildren in developed countries have shown insufficient scores in PA levels in Physical Education classes [27] and do not fulfil the recommendation of exerting 60 daily minutes of moderate-to-vigorous PA in extracurricular hours [28–30]. The latter situation is more acute in girls than in boys [29,30], and more pronounced in adolescence than in childhood [31,32]. Boys tend to evaluate themselves more positively in terms of PMC than girls [33,34]; in terms of achievement motivation, boys tend to be more ego-oriented or result-oriented, whereas girls are more task- or learning-oriented [35,36].

Most studies of PMC have evaluated it as a dimension of the achievement goal theory in PE classes, or they have applied tools such as the analysis of physical self-concept components. Few studies have attempted to ascertain whether motivation in a PE class context is related to motivation to perform PA [37]. In this current study, we base our examination of PMC on the achievement goal theory [38,39], as student behaviour in a series of different sports and PE situations tends to consist of making an effort to prove one's ability and competence in an achievement goal context. Ruiz-Pérez et al. [40] reviewed several Spanish studies that had applied the Spanish version of the AMPET test (Achievement Motivation in Physical Education); notably, they found medium to low values in PMC factor scores in most studies. Noting that task-oriented students (in terms of achievement goals) might display a lack of interest in items featuring social comparison with peers, they decided to modify the Spanish version of AMPET by dividing the PMC factor into two subfactors: the self-perception of motor competence (SPMC) and comparative perception of motor competence (CPMC), with the goal of encompassing the PMC concept in its entirety. These results are in line with the considerations of socio-cognitive theorists regarding motivation, where they highlighted that students may evaluate their competence from a self-referential perspective or by comparing themselves with other classmates, which would be related to their Ego or Task motivational orientations [40]. In the validation of their AMPET tests, they obtained a good correlation between the two subfactors. They also observed a general tendency toward higher scores on SPMC than on CPMC: this finding provides interesting information on adolescents' main orientation, and it confirms the view expressed by several authors, who have stated that a spirit of motivation should predominate in PE lessons and in contexts of acquiring motor skills: in other words, motivation in PE classes should be more oriented toward task fulfilment and achieving personal progress than toward making competitive comparisons with one's peers [41–43]. As mentioned above, several studies have shown that girls are more task-oriented; moreover, they tend to participate less in PA/sports than boys.

Until now, studies in this area have focused on the mediating role of PMC between MC and PA, but no studies have done so while subdividing PMC into SPMC and CPMC. Moreover, few studies have examined the predictive potential of the model proposed by Stodden et al. [6]. Thus, our main objective is to explore the predictive value of MC regarding PA as well as the mediating role played by SPMC and CPMC in the overall equation, thereby confirming the theoretical model propounded by Stodden et al. [6] and elucidating a series of relationships among the variables of our conceptual model. As a secondary objective, taking into account the gender variable, our study aims to verify gender differences in order to guide future gender-differentiated strategies on the basis of the data obtained here. This study was carried out on adolescents of the Spanish region of Aragon.

As a research hypothesis, this study postulates that both SPMC and CPMC play a mediating role between MC and PA in both boys and girls. Furthermore, this research hypothesises that boys have higher PA and higher values of SPMC and CPMC than girls.

## 2. Materials and Methods

### 2.1. Participants

The participants in this study were adolescents enrolled in schools of the Spanish Autonomous Community of Aragon in years 1 to 4 of Compulsory Secondary Education (Educación Secundaria Obligatoria). The sample was obtained through a random procedure in which provinces (Huesca, Zaragoza, and Teruel) and academic years (years 1 to 4 of ESO) were taken as strata. A sampling error of more/less 3% for the 95% confidence intervals was obtained by assuming P = Q = 0.5. The sample size was 1048 individuals, which decreased to 925 after eliminating those participants for whom no data were collected. Of those, 495 (53.6%) were male, and 428 (46.3%) were female, aged between 12 and 19 years; however, most were 12–16 years old (99.2%). The mean age was 13.75 years (SD = 1.28).

### *2.2. Variables and Tools*

To evaluate MC, we applied the Multidimensional Sportcomp Battery for MC [44], designed as a tool for Physical Education teachers at the ESO level to verify their students' MC and adapt their teaching to the results. The test comprises ten sub-tests theoretically subdivided into two groups: five motor aptitude tests (flexibility: sitting in front of a flexibility box and stretching as much as possible; throwing a medicinal 2 kg ball; doing a maximum number of sit-ups in 30 s; manual dynamometry with a dynamometer; running up and back over a 9 m distance; picking up a baton and returning to the starting point twice) and five coordination and motor control tests (maintaining equilibrium on one leg with eyes closed for a maximum time of 60 s; covering a 3 m length over supports; hopping with feet together over a 7 m distance; hopping on one foot over a 7 m distance; making as many lateral jumps as possible in 15 s).

Nevertheless, our validation of this tool [45] revealed that three of the ten tests (Flexibility, Equilibrium, and Lateral Jumps) could not grouped with any of the other tests, while the seven remaining ones could be grouped together under two factors: an Upper Body Strength factor (Medicine Ball and Dynamometry) and a Coordination factor (sit-ups; running up and back; one-foot hopping; 7 m on one foot and 7 m feet together). Since these test scores have different measurement scales, we transformed them into Z-scores in order to be able to analyse them together.

We evaluated self-perceived motor competence (SPMC) and comparatively perceived motor competence (CPMC) by applying the adaptation of the Spanish version of the AMPET test (Achievement Motivation in Physical Education) [40], which has been given the name AMPET4. We used 9 items ($\alpha = 0.874$) to evaluate the dimension of self-perceived motor competence ("I have always considered myself someone capable of doing any exercise in PE class well"; "I always have the impression that I have a talent for PE classes"; "Until now, I have done well in PE without really trying"; "I have always learned the PE exercises/sports quickly"; "I like Physical Education because I find that I'm capable of doing any task proposed in class"; "I think I have the necessary qualities to do the exercises in PE classes"; "Since childhood, I have been capable of doing the exercises/sports in PE classes well"; "I have always achieved the goals that the PE teacher proposes in class"; "I can do any type of exercise, no matter how intense it is, if it can help me improve my performance in Physical Education"), and we used 5 items from the 32 test items for the dimension of comparatively perceived motor competence ($\alpha = 0.831$): ("I have always viewed myself as one of the best in Physical Education"; "I think I have more abilities than my classmates for PE"; "In PE, I always have the impression of being better than my classmates"; "I have been told by others that I am an all-around player who is able to do any exercise in PE class well"; "I've frequently been congratulated for being better than other classmates in PE class". Exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) yielded a good correlation between these two dimensions. All of the items were evaluated on Likert-type scales, with 1 corresponding to the greatest disagreement with the item and five corresponding to the greatest degree of agreement.

To evaluate the practice of PA, we used three of the eleven indicators from the WHO Health Behaviour in Schoolchildren survey in its Spanish version [46]: they evaluate physical activity outside of school ("Outside of school hours: how often do you participate in sports, games, or gym exercises?"), intense physical exercise outside of school ("Outside of school hours: how many times a week do you usually exercise in your free time so much that you sweat or run out of breath), and the intention of being physically active in the future ("Do you think that when you will be 20 years old, you will do a sport or participate in physical activity or sports?"). The three indicators were evaluated on Likert-type scales with five, seven, and four options, respectively, yielding a minimum score of 3 and a maximum score of 16. In this study, the internal consistency of these three items is 0.696.

### 2.3. Procedure

We started by contacting the administration teams and Physical Education departments of the schools we had selected during the sampling. After obtaining their agreement to collaborate in our research, we contacted the adolescents' families via consent forms requesting their authorization to participate in this study. In order to pass the tests in the centres, a group of volunteers—all of them students of Physical Education Teaching from the faculties of Huesca and Zaragoza—and students of Physical Activity and Sport Sciences from Huesca took part in the tests. They were prepared in a specific way with the aim of following common criteria. Each collaborator was assigned an average of 3–4 centres. There were two phases, the first one for the motor test and the second one in which we went back to the centres to pass the surveys. The motor test was carried out individually and outside the rest of the class group, taking about 20 min per pupil. The surveys, also of an individual nature, were completed in parallel with the rest of the classmates.

This study was carried out in accordance with the recommendations of the Council of the British Educational Research Association in the second edition of their Ethical Guidelines for Educational Research BERA [47], given that there is no national educational research ethics committee operating on a national level in Spain at this moment. The protocol was approved by the Government of the Autonomous Region of Aragon (Spain), following the proposal of the Advisory Council for Research and Development (CONAI + D), as part of a grant for the Development of Networks of Researchers, Mobility, and Technological Research and Development Projects within the framework of cooperation of the Pyrenees Working Community (Ref.: CTPP06/09).

### 2.4. Statistical Analysis

The analysis of the results was conducted in two phases. In the initial phase, we carried out a descriptive analysis of the means of the scales used in this study, differentiating by sex in order to achieve an initial exploration of results and to verify whether there were differences between boys and girls.

In the second phase, we used path analysis to test our hypothetical model of causal structure. A path model was chosen [48], because such models allow for the establishment of relationships among variables by defining exogenous variables (MC) as independent variables and endogenous variables (PA) as dependent variables; at the same time, those same endogenous variables can act as mediating variables (SPMC and CPMC), according to our hypotheses. The path model also enabled us to establish direct and indirect effects among variables. Designed on the basis of our review of the previous literature and represented in Figure 1, our specific path model was tested with the IBM-SPSS software (v.26) and its AMOS extension (v.26). The estimation method chosen to test the measurement model was asymptotically distribution-free (ADF), which is recommended for scales that cannot be measured quantitatively and for which multivariate normality cannot be assumed [49,50]. Initially, correlations were obtained among all the factor scores of the variables in both the Girls and Boys subsamples. We subsequently compared the results of the two groups using Fisher's Z transformation of the correlation coefficient in order to ascertain whether or not the correlation coefficient was different in those groups.

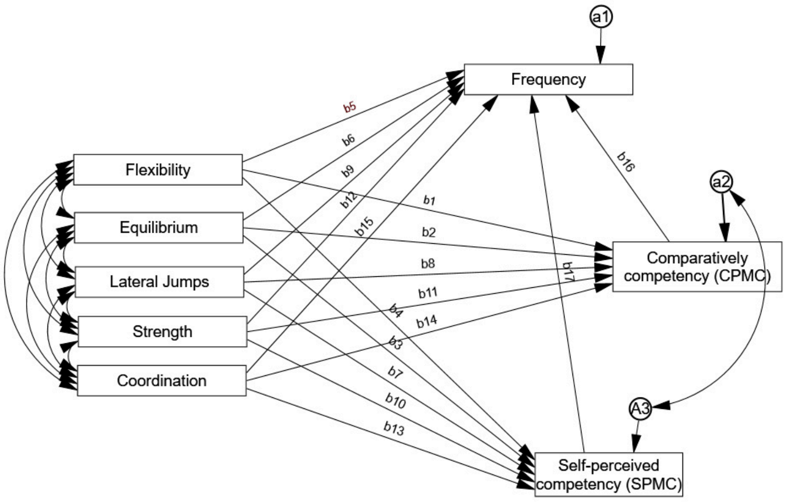


**Figure 1.** Theoretical Path Model.

The model's goodness of fit was tested using the $\chi^2$ test and the $\chi^2$/degrees of freedom ratio (DCIM/GL in Amos), the Root mean square of approximation (RMSEA), and Tucker–Lewis Index (TLI) and Comparative fit index (CFI) indicators as well as their critical levels as indicated by Vandenberg [51], Schlermelleh-Engel et al. [52], and Byrne [50]. We applied multigroup analysis to verify if significant differences by sex might be influencing relationships among variables. To achieve that distinction among models, we compared a series of nested models; the outcome of comparisons is detailed below in the Section 3. To contrast the differences among groups, we compared the models with the calculation of the differences in $\chi^2$ and the AIC index. The $\chi^2$ and AIC are used in the comparison of two or more nested models: the Akaike Information Criterion (AIC) is used with smaller values that represent a better fit of the hypothesized model [50]. the other hand, $\Delta\chi^2$ is used to determine if two nested models are different and if one of them improves the model fit [50].

## 3. Results

Table 1 shows the mean values of the variables in this study for boys and girls. As can be noted, the patterns in most of the variables under consideration are different for boys and for girls. Thus, in terms of the frequency of sports activity, girls are close to the scale's mean theoretical value (theoretical value: 9.5 points; girls' mean: 9.20), whereas boys tend to be more active (11.04). These differences in the frequency of practicing sports are reproduced in the factors of self-perceived motor competence (SPMC) and comparatively perceived motor competence (CPMC), with boys obtaining higher scores. Size effects according to $\eta^2$ indicate that these differences are important. Regarding the results of the PA tests, substantial differences can be observed in the areas of strength and coordination, where boys obtain better scores, as well as in flexibility, where girls score higher. No significant differences between boys and girls can be observed in the areas of equilibrium or lateral jumps.

**Table 1.** Comparison of means between boys and girls.

| | Boys | | Girls | | | | |
|---|---|---|---|---|---|---|---|
| | Mean | SD | Mean | SD | Brown-Forsythe | Sig. | $\eta^2$ |
| Frequency | 11.04 | 2.59 | 9.20 | 2.82 | 103.041 | 0.000 | 0.104 |
| Strength | 0.87 | 2.08 | −0.97 | 1.08 | 288.429 | 0.000 | 0.228 |
| Coordination | −0.93 | 2.60 | 1.00 | 2.55 | 126.165 | 0.000 | 0.123 |
| Flexibility | −0.33 | 0.95 | 0.35 | 0.95 | 113.322 | 0.000 | 0.112 |
| Equilibrium | 0.03 | 1.07 | −0.06 | 0.94 | 1.936 | 0.164 | 0.002 |
| Lateral Jumps | 0.05 | 1.03 | −0.08 | 0.99 | 4.052 | 0.044 | 0.004 |
| AMPET SPMC | 2.87 | 0.54 | 2.43 | 0.58 | 135.297 | 0.000 | 0.133 |
| AMPET CPMC | 2.68 | 0.61 | 2.27 | 0.61 | 99.299 | 0.000 | 0.101 |

The correlations among the variables under study are grouped in Table 2. Correlations for the Girls subsample are in the table's upper portion, and those for the Boys subsample are in the lower portion. A high correlation between self-perceived motor competency (SPMC) and comparatively perceived motor competency (CPMC) particularly stands out (rboys = 0.750 and rgirls = 0.764). Following that relationship, both SPMC and CPMC are related to the frequency of sports activity (correlation lying between 0.388 and 0.462), with slightly higher values in the case of girls, although the difference is not statistically significant. The pattern in boys and girls in the MC tests and in the frequency of sports activity is different: in the Strength test, there is a direct, significant relationship in the case of girls (r = 0.203), but the correlation is not significant in boys (r = 0.076). A comparison between those two correlations shows that they are statistically significant (Z = −1.96, $p$ = 0.05). Correlations in the frequency of sports activity and in coordination are significant in both cases, but with a higher value (Z = −2.28, $p$ = 0.022) for girls (r = −0.319) than for boys (−0.169). Once again, the pattern in flexibility is different (Z = −2.15, $p$ = 0.031). However, there is no relationship with the frequency of sports practice in boys (r = 0.045), whereas there is one in girls (0.187). Lastly, no relationship can be observed between frequency and the equilibrium test in any of the two subsamples; nevertheless, there is a small relationship with lateral jumps, with no significant differences between boys and girls. In the remaining correlations gathered in Table 2, no significant differences were observed between boys and girls.

**Table 2.** Correlations among variables. Upper portion: girls; lower portion: boys.

| | **Frequency** | **Strength** | **Coordination** | **Flexibility** | **Equilibrium** | **Lateral Jumps** | **AMPET_ SPMC** | **AMPET_ CPMC** |
|---|---|---|---|---|---|---|---|---|
| Frequency | | 0.215 ** | −0.319 ** | 0.187 ** | 0.067 | 0.198 ** | 0.452 ** | 0.490 ** |
| Strength | 0.068 | | −0.448 ** | 0.163 ** | 0.024 | 0.064 | 0.199 ** | 0.163 ** |
| Coordination | −0.169 ** | −0.501 ** | | −0.193 ** | −0.112 * | −0.327 ** | −0.236 ** | −0.289 ** |
| Flexibility | 0.045 | 0.283 ** | −0.311 ** | | 0.049 | 0.139 ** | 0.104 * | 0.139 ** |
| Equilibrium | 0.018 | 0.061 | −0.077 | −0.025 | | 0.103 * | 0.162 ** | 0.163 ** |
| Lateral Jumps | 0.211 ** | −0.035 | −0.336 ** | 0.090 * | 0.116 * | | 0.120 * | 0.152 ** |
| AMPET SPMC | 0.398 ** | 0.149 ** | −0.254 ** | 0.075 | 0.116 * | 0.157 ** | | 0.779 ** |
| AMPET CPMC | 0.417 ** | 0.160 ** | −0.224 ** | 0.082 | 0.123 ** | 0.212 ** | 0.762 ** | |

* Correlation is significant at 0.05; ** Correlation is significant at 0.01.

In order to test the goodness of fit of the theoretical model proposed in Figure 1 and to elucidate differences between boys and girls, we carried out a sequence of steps. To begin with, we analysed the model, asking the programme to estimate regression weights under the supposition that they were the same for boys and girls (Structural Weights in AMOS: Table 3). That initial model yielded reasonable goodness of fit values, although some weights were non-significant. After eliminating them, we obtained a new model with all foreseen estimations from zero. In that model (Figure 2), three predictors of PA appear (AMPET CPMC, AMPET SPMC, and Coordination); meanwhile, all of the physical tests, except for flexibility, predict SPMC and CPMC.

On the model depicted above, we tested whether any differences between boys and girls could be ascertained. As shown in Table 3, there were two cases in which the proposed model, which allowed for estimations to be different for girls and for boys, improved goodness of fit with two restrictions: β10 ($\Delta\chi^2$ = 7.279, Ddf = 1, $p$ = 0.005) and β15 ($\Delta\chi^2$ = 8.789, Δdf = 1, $p$ = 0.005). As a final model, we herefore adopted the one that assumed those differences in its prediction between boys and girls: its goodness of fit values are adequate ($\chi^2$ = 27.352; df = 21; $p$ = 0.160; $\chi^2$/df = 1302, TLI = 0.975, GFI = 0.990; RMSEA = 0.018). Its estimated values for boys and for girls are grouped in Figure 2.

**Table 3.** Comparisons among models.

| Model | $\chi^2$ | DF | *p* | $\chi^2$/DF | TLI | CFI | RMSEA | AIC |
|---|---|---|---|---|---|---|---|---|
| Structural weights | 24.479 | 17 | 0.107 | 1.44 | 0.963 | 0.989 | 0.022 | 134.479 |
| Structural covariances | 169.548 | 32 | <0.001 | 5.298 | 0.639 | 0.793 | 0.068 | 249.548 |
| Structural residuals | 175.732 | 35 | <0.001 | 5.021 | 0.662 | 0.789 | 0.066 | 249.732 |
| Structural weights + no sig | 42.136 | 23 | 0.009 | 1.832 | 0.930 | 0.971 | 0.03 | 140.136 |
| Free β2 | 42.029 | 22 | 0.006 | 1.91 | 0.923 | 0.97 | 0.031 | 142.029 |
| Free β3 | 41.291 | 22 | 0.008 | 1.877 | 0.926 | 0.971 | 0.031 | 141.291 |
| Free β7 | 42.036 | 22 | 0.006 | 1.911 | 0.923 | 0.97 | 0.031 | 142.036 |
| Free β8 | 42.087 | 22 | 0.006 | 1.913 | 0.923 | 0.97 | 0.031 | 142.087 |
| Free β10 | 34.407 | 22 | 0.045 | 1.564 | 0.953 | 0.981 | 0.025 | 134.407 |
| Free β11 | 40.528 | 22 | 0.009 | 1.842 | 0.929 | 0.972 | 0.03 | 140.528 |
| Free β13 | 42.136 | 22 | 0.006 | 1.915 | 0.923 | 0.97 | 0.032 | 142.136 |
| Free β14 | 41.816 | 22 | 0.007 | 1.901 | 0.924 | 0.97 | 0.031 | 141.816 |
| Free β15 | 33.348 | 22 | 0.057 | 1.516 | 0.957 | 0.983 | 0.024 | 133.348 |
| Free β16 | 40.679 | 22 | 0.009 | 1.849 | 0.929 | 0.972 | 0.03 | 140.679 |
| Free β17 | 40.06 | 22 | 0.011 | 1.821 | 0.931 | 0.973 | 0.03 | 140.060 |
| Free β10 + β15 | 27.352 | 21 | 0.160 | 1.302 | 0.975 | 0.99 | 0.018 | 129.352 |

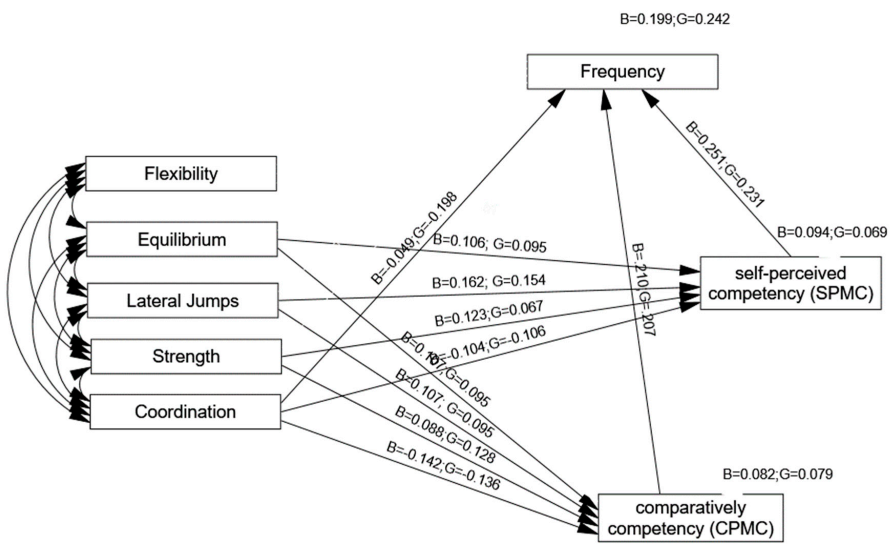


**Figure 2.** Path Model (B = boys; G = Girls).

This model explains 19.9% of the variance in PA in boys and 24.2% in girls. It explains 8.2% of the variance of self-perceived motor competence (SPMC) in boys and 7.9% thereof in girls as well as 9.4% of comparatively perceived motor competence (CPMC) in boys and 6.9% thereof in girls. This final model underscores the fact that, in both boys and girls, self-perceived motor competence (β15 boys = 0.210; β15 girls = 0.207) and comparatively perceived motor competence (β14 boys = 0.251; β14 girls = 0.231) play a substantial role in PA. A third variable, coordination, also exerts a substantial weight in predicting PA (βboys = 0.049; β13 girls = 0.198): as mentioned above, its weight is statistically more pronounced in the case of girls than in boys. In other words, coordination is more relevant for girls in the frequency of PA than for boys.

Our model also proposes the existence of a direct relationship between self-perceived motor competence (SPMC) and comparatively perceived motor competence (CPMC). That relationship was confirmed in boys as well as in girls, without significant regression weight differences between those two groups. Statistically significant relationships with four MC indicators were observed: equilibrium, lateral jumps, strength, and coordination. The relationship with flexibility was not significant. Despite this, the percentage of explained variance is slightly higher in CPMC in the case of boys (9.4% vs. 6.9%), lateral jumps are the best predictor thereof (β boys = 0.162; β girls = 0.154); at the same time, the strength factor plays an important role in boys (β = 0.123). Self-perceived motor competence (SPMC) explains 8.2% of variance in boys and 7.9% of variance in girls, and coordination plays an important role (β boys = 0.142; β girls = 0.136).

The configuration of the model shows that three of the MC indicators (Lateral Jumps, Equilibrium, and Strength) are only related to SPMC and are not directly related to the frequency of PA: thus, in such cases, an exclusively mediating relationship must be assumed. The mediating role of Coordination would be partial since, as mentioned above, that variable has a direct relationship with the frequency of PA and has different weights in girls than in boys. Nonetheless, an analysis of indirect relationships allows us to estimate the indirect contribution of the MC indicators to the frequency of PA: the most relevant predictor is Lateral Jumps (indirect effect: Boys = 0.063, Girls = 0.055), followed by Equilibrium (Boys = 0.051; Girls = 0.042) and Strength (Boys = 0.049; Girls = 0.042). Still, the most relevant motor competence in PA is Coordination, particularly in girls, in whom we have seen that the direct effect is substantial (Girls: total effect = −0.251, direct effect = −0.198, indirect effect = 0.042; Boys: total effect = −0.105, direct effect = −0.049; indirect effect = −0.056).

## 4. Discussion

The main objective of this study was to explore the predictive value of motor competence (MC) in the practice of physical activity (PA) and the mediating role played by self-perceived motor competence (SPMC) and by comparatively perceived motor competence (CPMC) in the overall equation, confirming the theoretical model of Stodden et al. [6] and elucidating a series of relationships among the variables of our conceptual model.

Several important findings were observed. The final theoretical model we propose explains 19.9% of the variance of PA in boys and 24.2% thereof in girls; it confirms the role played by MC in PA, as well as the partially mediating role played by SPMC and CPMC in PA. These results confirm the model propounded by Stodden et al. [6] and are in line with the findings of previous research teams [1,7–10], who have likewise upheld it. Moreover, our findings are in line with previous studies on the relationship between the perception of MC and the practice of PA [7–9,13,14]. However, ours is the first study in this area to differentiate the self-perception of motor competence (SPMC) and the comparative perception of motor competence (CPMC). In each of these two variables, our findings reaffirm the essential role played by the perception of MC in PA. Regarding the predictive value of motor competence, our findings are close to those of Barnett et al. [15], who studied the relationship between object control and PA in adolescents; in the case of girls, our findings are in line with those of Davison et al. [21], who analysed the perception of MC and the self-declared frequency of PA in girls ages 9 to 11 (MC explained 27% of PA). The tool featured in our study contained a considerable number of questions designed to measure comparatively conceived motor competence (CPMC): our results show that CPMC plays an important role in relation to PA in both sexes. In accordance with the model propounded by Stodden et al. [6], this underscores the degree to which adolescents find it important to compare themselves with their peers, along with the substantial role played by their meta-perception of how they think their peers view them. Literature referring to the motivational atmosphere that should reign in PE classes and in the acquisition of motor skills continues to emphasize that such activities should be goal-oriented and should emphasize personal progress rather than being oriented toward comparison with others [41–43]. However, we note that much progress still needs to be made, particularly since the importance of peer approval increases tremendously in adolescence. But our results regarding the importance of SPMC in the practice of PA leave room for optimism: a window of opportunity for action is still open, in accordance with Cecchini et al. [41], Ntoumanis and Biddle [43], and Granero-Gallegos and Baena-Extremera [42], who propose that the acquisition of motor skills should become more task-oriented. Adjustments in line with these suggestions can be made in PE lessons by reducing the amount of competitive learning, which has been predominant in the school subject of PE until now [53], and by replacing such activities with cooperative teaching–learning strategies that encourage satisfactory academic, social, and motivational accomplishments [54]. Our results show that comparatively perceived motor competence (CPMC) also has interesting repercussions on the practice of PA since we found a high correlation between SPMC and CPMC. Thus, improving one's self-perception of motor competence (SPMC) can benefit PA and one's perception of how others view one's motor competence (CPMC). This high correlation between the two types of motor competence perception confirms the results obtained by Ruiz-Pérez et al. [40], which were similar; our study has now extended them by finding a greater relevance of that relationship in the case of girls (although it does not attain statistical significance). We find this important, because girls practice less PA than boys: this, in turn, should give rise to further reflection regarding potential areas in which our conclusions can be applied.

Our data also reveal differences among the sexes in certain variables. Boys practice more PA than girls, a finding that is consistent with previous studies [29–32]. Boys also display a greater degree of SPMC and CPMC than girls. Rose et al. [33] and Royo et al. [34] also found that boys evaluated their motor competence more positively than girls. To reduce these differences and to achieve a greater degree of harmonious co-existence in PE classes, it would thus be recommendable to guarantee equal opportunity among the sexes while prioritizing inclusive activities and the diversification of content [8], such as dances and corporal expression, well as content that includes the use of new technologies, traditional games, or cooperative activities such as Acrosprot or group orientation, for example. In line with our suggestions for improving SPMC in adolescent students of PE, it would likewise be recommendable to increase task-oriented teaching–learning strategies and evaluations, particularly for females, and to generally emphasize cooperative methodologies while reducing those that are merely competitive.

The relationships between MC, PA variables, and the perception of motor competence in both sexes all provide important grounds for reflection. This study's results have confirmed the existence of a direct relationship between MC and CPMC, as well as between MC and SPMC. This, in turn, confirms that, although the relationship between MC and the perception of MC is less pronounced in childhood [23], it becomes more precise and reinforced in adolescence [6]. In the physical activity tests and the MC factors we analysed, we observed a direct relationship between motor coordination, motor control, and PA. Meanwhile, CPMC and SPMC are related to the factor of motor coordination and motor control in both sexes, thereby confirming the important role played by motor coordination and motor control in adolescents' perception of their motor competence [6,7,23]. This highlights the essential importance of working on general motor coordination in adolescence (and previously) in both sexes, since it will lead to the improvement of motor competence (MC), as well as a more satisfactory degree of the self-perception (SPMC) and comparative perception (CPMC) of motor competence. As far as we have been able to ascertain, all of these variables play an important role in motivating adolescents to practice sports during adolescence and, subsequently, in adulthood.

We suggest that these findings be taken into account in PE lessons and other areas of motor skill acquisition and sports: specifically, we recommend that PE pedagogy should become more task oriented. This will help improve adolescents' self-perception of their motor competence (SPMC), which, in turn, will benefit the practice of PA, particularly given the major role played by adolescents' tendency to compare themselves to a great extent with their peers. We suggest that motor coordination should be given top priority from early childhood on, in order to attain levels that allow adolescent students to achieve adequate competence to practice any sports discipline. This is particularly important, because adolescence is the period in which more complex, specialized movement skills are acquired and practiced, and these elements, in turn, are significantly related to adolescents' perception of their competence, as well as with their frequency of practicing PA (in both sexes), as shown in this study.

In an era where sustainability underlines the importance of our educational and social efforts [55], Physical Education has a major role to play in promoting health and general well-being. This study makes interesting contributions that contribute to several of the Sustainable Development Goals (SDGs) set by the United Nations. They contribute by seeking to ensure healthy living and promote well-being throughout life; they contribute to the pursuit of inclusive quality education and promote learning opportunities for all, with Physical Education classes being a compulsory space for all students; and they contribute to gender equality by promoting girls' participation in Physical Education and equal conditions for participation in sporting activities. In summary, our findings can be very useful in Physical Education classes and sport activities at a school age, becoming very valuable tools to promote a more sustainable and healthier world.

## 5. Conclusions

The main findings of this study underline the important mediating role played by self-perceived motor competence and comparatively perceived motor competence between motor competence and physical activity practice in both adolescent boys and girls. The final proposed model explains 19.9% of the variance in boys and 24.2% of the variance in girls. In particular, a direct relationship is also found between tests of motor coordination and motor control and the practice of physical activity. With regard to gender differences, this study found that boys were more physically active and that the values of both motor competence perceptions studied were higher in the male group. This study highlights the extent to which adolescents' perceived motor competence affects their actual motor competence. To develop further research, it would be interesting to study the bidirectionality of some of the correlations elicited herein, thereby providing additional information on the effect of the practice of PA on SPMC, CPMC, and MC. It could also be worthwhile to investigate the effects of a clearly task-oriented tendency in PE on adolescents' self-perception of their motor competence, their compared perception of their motor competence, their frequency of practicing PA, and their motor competence. Our study's main limitation lies in its selective and cross-sectional nature, which limits the causal relationships among its variables; we thus suggest that studies such as this current one and those we are proposing should also be carried out longitudinally. Also, the subjective measurement of PA is another important limitation of our study, suggesting further research using objective instruments for PA measurement.

**Author Contributions:** Conceptualization, E.R., J.L.-P. and S.O.; methodology, E.R., J.L.-P. and S.O.; software, M.D. and S.O.; validation, J.L.-P.; formal analysis, E.R., M.D. and S.O.; resources, J.L.-P. and S.O.; data curation, J.L.-P. and E.R.; writing—original draft preparation, E.R. and S.O.; writing—review and editing, J.L.-P., M.D. and S.O.; project administration, J.L.-P.; funding acquisition, J.L.-P. and S.O. All authors have read and agreed to the published version of the manuscript.

**Funding:** This research was funded within the framework of cooperation with the Pyrenees Working Community Development of Networks of Researchers, Mobility, and Technological Research and Development Projects; within the framework of cooperation with the Pyrenees Working Community, Grand Ref.: CTPP06/09; and by the Government of Aragon. Grants to promote the research activity of research groups are recognized by the Administration of the Community of Aragon for the period 2023–2025. Grant S57_23R: Educaviva-Education and Psychological Processes.

**Institutional Review Board Statement:** This study was carried out in accordance with the recommendations of the Council of the British Educational Research Association in the second edition of their Ethical Guidelines for Educational Research BERA [47], given that there is no national educational research ethics committee operating on a national level in Spain at this moment. The protocol was approved by the Government of the Autonomous Region of Aragon (Spain), following the proposal of the Advisory Council for Research and Development (CONAI + D), as part of a grant for the Development of Networks of Researchers, Mobility, and Technological Research and Development Projects within the framework of cooperation with the Pyrenees Working Community (Ref.: CTPP06/09).

**Informed Consent Statement:** Informed consent was obtained from all subjects involved in this study.

**Data Availability Statement:** The data presented in this study are available on request from the corresponding author.

**Conflicts of Interest:** The authors declare no conflict of interest.

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