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Self-Concept and Academic Achievement in Primary School: A Predictive Study

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Abstract

The study of academic achievement continues to be one of the "star" topics in the field of education today because of its great importance as an indicator for assessing educational quality and has therefore been studied from various perspectives. In this regard, the aim of this study was to study which dimensions of self-concept (behavioral, intellectual, physical, lack of anxiety, social or popularity and subjective happiness-life satisfaction) predict performance in each core subjects (Spanish Language and Literature, Mathematics, Natural Sciences, Social Sciences and First Foreign Language (English)). For this purpose, a sample of 116 students from the last cycle of Primary Education (10-12 years) was selected by accessibility and administered a multidimensional Self-Concept Scale. The data were analyzed using the multiple linear regression technique, evaluating the Root Mean Squared Error, statistical power and effect size in all of them. The main results show that intellectual self-concept is the most important predictor of academic achievement ($p<.05$). Therefore, schools should be aware of the importance of fostering confidence and expectations of success in students' academic tasks.

Introduction

The study of academic achievement is one of the most important topics in the field of education (Arroyo et al., 2019), as it is the main indicator when evaluating the quality and equity of the education system (Rodríguez et al., 2004). This phenomenon is characterized by the numerous factors that influence it, including: personal variables (intelligence, self-concept, etc.), contextual, school (teaching methodology, school climate, teachers, etc.) and social variables (family, peer relations, etc.) (Manassero & Vázquez, 2005). Among personal variables, self-concept is one of the variables most closely linked to academic achievement (Cárcamo et al., 2020; Giner et al., 2019; Gargallo et al., 2009; Herrera et al., 2017; Martínez & Méndez, 2020). Self-concept develops in three distinct stages: a first existential or "primitive self" stage (0-2 years), in which the child develops the perception of him/herself as something different from the rest; an "external self" stage (2-12 years), in which the environment plays the greatest role as there is an important opening to the entry of external information; and a final "inner self" stage (from the age of 12) in which the adolescent tries to define his/her identity. It is in the second stage when

there is greater openness, for example when the student's environment will define to a greater extent the way in which he/she perceives him/herself, which gives great importance to the figure of the teacher given the role he/she plays over the student and the large amount of time they share in the classroom (Cazalla-Luna & Molero, 2013). In this sense, as teachers must be aware of the importance of showing a learner confidence and expectations of success in their tasks so that they try to realize the hopes that have been placed in them. It is vital to achieve students with a positive self-concept in order for them to be able to cope with educational challenges. In other words, the teacher-student relationship has a significant significance, which goes beyond the simple transmission of content and teaching-learning experiences, as the development of the internal beliefs that the student possesses will be closely linked to the skills and learning that the student possesses (Closas et al., 2020).

The self-image that primary school students generate of themselves is largely developed in educational centers, since this is where experiences with different agents are fostered, in which different factors such as success and failure, social relationships or the roles assumed that influence the formation of the self-concept come into play (Galindo-Domínguez, 2019). Consequently, it will be during their stay in primary schools, and because of the experiences there, when the greatest development of self-concept takes place (Cazalla-Luna & Molero, 2013). When students develop a positive self-concept, they have a greater capacity to understand the environment that surrounds them and, therefore, to respond appropriately to problems and circumstances that may arise, which has a favorable influence on adaptation and performance at school, and ultimately, on well-being in general (Sánchez et al., 2019). In contrast, a negative self-concept translates into a lower perception of one's positive characteristics and greater anxiety about failure, directly affecting one's well-being and performance (Lagarda et al., 2021). Likewise, when self-concept is negative, students undervalue their abilities and have an unrealistic view of themselves, which leads to poor educational performance (Chávez-Becerra & Castillo-Nava, 2020). Therefore, it is essential for education to achieve a positive self-concept among students, as this will influence the decisions they make and their academic performance (Van Canegem et al., 2021).

Self-concept has traditionally been defined as the perception or self-perception and knowledge we have of ourselves, which we create based on the experiences and interpretations we make of our context (Shavelson et al., 1976). Following the definition of García et al. (2019), it is a cognitive dimension generated on our mental image and lacks a moral component as it does not include negative or positive value judgments. Self-concept arises as a result of children's lived experience in relation to their environment and is therefore a factor that greatly influences their development (Sánchez et al., 2019).

For decades, self-concept has been conceived as a multidimensional construct (Shavelson et al., 1976). The balanced construction of self-concept depends, to a large extent, on a positive development of the different dimensions that make up an individual's perception and appraisal of him/herself. These dimensions vary in number and identity according to the model of self-concept adopted. One of the most common taxonomies in the literature is that of Marsh et al. (1983), who classify self-concept in four dimensions: physical, social, academic and personal, the latter dimension including emotional, ethical and moral perceptions. Along the same lines, García & Musitu (1999) also define self-concept taking into account the physical, social and academic dimensions, adding, in addition, the family and emotional dimensions. In this sense, the physical dimension refers to the self-

perception that students have about their own physical appearance, as well as their involvement in sporting activities; the social dimension is the perception that the subject has about their way of relating to others; the academic dimension refers to the student's perception of their performance at school; the family dimension is defined as the student's perception of their relationship with their parents in terms of trust and affection; Finally, the emotional dimension is the way in which students perceive their emotional state and how they feel about the responses they give to different situations that may occur in their environment (García & Musitu 1999).

In this study we focus on the classification developed by Piers & Harris (1969) and continued by Piers & Herzberg (2002), as it studies self-concept in a broader and more comprehensive way, with a classification of six factors: a first factor is behavioral self-concept, which refers to how the student perceives his or her behavior at school and at home; the second factor is intellectual and scholastic status, related to the academic self-concept of the models explained above and referring to the perception of performance, abilities and the opinions others have about his or her performance at school; the third factor is appearance and physical image, which would correspond to physical self-concept, emphasizing the student's appearance; the fourth factor is absence of anxiety, which would correspond to physical self-concept, emphasizing the student's appearance; the fourth factor is the absence of anxiety, similar to the emotional self-concept, and refers to the perception of emotional stability in situations where emotions are disturbed; the fifth factor is popularity or social acceptance, linked to the social self-concept of the models explained above, and is the child's perception of relationships with peers in the school environment; finally, the sixth factor is happiness and satisfaction, or the degree to which students perceive their well-being and are satisfied with the life they have.

It has already been mentioned that self-concept is a construct that plays a fundamental role in students' academic performance. This concept is the one that most influences performance, as it largely conditions school learning (Loayza, 2019). The systematic review carried out by Mansilla et al. (2021) with 20 studies from different educational stages concludes that there is a dependence between both variables, with a positive and direct relationship between both variables regardless of the context, the focus of the study or the characteristics of the participants.

Along the same lines, the meta-analysis by Möller et al. (2020), which analyses the relationship between self-concept and academic performance through 121 correlational studies carried out on primary school students in the subjects of language and mathematics, obtains a positive, significant relationship between the variables, with a moderate intensity in both mathematics ($\beta = 0.57$) and language ($\beta = 0.46$). In Huang's (2011) longitudinal meta-analysis conducted with 39 samples of pre-adolescent students, it is concluded that the longitudinal relationship between self-concept and academic performance is between 0.20 and 0.27.

An important consideration is the subject specific nature of the self-concept. The relationships between self-concept and academic achievement depend on the comprehensiveness/specificity of the self-concept measure. This is why some studies have found different results depending on the school subject. The study by Cárcamo et al. (2020) stands out for finding differences in the relationship between self-concept and performance in the subjects of mathematics and language, being significant and positive in all cases, with a correlation of medium

intensity in mathematics for both boys (r=.46) and girls (r=.43), but low in language for boys (r=.09) and girls (r=.18). Schulte & Wegner (2021) show similar results when they demonstrate that there is a close relationship between self-concept and interest in the subject.

All the research cited above focuses on studying self-concept in a unidimensional way, and there is little literature on the analysis of academic achievement from a multidimensional perspective of self-concept, despite the fact that in recent decades some studies have been carried out that highlight the importance of assessing this construct in terms of its multiple dimensions (Urquijo et al., 2002; Salum-Fares et al., 2011; Herrera et al., 2017; García & Musitu, 1999). Most of them agree on the importance of the academic dimension of self-concept above the others when it is related to academic achievement. In this sense, Herrera et al. (2017) analyzed the correlations between the self-concept dimensions of the theoretical model of García & Musitu (1999) with the primary school subjects of Knowledge of the Environment, Spanish Language and Maths, finding positive relationships of moderate intensity between the three subjects and academic self-concept (r=. 44, r=.48, r=.46, respectively), positive with a low intensity in social self-concept (r=.14, r=.18, r=.15), and moderate-low in the relationship with family self-concept (r=.28, r=.29, r=.27), all of these relationships being significant.

However, the correlations were not significant for emotional and physical self-concept in any of the three subjects. Along the same lines, Mansilla et al. (2021) conclude that it is essential to assess students' academic self-concept in order to obtain information about their perceptions of their academic competencies and thus to understand their school behavior. Although the study of the relationship between academic performance and self-concept has been addressed on many occasions, there is a notable lack of research that goes a step further and attempts to predict performance in different subjects based on the different dimensions of self-concept. In this sense, only the regression analysis of Cárcamo et al. (2020) has been found, in which self-concept is the predictor variable with the greatest relative importance in the model on performance in mathematics (β=.43), and the second on performance in language (β =.28) in primary school students. On the other hand, in the model of Giner et al. (2019), with primary and Compulsory Secondary Education (ESO) students, the percentage of variance explained was low, but self-concept was presented as the most important variable of all those considered in the study. Making a distinction by dimensions of self-concept, results can be found at the university level in the multiple linear regression analysis carried out by Gargallo et al. (2009), in which academic performance is explained by 10.5% by academic, physical and family self-concept, the first of these being the most important of the three variables.

In view of the literature review carried out, the need to extend the study from predictive models, attending to the different dimensions of self-concept and from different educational subjects, is evident. Furthermore, the importance of working on this problem in Primary Education has been shown, as it is a transcendental stage where the balanced shaping of the personality begins. Therefore, the general objective of this research is to study which dimensions of self-concept (behavioral, intellectual, physical, lack of anxiety, social or popularity and subjective happiness-life satisfaction) predict performance in each core subjects (Spanish Language and Literature, Mathematics, Natural Sciences, Social Sciences and First Foreign Language (English)) of the last cycle of Primary Education (Royal Decree 126/2014, of 28 February).

Method

This is a quantitative-cross-sectional research based on a non-experimental design, as there is no manipulation of the independent variable (Juste et al., 2012), but the aim is to predict performance in each core subjects by means of predictive models based on the dimensions of self-concept.

Participants

The sample was selected by accessibility (non-probabilistic sampling) and the inclusion criteria were considered to be enrolled in the last cycle of primary education, to attend school regularly (attendance above 90%) and not to maintain face-to-face training at the school throughout the course. The exclusion criterion was failure to provide informed consent from the families to participate in the research. For these reasons, 27 students were eliminated from the study, resulting in a total sample of 116 students from a town in Spain (Canarias) who were in the last cycle of primary education (48.3% were in the fifth year of primary school and 51.7% in the sixth year). Of the total number of students, 46.6% were female and 52.6% were male, aged between 10 and 12 years ($\bar{X}$ = 10.83; SD = 0.77) belonging to the academic year 2020/2021.

Instruments and Variables

As a predictor variable, self-concept is considered, measured by means of the Piers-Harris Self-Concept Scale (Piers & Herzberg, 2002), elaborated to be administered to subjects aged 7 to 12 years and adapted to Spanish by Cardenal & Fierro (2003). The instrument is composed of a total of 80 items on a dichotomous response scale (Yes/No) organized into six dimensions: (i) behavioral (18 items), which describes the degree to which the individual affirms or denies behaviors of a problematic nature; (ii) intellectual (17 items), which measures the child's self-evaluation in relation to academic tasks, including a general perception towards the educational institution; (iii) physical (12 items), which asks about behaviors related to their physical characteristics (appearance and physical attributes), and aspects such as leadership and the ability to express their opinions; iv) lack of anxiety (12 items), which describes an altered mood and includes different emotions related to worry, nervousness, sadness or fear; v) social or popularity (12 items), which assesses how the individual values his/her relationship, popularity and acceptance among his/her peer group; vi) subjective happiness-life satisfaction (9 items), which describes the general feeling of being happy and content with life. With respect to psychometric properties, high internal consistency (α = .91) was found for the total score.

The dependent or response variable is academic performance operationalized as the average score obtained by fifth and sixth graders in the final assessment in each core subjects: Spanish Language and Literature, Mathematics, Natural Sciences, Social Sciences and First Foreign Language (English) (see Table 1). These variables have been selected as they have a greater curricular weight in Primary Education. In other words, unlike other subjects, these subjects are compulsory throughout Spain because their purpose is to guarantee essential knowledge and competences in a common way.

Table 1 shows the academic performance in each of the core subjects, as well as the number of subjects, mean, minimum and maximum values, and standard deviation. As can be seen, the average marks are not very high, around 6, with the highest score being obtained in Social Sciences.

Table 1. Descriptive Values of the Average Score Obtained in the Different Academic Subjects

	N	Minimum	Maximum	M	SD
Spanish Language and Literature	116	2	10	6.190	1.851
Mathematics	116	2	10	6.060	1.922
Natural Sciences	116	2	9	6.241	1.677
Social Sciences	116	3	10	6.500	1.602
English	116	3	9	6.181	1.629

This score obtained in each subject (between 1-10 points) derives from the total evaluation of the learning established in the evaluation criteria described in the Resolution of 13 May 2015 establishing the rubrics of the evaluation criteria in Primary Education in the autonomous community of the Canary Islands, which emanate from Royal Decree 126/2014, of 28 February. These assessment criteria are the fundamental reference for the assessment and marking of pupils. It is prescriptive to highlight that we chose to assess academic performance in each core subjects through the average score of academic subjects instead of standardized tests, as the scientific literature reflects that these are more valid and reliable results as they avoid external factors such as fatigue, sensitization, contrast or learning adaptation during the performance of standardized tests (Sanz et al., 2020).

Procedure and Data Analysis

This research was conducted during the 2020/2021 academic year. Firstly, an online meeting was held with the head teachers of the schools at the end of April 2021, where they were informed of the purpose and protocol of the study, and informed consent was requested so that the schoolchildren could participate. Subsequently, they informed the Pedagogical Coordination Committee (CCP) and the School Council of each school, where they agreed to participate in the study. In May 2021, the parents/legal guardians of the pupils completed an authorization form in which they voluntarily agreed to their children's participation in the study. This research was carried out in accordance with the ethical standards recognized by the Declaration of Helsinki (2013 revision), following the recommendations of Good Clinical Practice of the EEC (document 111/3976/88 of July 1990) and the current Spanish legal regulations governing clinical research on humans (Royal Decree 561/1993 on clinical trials).

Prior to conducting this quantitative research, the sample size was calculated (Martínez et al., 2020), which is a practice rarely carried out by researchers (Sormani, 2017) despite its importance as it guarantees that the results of the study are robust (Quispe et al., 2020). After jointly estimating the statistics in Table 2, where u refers to the number of variables and f^2 refers to the effect size in linear regression models, it was obtained that the minimum sample should be a total of 98 subjects in order to carry out the multiple linear regression technique, something that is fulfilled since we have a total sample of 116 students.

Table 2. Statistics for Sample Size Calculation

u	f^2	Sig.	Power
6	0.15	0.05	0.80

Once the sample adequacy had been checked, the multiple linear regression technique was used to respond to the research objective. Prior to the development of the regression models, the independent variables were correlated (see Table 3) in order to eliminate those that were providing the same information. For this purpose, Spearman's correlation coefficient was used, since none of the variables fulfilled the normality assumption (Martínez et al., 2020). It should be noted that no variable was eliminated, as the intensity of the relationship was less than 0.8 (Aldas & Uriel, 2017).

Table 3. Spearman Correlation

	M	*SD*	1	2	3	4	5
1. Behavioral	14.966	2.741					
2. Intellectual	11.250	3.560	.434**				
3. Physical	8.905	2.670	.252**	.574**			
4. Anxiety	6.060	2.425	.355**	.416**	.394**		
5. Popularity	9.488	2.236	.358**	.456**	.358**	.357**	
6. Happiness	7.276	2.028	.459**	.656**	.583**	.393**	.451**

Note. ***$p < .001$, ** $p < .01$, *$p < .1$

The multiple linear regression technique was then carried out using the stepwise method for each core subjects. Thus, a total of five predictive models were estimated. Before interpreting the coefficients, goodness-of-fit and model assumptions were assessed. To analyze the goodness-of-fit, the F-test was used, which indicates whether the linear relationship being analyzed is statistically significant. It is worth noting that in all models this statistic was significant, thus confirming the relevance of the linear regression technique. In addition, the adjusted R^2 and the effect size of the model using the f^2 statistic were used to assess the quality of the fit. An effect size is considered small at a value between 0.02 and 0.15, medium between 0.15 and 0.35 and large at values above 0.35 (Cohen, 1988).

The assumptions were checked as indicated by Pardo & San Martín (2010). The assumption of non-collinearity was verified using the Variance Inflation Factor, where values below 10 indicate that there is no problem of collinearity between the independent variables. The assumption of linearity by means of the lack of fit test through the creation of second and third order polynomial regressions. If these variables are not significant, it is concluded that the predictors are linearly related to the response variable. The assumption of independence of the errors through the calculation of the Durbin Watson statistic where values between 1.5 and 2.5 reaffirm this independence. The assumption of homoscedasticity of the residuals by representing a scatter plot of the forecasts and the residuals to check that the populations have the same variance. The Breusch-Pagan test has also been used to check the homogeneity of the residuals. Finally, the assumption of normality of the residuals referred to the fact that the scores of each group constitute a random sample drawn from the normal population, using Anderson-

Darling statistics and Q-Q plots of the residuals. In all models these assumptions are met. The influence of outliers was also tested using Cook's distance. As the value obtained was less than 1, it was concluded that there was no influential case (Field, 2013). When running a multiple linear regression model, it is essential to determine the individual contribution of each predictor. For this purpose, the R^2 statistic averaged according to the order in which the predictors are entered into the model was used (Groemping, 2006).

Finally, where the lower the Root Mean Squared Error (RMSE), the lower the prediction error of the model (Raschka & Mirjalili, 2019), and the statistical power of the regression analysis were evaluated, considering values above 80% optimal (Cohen, 1988). The latter statistic refers to "the degree of probability of rejecting a null hypothesis when it is actually false" (Cárdena & Arancibia, 2014, p. 211-212). For the analysis of all the data we used the R program, version 4.2.0 (R Core Team, 2021), specifically for the calculation of the sample size and the statistical power of the predictive models we used the pwr package (Champely et al., 2018) and for the assumptions those explained in table 4.

Table 4. Kicks Used When Checking Assumptions

Assumptions	**Packages**
Normality	Nortest (Gross & Ligges, 2015)
Homoscedasticity	lmtest (Hothorn et al., 2015)
Linearity	Car (Fox et al., 2012)
Multicollinearity	
Independence of errors	

Also, to assess the relative importance of the explanatory variables the relaimpo package (Groemping, 2006).

Results

The results are presented below for each of the different core subjects, presenting only the significant variables.

Academic Achievement in Language and Literature

Table 5 shows the final predictive model for Language and Literature. Of the six variables introduced in the model, two (intellectual and physical) are statistically significant. Specifically, for each point that the intellectual self-concept of students increases, their performance in Language and Literature will increase by 0.308 points. However, physical self-concept is negatively related to the response variable. This means that for every point increase in physical self-concept, student performance decreases by 0.275. In relation to the relative importance of each explanatory variable, it is clear that the intellectual dimension has a higher relative importance (77%) than the physical dimension (24%).

In terms of goodness of fit, this model explains approximately 19% of the variance in Language and Literature achievement, which refers to a medium effect size (Cohen, 1988). The prediction error is low (1.64) and the

statistical power is high (95%). In relation to the latter statistic, this means that there is a 95% probability that, in other studies with the same characteristics as this one, the effects are significant.

Table 5. Regression Statistics (Language and Literature)

	B (SE)	**Relative importance**
Intercept	5.175 (0.578)***	
Intellectual	0.308 (0.057)***	.776
Physical	-0.275 (0.07)***	.244
R^2 adjusted	.188	
$\boldsymbol{f^2}$	0.255	
RMSE	1.645	
Statistical power	95%	

Note. ***p < .001, **p < .01, *p < .1

Academic Achievement in Mathematics

Table 6 shows the predictive model for Mathematics. In relation to the coefficients, for each point increase in students' intellectual self-concept, performance increases by 0.275 points. However, for each point increase in physical self-concept, performance in Mathematics decreases by 0.289 points. Regarding goodness of fit, this model explains approximately 14% of the variance in Mathematics performance, which refers to a mean effect size (0.182). Regarding the relative importance, it is clear that the intellectual variable has a higher importance (70%) in the model. As for the RMSE, its value is low, which indicates little prediction error, with a statistical power of 90%.

Table 6. Regression Statistics (Mathematics)

	B (SE)	**Relative importance**
Intercept	5.471 (0.618)***	
Intellectual	0.275 (0.061)***	.701
Physical	-0.281 (0.082)***	.299
R^2 adjusted	.139	
$\boldsymbol{f^2}$	0.182	
RMSE	1.760	
Statistical power	90%	

Note. ***p < .001, **p < .01, *p < .1

Academic Achievement in Natural Sciences

The final model of achievement in Natural Science consists of a single significant variable (behavioural) (see Table 7). Specifically, the value of its coefficient indicates that for each point increase in behavioural self-concept, Performance will increase by 0.193 points. In terms of goodness of fit, this model explains approximately 9% of

the variance of the criterion variable, the effect size being small. The prediction error is low (1.468) and the statistical power is above 80%, so it is considered acceptable.

Table 7. Regression Statistics (Natural Sciences)

	B (SE)	**Relative importance**
Intercept	3.327 (0.876)***	
Behavioral	0.193 (0.057) ***	.302
R^2 adjusted	.091	
f^2	0.100	
RMSE	1.468	
Statistical power	88%	

Note. *** $p < .001$, ** $p < .01$, * $p < .1$

Academic Achievement in English Language

Table 8 shows the final regression model for the dependent variable English performance. This model is made up of three significant variables, of which intellectual self-concept and happiness are positively related to the response variable. For each point increase in students' intellectual self-concept and happiness, achievement increases by 0.194 and 0.171 points, respectively. However, for each point increase in physical self-concept, performance decreases by 0.259 points. Regarding goodness of fit, this model explains approximately 16% of the variance of the criterion variable with a medium effect size. The variable with the highest relative importance is intellectual self-concept (49%). The prediction error is small (1.468) and the power is very high (94%).

Table 8. Regression Statistics (English Language)

	B (SE)	**Relative importance**
Intercept	5.055 (0.556)***	
Intellectual	0.194 (0.058)***	.491
Physical	-0.259 (0.073)***	.276
Happiness	0.171 (0.101)*	.233
R^2 adjusted	.159	
f^2	0.221	
RMSE	1.468	
Statistical power	94%	

Note. *** $p < .001$, **$p < .01$, *$p < .1$

Academic Achievement in Social Sciences

The final model of performance in Social Studies is made up of a total of two significant variables (intellectual and physical self-concept) (see Table 9). In relation to the coefficients, for each point increase in students' intellectual self-concept, performance increases by 0.316 points. However, for each point increase in physical

self-concept, performance in Mathematics decreases by 0.267 points. The variable with the highest relative importance is intellectual self-concept (80%). In terms of goodness of fit, this model explains approximately 27% of the variance of the criterion variable, and the effect size is high. The variable with the highest relative importance is the intellectual dimension (0.799). Finally, the RMSE is low (1.347) and the statistical power of the analysis is high.

Table 9. Regression Statistics (Social Sciences)

	B (SE)	**Relative importance**
Intercept	5.320 (0.473)***	
Intellectual	0.316 (0.047)***	.799
Physical	-0.267 (0.063)***	.201
R^2 adjusted	.273	
$\boldsymbol{f^2}$	0.401	
RMSE	1.347	
Statistical power	100%	

Note. ***$p < .001$, **$p < .01$, *$p < .1$

Discussion and Conlusion

The aim of this research was to study which dimensions of self-concept (behavioral, intellectual, physical, lack of anxiety, social or popularity and subjective happiness-life satisfaction) predict performance in each core subjects (Spanish Language and Literature, Mathematics, Natural Sciences, Social Sciences and First Foreign Language (English)) in the last cycle of Primary Education (10-12 years). The main finding is that the intellectual dimension of the multidimensional self-concept is the most important variable in relation to performance in the core subjects of the primary curriculum, with the exception of the area of Natural Sciences, where the only significant variable was the behavioral dimension. These results take on greater importance since this study is a pioneer in the development of predictive models of the dimensions of the multidimensional self-concept on academic performance at the Primary Education stage, hence the original focus of our study. At the educational level, these results take on greater importance given the age of the sample, since these are transcendental stages of life where the consolidation of the individual's personality can have an impact on greater academic performance and, consequently, on the beliefs and abilities that one has about oneself (Möller et al., 2020).

Considering the theory of psychoanalysis (Freud, 1923), these findings may be due to the fact that the intellectual self-concept is the most complete description of what we are capable of doing academically with our current self. Therefore, it can be considered as an anticipatory factor of academic performance, since school behavior cannot be understood without considering the perceptions that the subject has of him/herself and, in particular, of his/her own academic competence. When students have a competent self-image of themselves, they have greater self-confidence and high expectations of self-efficacy, and are more involved in their own learning process (Manassero-Mass & Vázquez-Alonso, 2005). Therefore, it could be said that there is a logical association between intellectual self-concept and academic performance; that is, the better the schoolchild's self-perception towards

academics, the better results he/she should obtain. This idea is reinforced in studies such as the systematic review by Peperkorn & Wegner (2020), which shows how self-concept positively influences high academic achievement and vice versa, as well as having a positive effect on future career success.

In terms of the association found in the area of Natural Sciences on behavioral self-concept; which refers to the way in which students perceive their behavior at school and at home, this can be explained by the fact that the aim of this area is for students to acquire the search for solutions to one of the most urgent problems facing humanity in order to survive and develop, which involves making individual and collective decisions from an ethical approach aimed at maintaining a balance between comprehensive development and care for the environment (Royal Decree 126/2014, of 28 February). As can be seen, there is a close link between the purpose of this area and behavioral self-concept. On the other hand, another of the dimensions of self-concept that has been shown to be a predictor of performance in the core subjects of the primary curriculum, with the exception of Natural Sciences, has been physical self-concept. In this case, it was found that the lower the physical self-concept, the higher the performance in these subjects.

This link between physical self-concept and performance could be explained by the intrinsic characteristics of the stage in which schoolchildren are immersed: adolescence. This begins with puberty, which marks the onset of puberty, generally occurring between 10 and 12 years of age. This stage is often differentiated from other developmental periods by its characteristic identity crisis (Cazalla-Luna & Molero, 2013). In this sense, scientific evidence shows that physical self-concept has a significant relevance in the adolescent stage, which does not last in later ages (Closas et al., 2018, Giner et al., 2019). This is due to the existence of a great social pressure towards physical attractiveness that begins at this stage of life. This is partly due to the presence of more hormonal factors and accelerated physical growth that influence interpersonal relationships between the sexes. In this evolutionary period, the importance of this physical aspect for self-concept is notable, since the result of one's own identity, image, self-respect and, in short, behavior depends on the result of whether or not one transgresses the rules and resolves normal tasks satisfactorily (Molero et al., 2013).

In this process of searching for identity that characterizes adolescents, it requires them to develop a philosophy of life to guide their behavior. In this sense, self-concept is an integral element of personal identity which includes evaluations, representations and attitudes that each person forges of him/herself. This knowledge provides a framework for the perception and organization of one's own experience, which leads to the regulation of behavior and may affect motivation to learn (Iniesta-Martínez & Mañas-Viejo, 2014).

In this line of argument, James (1890), through his theory of the stream of consciousness, affirms that everyone has as many social selves as there are individuals who generate a mental image of that person. This author states that the self-concept is eminently social; and, on the other hand, he points out the importance of the difference between achievements (perceived self) and aspirations (ideal self), and of the distinction between perception (judgement) and the importance conferred (value) to those achievements. This theoretical underpinning supports why students with lower physical self-concept would perform better in these academic subjects. That is, it has recently been sociologically described that we are in the age of image, and it seems that, in a generalized way, all

schoolchildren, whether they are good students or not, take care of their physical appearance, they want to be and look attractive (Carrillo-López, 2021). People with a body image close to the ideal of beauty are better evaluated by the rest of society and their interpersonal relationships are more satisfactory. Hence, there may be a dissatisfaction with their physical appearance. However, Iniesta-Martínez & Mañas-Viejo (2014) indicate that the stereotype of the classic "nerd", with an unkempt and socially unaccepted image, is increasingly disappearing. The stereotypes of brilliant schoolchildren who are careless in their attention to their external appearance are therefore being left behind.

In this line, some research (García et al., 2019; Grygiel et al., 2017) has described that this era is characterized by changing tendencies of schoolchildren, framed in a society where individualism is prioritized and with infinite offers in terms of material things. Therefore, from compulsory education onwards, we must work on prevention, increasingly trying to ensure that the results extracted from the various research studies on the relationship between school performance and the dimensions of self-concept can lead to specific pedagogical actions and create educational projects aimed at promoting the balanced personal development of schoolchildren and their academic performance.

Finally, it should be noted that there are some limitations to this research. Firstly, the fact that participants were not randomly selected means that many variables are not controlled for (low external validity). Secondly, the fact that the instruments used conform to self-reporting strategies may lead to social desirability bias in the results. Furthermore, the fact that we only included and analyzed those schoolchildren who maintained a classroom education at school due to the covid-19 pandemic is another limitation of the study that needs to be overcome in future studies. In addition, it would be interesting for future intervention and longitudinal studies to analyze what happens with other subjects and to control for confounding variables such as the maturity level of the schoolchild, socio-economic status or a non-face-to-face educational training. That is, they should consider that self-perceptions develop in a social context, which implies that the self-concept and its particular functioning is linked to the immediate context. However, self-perceptions also depend on the evolutionary characteristics of the individual at each stage of development. Consequently, the development of self-concept can be seen from an interactionist approach: the environment enables certain experiences which will be dealt with according to developmental possibilities (Cazalla-Luna & Molero, 2013).

An example of this is the fact that while in early childhood schoolchildren recognize their need for parents for their survival, in adolescence, peers and the achievement of family independence are more important. The main strength of the study is its methodological approach, as it studies the influence of the dimensions of self-concept on each academic subjects through predictive models. These are characterized by their high statistical power, low prediction error (RMSE) and medium effect size.

In conclusion, on the basis of the results obtained and with the suggested caution, it is concluded that the physical and intellectual dimensions of the multidimensional self-concept are predictors to be taken into account in the performance of each academic subjects in the last cycle of primary school; with the exception of the area of natural sciences, where the only predictor was the behavioral dimension. These results may be of particular interest to

educational staff in order to contribute to the improvement of the quality of the teaching-learning process. In this way, self-concept can be taken into account as another variable within the educational context that can be used to guide them towards a comprehensive education, since the relevance and applicability of self-concept can be an important product variable (balanced development of self-concept as an objective of the teaching-learning process), and also as a variable that can facilitate the achievement of other desirable results (higher academic performance).

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