Revista de Psicodidáctica 29 (2024) 139–146

Revista de Psicodidáctica

www.elsevier.es/psicod

Original

Using profile analysis and ROC curves to examine the relationship between perfectionism and academic self-efficacy in secondary school students

Andrea Fuster-Rico[a], María Vicent[a,*], Carolina Gonzálvez[a], María Pérez-Marco[a], Lucía Granados-Alós[b], and Raquel Suriá[c]

[a] *Department of Developmental Psychology and Teaching, University of Alicante, Spain*
[b] *Faculty of Education, International University of Valencia, Spain*
[c] *Department of Communication and Social Psychology, University of Alicante, Spain*

ARTICLE INFO

Article history:
Received 1 October 2023
Accepted 11 January 2024
Available online 8 February 2024

Keywords:
Perfectionism
Academic self-efficacy
Adolescent population
Latent profile analysis
ROC curves

ABSTRACT

This study attempts to clarify the relationship between multidimensional perfectionism and academic self-efficacy in adolescents using a dual approach: variable-oriented and person-oriented. The study sample consisted of 1375 students aged 15 to 18 ($M = 16.36$, $SD = 1.04$). The *Child and Adolescent Perfectionism Scale* and the *Perceived Self-Efficacy in Academic Situations Scale* were used. Four perfectionist profiles were obtained from a combination of *socially prescribed perfectionism* (SPP) and *self-oriented perfectionism* (SOP) based on the *Latent Profile Analysis*: *very low perfectionism*, *low perfectionism*, *high perfectionism*, and *moderate perfectionism*. The *high perfectionism* group scored significantly higher on academic self-efficacy than the other groups. Furthermore, *post-hoc* comparisons revealed statistically significant differences in academic self-efficacy between all profiles, with moderate to large effect sizes, with the exception of the *very low* and *low perfectionism* groups. Logistic regressions demonstrated that SOP and SPP positively and significantly predicted high scores on academic self-efficacy. Upon analysis of the ROC curves, it was found that both SOP and SPP display good and similar discriminative ability, correctly classifying 79% and 76% of the participants with and without high academic self-efficacy levels, respectively. Possible explanations and implications for Educational Psychology are discussed.

Empleando análisis de perfiles y curvas ROC para examinar la relación entre el perfeccionismo y la autoeficacia académica en estudiantes de Educación Secundaria

Palabras clave:
Perfeccionismo
Autoeficacia académica
Población juvenil
Análisis de perfiles latentes
Curvas ROC

RESUMEN

El presente estudio pretende contribuir a esclarecer la relación que existe entre el perfeccionismo multidimensional y la autoeficacia académica en población juvenil a partir de un doble enfoque: centrado en la persona y en la variable. La muestra está compuesta de 1.375 estudiantes de entre 15 y 18 años ($M = 16.36$, $DT = 1.04$). Se emplean la *Child and Adolescent Perfectionism Scale* y la *Escala de Autoeficacia Percibida en Situaciones Académicas*. A través del análisis de perfiles latentes se obtienen cuatro perfiles perfeccionistas resultado de la interacción entre el *perfeccionismo socialmente prescrito* (PSP) y el *perfeccionismo autoorientado* (PAO): *perfeccionismo muy bajo*, *perfeccionismo bajo*, *perfeccionismo alto* y *perfeccionismo moderado*. El grupo con *perfeccionismo alto* puntúa positiva y significativamente más alto en autoeficacia académica que el resto. Además, las comparaciones *post-hoc* muestran que, en relación con la autoeficacia académica, existen diferencias estadísticamente significativas entre todos los perfiles

PII of original article:S1136-1034(24)00002-9.
* Corresponding author.
E-mail address: maria.vicent@ua.es (M. Vicent).

https://doi.org/10.1016/j.psicoe.2024.02.004

con tamaños del efecto moderados y grandes, excepto para aquellos con *perfeccionismo muy bajo* y *perfeccionismo bajo*. Las regresiones logísticas evidencian que el PAO y el PSP predicen de forma positiva y significativa altas puntuaciones en autoeficacia académica. Al emplear el análisis de las Curvas ROC, se obtiene que la capacidad discriminativa tanto del PAO como del PSP es buena y similar, clasificando correctamente al 79% y 76% de los participantes con y sin altos niveles de autoeficacia académica. Se discuten las posibles explicaciones y las implicaciones de los resultados para el ámbito de la Psicología de la Educación.

Introduction

The study of perfectionism, a complex and multidimensional personality trait (Flett et al., 2022), is increasingly frequent, with regard to both its origins and its development (Jeong & Ryan, 2022; Vicent et al., 2017). This trait is notable given its close link to psychopathology in general (Limburg et al., 2017) and its high prevalence in clinical and community populations, with rates that have increased exponentially over recent decades (Curran & Hill, 2019). Although no consensus exists regarding the definition of perfectionism, Flett et al. (2016) attributed two dimensions to child and youth perfectionism. On the one hand, socially prescribed perfectionism (SPP) refers to the belief that others demand that an individual achieve perfection, while, on the other hand, self-oriented perfectionism (SOP) refers to self-criticism and striving for perfection, as well as the self-imposition of high standards. Although diverse studies have positively linked certain perfectionism dimensions with adjustment variables such as academic performance (Madigan, 2019), psychological well-being (Kamushadze et al., 2021), conscientiousness (Di Fabio et al., 2019), and general and creative self-efficacy (Goulet-Pelletier et al., 2022); others have clearly maladaptive effects (Chemisquy et al., 2019). Therefore, although perfectionism may be viewed from a positive perspective (Kinman & Grant, 2022), considerable pressure to be perfect exists amongst adolescents, causing a major social problem (Campeau et al., 2023).

Perfectionism and academic self-efficacy

Academic self-efficacy has been defined as an individual's set of beliefs regarding his/her ability to achieve a desired result through academic tasks in distinct settings, circumstances, and difficulty levels (Ford et al., 2023; Wuthrich et al., 2021). In the educational setting, it is a variable of great relevance given its impact on student motivation and learning (Codella et al., 2020). Therefore, it has been positively and significantly related to academic performance (Martínez et al., 2021; Weber & Harzer, 2022; Zeinalipour, 2022), emotional implication (Bostan et al., 2022), and school commitment and belonging (Yang et al., 2022). In addition, it has been found to develop in large part from how students perceive and interpret major sources of information (Ford et al., 2023). This is the area in which perfectionism may play a relevant role. High self-imposed standards or demands of others and a predisposition to seek perfection may influence the student's academic self-efficacy development (Ford et al., 2023).

Few studies have provided preliminary data on the relationship between perfectionism and academic self-efficacy in children and adolescents. One study published by Bong et al. (2014), using a sample of 304 students aged 12 and 13, found that SOP is positively and significantly correlated with academic self-efficacy in the areas of mathematics and English language, but this was not the case with SPP. Along these lines, Ford et al. (2023) examined the relationship between perfectionism and mathematical academic self-efficacy in a sample of 1,683 adolescents aged 11 to 14, finding that mathematical self-efficacy is positively and significantly related to SOP, while results were not significant for SPP.

The other scientific findings with regard to the link between these two variables focuses on the analysis of general self-efficacy in university students or adults, having contradicting results (Arazzini-Stewart & De George-Walker, 2014; Kurtovic et al.,2019; Pázozdy et al., 2023; Seo, 2008; Wang et al., 2023; Willians & Edwards, 2022). On the one hand, Seo (2008), Wang et al. (2023) and Willians and Edwards (2022) found a positive and statistically significant relationship between SOP and general self-efficacy. However, Wang et al. (2023) observed that SPP was significantly and negatively linked to self-efficacy. On the other hand, using other indicators of perfectionism, distinct from SOP and SPP, Arazzini-Stewart and De George-Walker (2014), reported that there is a significant and negative relationship existing between perfectionism and self-efficacy. Kurtovic et al. (2019) found that self-efficacy had a statistically significant negative relationship with discrepancy, while for standards and order, there was a positive and statistically significant relationship. Finally, Pázozdy et al. (2023) also analyzed the bivariate correlations, which revealed negative associations between perfectionism and self-efficacy, only reaching statistical significance in the female samples.

After reviewing the literature on perfectionism and academic self-efficacy, a series of limitations were found. Firstly, only two studies specifically focused on academic self-efficacy, having results that coincided in finding positive and statistically significant relationships between mathematical academic self-efficacy and SOP, with this not being the case for SPP (Bong et al., 2014; Ford et al., 2023). However, these results only provide data regarding self-efficacy within this specific area of knowledge, so they cannot be extrapolated to overall academic self-efficacy. Secondly, although childhood and adolescence are sensitive periods for the development of perfectionism (Damian et al., 2022), all of the studies were carried out on university student populations, except for two that considered a child/youth population (Bong et al., 2014; Ford et al., 2023) and the study by Willians and Edwards (2022) considering an adult population.

Finally, the cited works took a variable-oriented approach as opposed to a person-oriented one. Currently, however, the person-centered approach is considered an emerging research line in the field of perfectionism (e.g. Haraldsen et al., 2021; Seong & Chang, 2021; Stornaes et al., 2019; Vicent et al., 2017; Vicent, Inglés, González, Sanmartín, Aparicio-Flores, et al., 2019; Vicent, Inglés, González, Sanmartín, Ortega-Sandoval, et al., 2019; Vicent et al., 2021; Vicent et al., 2022), since it permits the identification of how perfectionist dimensions combine through profiles, presenting the results in terms of the adaptation and mismatch obtained by each profile, to better reflect the reality experienced by individuals (Vicent, Inglés, González, Sanmartín, Aparicio-Flores et al., 2019). Very few studies on perfectionist profiles have been conducted with child and adolescent populations. Furthermore, the profile solutions obtained tend to vary from study to study, perhaps due to the use of different scales to measure perfectionism. For example, Vicent, Inglés, González, Sanmartín, Aparicio-Flores et al. (2019) and Vicent et al. (2022) used the *Child and Adolescent*

Table 1
Sample distribution by sex and age

	15 years old	16 years old	17 years old	18 years old	Total
Boys	169	216	192	118	695
	12.3%	15.7%	14.0%	8.6%	50.5%
Girls	189	187	189	115	680
	13.7%	13.6%	13.7%	8.4%	49.5%
Total	358	403	381	233	1375
	26.0%	29.3%	27.7%	16.9%	100%

Perfectionism Scale (CAPS; Flett et al., 2016) and obtained three perfectionism profiles (high perfectionism, moderate perfectionism, and no perfectionism) whereas Haraldsen et al. (2021) used the *Frost Multidimensional Perfectionism Scale* (FMPS; Frost et al., 1990) and identified four profiles (no perfectionism, perfectionism dominated by effort, perfectionism dominated by concerns, and mixed perfectionism).

The present study

This study attempts to clarify the relationship between multidimensional perfectionism and academic self-efficacy in adolescents using a dual approach: person-oriented and variable-oriented. First, (1) it attempted to identify profiles of youth perfectionism resulting from the combination of the SPP and SOP dimensions. Next, (2) it aimed to verify whether the identified profiles varied from one another in terms of academic self-efficacy levels. Based on past literature that identified classes of perfectionism using the CAPS, three classes were expected to be found, consisting of high, moderate, and no perfectionism (Vicent, Inglés, Gonzálvez, Sanmartín, Aparicio-Flores et al., 2019; Vicent et al., 2022). Assuming that this three-class model is found, it is expected that the *high perfectionism in SOP* group will have the highest levels of academic self-efficacy since, according to Bong et al. (2014) and Ford et al. (2023), there is a significant positive association between SOP and mathematics academic self-efficacy, but this is not the case for SPP. Second, using a variable-oriented approach, (3) the study analyzes the predictive capacity of attaining high scores on academic self-efficacy according to both perfectionist dimensions, SOP, and SPP; (4) and the discriminative capacity of both subscales for identifying individuals with and without high levels of academic self-efficacy. In this way, according to Bong et al. (2014) and Ford et al. (2023), it was expected that the SOP dimension would have a positive predictive capacity and a good discriminative capacity regarding the condition of having or not having high self-efficacy.

Method

Participants

Study participants were selected by randomized cluster sampling. The primary geographic area was the province of Alicante: center, north, south, east, and west. The secondary units are the compulsory secondary education institutes (two to three, selected randomly and in proportion in each area, choosing 15 public and private institutes). Classrooms were the tertiary units, with four being randomly selected, one per course year from the 3rd year of compulsory secondary education to the 2nd year of baccalaureate studies. Following this system, the sample consisted of 1,375 students aged 15 to 18 ($M = 16.36$, $SD = 1.04$), of which 695 were boys and 680 were girls. Table 1 shows the distribution of the sample based on sex and age. The sample is homogenous, as revealed by the Chi-squared test ($\chi^2 = 3.103$, $p = .38$). The ethnic composition of the sample is: 86.34% Spanish, 6.79% Latin American, 4.12% Arab, 2.55% other European, and 0.20% were Asian. In most cases, the socioeconomic level of the participants was average.

Instruments

Child and Adolescent Perfectionism Scale (CAPS; Flett et al., 2016). This scale evaluated SPP (ten items; e.g. «I want to be better in everything that I do») and SOP (12 items; e.g. «I feel like people ask too much about me») using a 5-point Likert-like scale (1 = false, 5 = very true). Reliability levels for SOP in this study are $\alpha = .80$ and $\Omega = .81$, whereas for SPP they are $\alpha = .80$ and $\Omega = .82$. The scale has been validated in Spain for a population of children aged 8 to 12 (Vicent, Inglés, Sanmartín et al., 2019).

Scale of Perceived Self-efficacy in Academic Situations (EAPESA; García-Fernández et al., 2010). This instrument has the objective of measuring the expectations of children and university students in terms of their self-efficacy in educational situations. It consists of 10 items (e.g. «I consider myself to be sufficiently capable of successfully taking on any academic task») measured using a 4-point Likert-like scale (1 = never, 4 = always), having a reported reliability for this study of $\alpha = .85$ and $\Omega = .87$.

Procedure

This study was approved by the Ethics Committee of the University of Alicante (UA-2023-03-07). A meeting was held with the directors of the selected schools to inform them of the proposed objectives, inviting them to collaborate in this project. In addition, written parental consent was requested. The instruments were applied collectively and anonymously during school hours. The average time for instrument administration was 15 minutes for the CAPS and five minutes for the EAPESA.

Statistical analysis

Bivariate correlations between the perfectionist dimensions and the ten items making up the EAPESA were analyzed. According to the values proposed by Cohen (1988), the magnitude of these correlations was considered small when the values range between 0.10 and 0.29; moderate between 0.30 and 0.49, and large for values equal to or greater than 0.50. For profile identification, a latent profile analysis was performed. The choice of the optimal profile was obtained from the theoretical interpretability of each model and considering the indices proposed by Song and Kim (2019): the lowest values of the Bayesian Information Criterion (BIC) and the Akaike Information Criterion (AIC); p values under .05 for the *Vuong-Lo-Mendell-Rubin Likelihood-Ratio Test* (LRT) and the *Bootstrap Likelihood Ratio Test (BLRT)*; and entropy scores approaching 1. In addition to these indices and statistics, to add sense to the classification by classes, no solution was considered if it included small profiles (with less than 25 subjects). These analyses were carried out using the MPLUS 8.10 program.

After determining the best fit of the models of perfectionism profiles, interclass differences in the mean scores of the 10 EAPESA items were calculated using analysis of variance (ANOVA). *Post hoc* tests (Bonferroni method) were also performed to identify where

Table 2
Indices of fit for the results of the latent profile analysis

Models	AIC	BIC	Adjusted BIC	LRT	Adjusted LRT	BLRT	Entropy	Size
2	7307.92	7344.50	7322.27	<.001	<.001	<.001	.68	0
3	6972.06	7024.32	6992.55	<.001	<.001	<.001	.75	0
4	**6871.15**	**6939.09**	**6897.79**	**.002**	**.003**	**<.001**	**.77**	**0**
5	6819.05	6902.67	6851.85	.099	.106	<.001	.72	1
6	6801.68	6900.98	6840.62	.050	.055	<.001	.75	2
7	6790.35	6905.32	6835.44	.165	.176	<.001	.74	2

Note. AIC = Akaike Information Criteria; BIC = Bayesian Information Criteria; LRT = Vuong-Lo- Mendell-Rubin Likelihood-Ratio Test; BLRT = Bootstrap Likelihood Ratio Test; Bold data = selected model.

there were statistically significant differences between the perfectionism profiles with regard to academic self-efficacy. In addition, the effect size was obtained through calculation of Cohen (1988) to determine the size of the differences found, interpreted as follows: *d* values between 0.20 and 0.49, between 0.50 and 0.79, and above 0.80 for small, moderate, and large effect sizes, respectively.

Binary logistic regression was used to analyze the predictive capacity of SOP and SPP on high scores on academic self-efficacy (scores above or equal to the 75th centile) using the forward stepwise regression procedure based on the Wald statistic. The predictive capacity was estimated using the Odds Ratio (OR), with values greater than 1 being considered a positive prediction; values less than 1 being negative predictions; and values equaling one being an absence of predictive capacity (De Maris, 2003). Both analyses of variance and logistic regressions are performed using the SPSS 28 program.

Finally, in order to verify the discriminative capacity of the scores on perfectionism to identify subjects with or without high levels of academic self-efficacy, the ROC curves were calculated (sensitivity versus specificity) separately for each perfectionism dimension (e.g., SOP and SPP). To interpret the value of the area under the curve (AUC), the following criteria were considered: between .75 and .90, it was estimated that the test is good; between .90 and .97, it is assessed that the discriminative capacity is very good; values between .97 and 1 indicate an excellent discrimination (Martínez-Pérez & Pérez-Martín, 2023). Sensitivity, or the true positive ratio, is operationalized as the percentage of subjects with high self-efficacy who are correctly classified using the score obtained on each of the perfectionism dimensions (SOP and SPP). Specificity, or the true negative ratio, is operationalized as the percentage of subjects that do not present high self-efficacy and who are identified using the score on each of the perfectionism dimensions. To determine the cut-off point determining the highest sensitivity and specificity, the Youden index was used. In this case, the MedCalc 19 program was used.

Results

Correlations between the perfectionist dimensions and academic self-efficacy

Positive and statistically significant bilateral correlations of a moderate nature were observed between both perfectionist dimensions and academic self-efficacy (SOP: $r = .41$, $p < .001$; SPP: $r = .34$, $p < .001$).

Analysis of latent profiles of perfectionism

Table 2 presents the fit obtained for each model from two to seven profiles. The six profile model obtained the lowest AIC and BIC, and a $p < .001$ for the BLRT. However, this is rejected since, in addition to not having the highest entropy, it has two clusters with less than 25 subjects. Therefore, the models with five and seven profiles were rejected, even though both had low data in terms of AIC, BIC, and adjusted BIC and a $p < .001$ for the BLRT. Models of two and three profiles were also rejected since they had the highest BIC levels, although $p < .001$ for the LRT and BLRT. As for the four profile model, it had low values of AIC and BIC, as well as the highest entropy since it was the closest to 1 and a $p < .001$ for BLRT, and all of the groups are representative of the sample. Therefore, the four profile model was selected since it had a greater classificatory utility and interpretability and given its adequate levels on all of the examined indices of fit.

The four profile model consists of four groups of perfectionism. The first classifies 35 (2.5%) students with very low mean scores, both on SOP (-2.61) and on SPP (-2.44), therefore, they are categorized as students with *very low perfectionism* levels. The second consists of 244 (17.7%) students and they had low scores for the SOP (-1.14) and SPP (-1.19), therefore, they are called students with *low perfectionism* levels. The third group includes 354 (25.7%) participants with high scores on SOP (1) and SPP (1.07), considered to have *high perfectionism* levels. Finally, the fourth profile is made up of 742 (54 %) adolescents receiving moderate scores on SOP (−0.05) and SPP (−0.06), therefore, this profile is labelled as *moderate perfectionism* (Figure 1).

The results of the ANOVA reveal statistically significant differences between the average scores on academic self-efficacy obtained by each perfectionist profile $F_{(3, 1371)} = 72.46$, $p = < .001$, $\eta^2 = .14$. The *high perfectionism* profile had the highest means in terms of academic self-efficacy ($M = 29.31$, $SD = 5.40$), while the *very low perfectionism* profile had the lowest mean ($M = 20.80$, $SD = 7.44$) (Table 3).

Post hoc comparisons (Table 4) reveal that, with regard to academic self-efficacy, there are statistically significant differences between all of the profiles except between the *very low perfectionism* and *low perfectionism* ones. In addition, the effect sizes associated with these differences are large ($d \geq 0.80$) for the comparisons between the *very low perfectionism* profile and those with *high* ($d = -.1.50$) or *moderate* ($d = -1.05$) *perfectionism*, and between the *low* and *high perfectionism* ($d = -1.07$) profiles. On the other hand, comparisons between *low* and *moderate perfectionism* ($d = 0.58$) and between *high* and *moderate perfectionism* ($d = 0.55$) had a moderate effect size.

Logistic regressions

Table 5 offers the results of the logistic regression analysis for the probability of having high scores on academic self-efficacy based on the perfectionism dimensions. The proportion of correct cases is 72.3% (SOP) and 70.9% (SPP). Furthermore, the R^2 values of Nagelkerke ranged between .29 for SOP and .25 for SPP. Both dimensions of the CAPS positively and significantly predicted high scores on academic self-efficacy. Specifically, a level of OR = 1.13 was found for both SOP and SPP. Therefore, the probability of having high academic self-efficacy scores is 13% higher with each point that the SOP and SPP scores increase.

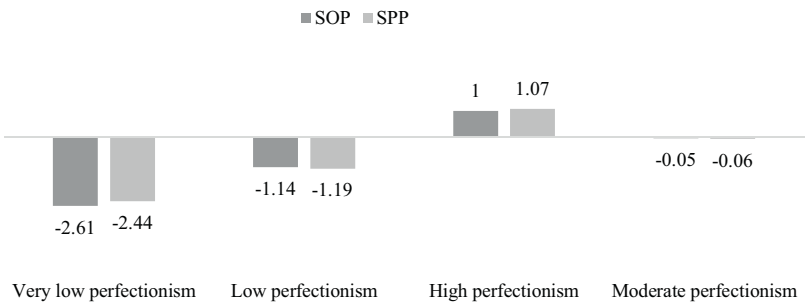

Figure 1. Graphic representation of perfectionism profiles obtained from the latent profile analysis.

Table 3
Means and standard deviations of each latent profile obtained on academic self-efficacy

Profiles	Very low perfectionism		Low perfectionism		High perfectionism		Moderate perfectionism		Statistical significance		
	M	*SD*	*M*	*SD*	*M*	*DS*	*M*	*SD*	$F_{(3,1371)}$	*p*	η^2
Self-efficacy	20.80	7.33	23.29	5.67	29.21	5.40	26.32	5.13	72.46	<.001	.14

Table 4
Pearson correlation indices and Cohen's d indices for post hoc contrasts between the mean scores obtained by the four profiles on academic self-efficacy

Profiles		Very low perfectionism vs. low perfectionism	Very low perfectionism vs. high perfectionism	Very low perfectionism vs. moderate perfectionism	Low perfectionism vs. high perfectionism	Low perfectionism vs. moderate perfectionism	High perfectionism vs. moderate perfectionism
Self-efficacy	*p*	n. s.	<.001	<.001	<.001	<.001	<.001
	d	–	−1.50	−1.05	−1.07	−0.58	0.55

Table 5
Binary logistic regression for the probability of receiving high scores on self-efficacy as a function of the perfectionism variables

Variable		χ^2	R^2	*B*	SE	Wald	*p*	OR	CI 95%
SOP	Correctly classified.: 72.3 %	156.79	.29	.12	.01	124.06	<.001	1.13	1.10–1.16
	Constant			−4.28	.24	101.93	<.001	.01	
SPP	Correctly classified.: 70.9 %	140.09	.25	.12	<.001	107.74	<.001	1.13	1.10–1.16
	Constant			-3.56	<.001	85.74	<.001	.02	

Note. χ^2 = Chi squared; R^2 = Nagelkerke squared; *B* = Regression coefficient; SE = Standard Error; Wald = Wald test; *p* = Probability; OR = Odds Ratio; CI = Confidence interval at 95%.

ROC curves

Figure 2 represents the area under the curve (AUC), which determines the discriminative capacity of the scores on SOP and SPP to identify subjects with or without high academic self-efficacy. The results for SOP suggest that the AUC value for the cut-off point of 38 is .79 (95% CI = .76–.82), being significant versus chance or a random ROC line ($p < .001$); sensitivity is 70.3; specificity is 78.7 and the Youden index is .49 (95% CI = .43–.55) suggesting a good discriminative capacity of the SOP subscale.

Regarding SPP, the AUC value found for the cut-off point of 31 was .76 (95% CI = .72–.79, $p < .001$), and sensitivity and specificity values of 70.1 and 70.6, respectively suggesting a good discriminative capacity for the cut-off point of .31 (Figure 2), having a Youden Index value of .44 (95% CI = .34–.54).

Discussion

This study aims to clarify whether a relationship exists between multidimensional perfectionism and academic self-efficacy in youth, based on a dual approach: person-oriented and variable-oriented. First, the results of the latent profile analysis permitted observation of the existence of four student profiles reflecting *very low, low, high and moderate perfectionism*. This model does not coincide with the proposed hypothesis, despite the fact that the CAPS is used as in the studies by Vicent, Inglés, Gonzálvez, Sanmartín, Aparicio-Flores et al. (2019) and Vicent et al. (2022). However, diverse studies using this procedure have identified four perfectionism profiles (Çimşir & Ülker-Tümlü, 2021; Gustafsson et al., 2016; Haraldsen et al., 2021; Seong & Chang, 2021; Vicent et al., 2021). This may mean that the differences between the number of perfectionism profiles identified in the scientific literature is more dependent on specific sample characteristics or researcher interpretation (Çimşir & Ülker-Tümlü, 2021) than on the instruments used to assess this construct.

Regarding the behavior of both perfectionism dimensions for each profile, our results are similar to those obtained by Vicent, Inglés, Gonzálvez, Sanmartín, Aparicio-Flores et al. (2019) in that no profile was found with distinct intensity levels for SPP and SOP. This may be because, as Greenspon (2014) and Lundh et al. (2008) suggested, the perfectionism facets tend to be manifested jointly and cannot be separated in daily life.

As for the results of the ANOVA, adolescents with a *high perfectionism* profile for both dimensions reported the highest means in terms of academic self-efficacy. This may be because they act as an ambitious group (Lin & Muenks, 2022) having a desire to be perfect that leads them to maintain high levels of effort, persistence, and dedication, in order to achieve their proposed objectives (Vicent, Inglés, Gonzálvez, Sanmartín, Aparicio-Flores et al., 2019). Or perhaps, this is the type of students developing a larger number of

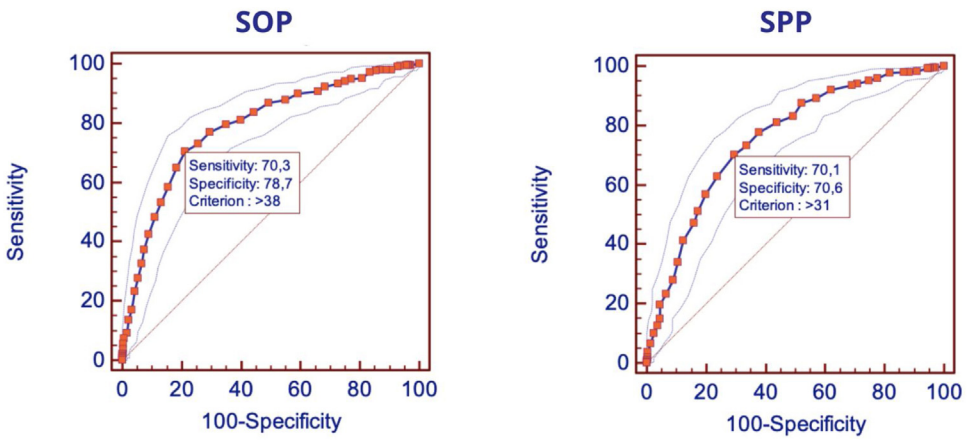

Figure 2. ROC curves for the discriminative capacity of the scores on SOP (left) and SPP (right) over high self-efficacy.

adaptive traits, reducing their levels of negative self-compassion and imposter's syndrome (Liu et al., 2023). Furthermore, statistically significant differences are found between all profiles, except for the *very low perfectionism* and *low perfectionism* profiles, which achieved moderate and large effect sizes. This clarifies the levels of student academic self-efficacy according to their perfectionism profile, suggesting that the higher the level of perfectionism in both dimensions, SPP and SOP, the greater the levels of self-efficacy.

These results obtained through the person-oriented approach are complemented by those derived from the variable-oriented one. Thus, the results of the logistic regressions reveal that both SOP and SPP positively and significantly predict high scores on academic self-efficacy. Along these lines, although the results of the analysis of the ROC curves cannot be compared with those of other studies, since no previous research has incorporated them in the field of perfectionism and academic self-efficacy, they do reflect that the discriminative capacity of both SOP and SPP is good and similar for both dimensions, permitting the correct classification of 79% and 76% of individuals with and without high levels of academic self-efficacy. The cut-off points that best discriminate subjects with and without high levels of academic self-efficacy are .38 for SOP and .31 for SPP. In both cases, sensitivity and specificity levels above .70 are obtained, indicating that these cut-off points permit the correct classification of over 70% of the subjects with high levels of academic self-efficacy (sensitivity), and without high levels of academic self-efficacy (specificity).

Collectively, the results confirm the proposed hypothesis and partially coincide with the findings of the past correlational studies conducted by Bong et al. (2014) and Ford et al. (2023), who provided preliminary data on the relationship between SOP, SPP, and mathematical academic self-efficacy. Thus, while in these studies only one of the two perfectionist dimensions is significantly linked to academic self-efficacy, the results found in this study offer sufficient evidence to consider that both dimensions, SPP and SOP, may be positively and significantly linked to academic self-efficacy. It is possible that certain perfectionist traits such as high standards, conscientiousness when carrying out tasks, order, or self-criticism may have an impact on the development of academic self-efficacy. It is also worth noting that social expectations and judgments, which take place mainly within the family environment, may enhance academic self-efficacy, since they are associated with the development of both SOP and PPS (Smith et al., 2022).

Limitations and future research lines

This study has certain limitations that must be considered. First, the data have been collected using a self-reporting technique, thus there is the possibility of social desirability biases. Secondly, caution must be taken when generalizing the results to other age groups and cultural contexts distinct from those used in this work. Therefore, it may be interesting to replicate this study in other countries in order to make comparisons and observe whether cultural differences affect how perfectionism is linked to academic self-efficacy. Finally, given the transversal design, it is not possible to make conclusions regarding causality between the considered variables. Therefore, longitudinal data should be included to permit the study of student perfectionist tendencies during distinct educational phases.

Conclusions and practical implications

Although this study has certain limitations, it offers novel contributions to the field of Educational Psychology, given that, on the one hand, it allows us to clarify the relationship between SOP, SPP, and academic self-efficacy using a dual focus (variable-oriented and person-oriented), in addition to being the first international study to include the analysis of ROC curves to understand the discriminative capacity of perfectionist dimensions over having self-efficacy in the educational setting. Psychology and educational professionals should consider that having a high academic self-efficacy may be a typical and adaptive characteristic of highly perfectionist students. However, given the close relationship between perfectionism, especially SPP, and psychopathology, in general (Limburg et al., 2017), we should not forget the potential risks associated with highly perfectionist profiles. Therefore, having high levels of academic self-efficacy and even success in studies is not incompatible with dissatisfaction or other forms of negative emotionality, since this may depend upon the students' skills to manage them (e.g. responsibility or tenacity) (Postigo et al., 2021; Serrano et al., 2022).

Funding

This study was financed by the Department of Innovation, Universities, Science and Digital Society of the (Spain) Generalitat Valenciana with the projects CIGE/2021/021 and CIAICO/2022/078, granted to MV and CG, respectively, as well as with the predoctorate assistance CIACIF/2022/252 granted to AFR.

References

Arazzini-Stewart, M., & De George-Walker, L. (2014). Self-handicapping, perfectionism, locus of control and self-efficacy: A path model. *Personality and Individual Differences*, *66*, 160–164. https://doi.org/10.1016/j.paid.2014.03.038

Bong, M., Hwang, A., Noh, A., & Kim, S. (2014). Perfectionism and motivation of adolescents in academic contexts. *Journal of Educational Psychology*, *106*(3), 711–729. https://doi.org/10.1037/a0035836

Bostan, C. M., Apostol, A. C., Andronic, R. L., Stanciu, T., & Constantin, T. (2022). Type of goals and perceived control for goal achievement over time. The mediating role of motivational persistence. *Acta Psychologica*, *231*(103776), 1–9. https://doi.org/10.1016/j.actpsy.2022.103776

Campeau, G., Yale-Soulière, G., Gauthier, C., & Turgeon, L. (2023). Perfectionism in schools. *Canadian Psychology*, *64*(2), 118–131. https://doi.org/10.1037/cap0000337

Chemisquy, S., Oros, L., Serppe, M., & Ernst, C. (2019). Caracterización del perfeccionismo disfuncional en la niñez tardía. *Apuntes Universitarios*, *9*(2), 1–26. https://doi.org/10.17162/au.v9i2.355

Çimşir, E., & Ülker-Tümlü, G. (2021). The roles of latent perfectionism classes in academicians' tendencies toward workaholism, useless superiority effort and narcissism. *The Journal of General Psychology*, *149*(4), 524–549. https://doi.org/10.1080/00221309.2021.1922342

Codella, R., Puci, M. V., Vandoni, M., Correale, L., Galvani, C., Togni, F., Casolo, F., Passi, A., Orizio, C., Alberti, G., Esposito, F., Montomoli, C., & La Torre, A. (2020). School self-efficacy is affected by gender and motor skills: Findings from an Italian study. *PeerJ*, *8*, Article e8949. https://doi.org/10.7717/peerj.8949

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. Erlbaum.

Curran, T., & Hill, A. P. (2019). Perfectionism is increasing over time: A meta-analysis of birth cohort differences from 1989 to 2016. *Psychological Bulletin*, *145*(4), 410–429. https://doi.org/10.1037/bul0000138

Damian, L. E., Negru-Subtirica, O., Pop, E. I., & Stoeber, J. (2022). Becoming a perfectionistic adolescent: Perceived parental behaviors involved in developmental trajectories of perfectionism. *European Journal of Personality*, *36*(1), 24–36. https://doi.org/10.1177/08902070211012902

De Maris, A. (2003). Logistic regression. In J. A. Schinka, & W. F. Velicer (Eds.), *Research methods in psychology* (pp. 509–532). John Wiley & Sons.

Di Fabio, A., Smith, M. M., & Salklofse, D. H. (2019). Perfectionism and healthy attitude toward oneself: Could humor be a resource? *International Journal of Environmental Research and Public Health*, *17*(1), 1–11. https://doi.org/10.3390/ijerph17010201

Flett, G. L., Hewitt, P. L., Besser, A., Su, C., Vaillancourt, T., Boucher, D., Munro, Y., Davidson, L. A., & Gale, O. (2016). The Child-adolescent Perfectionism Scale: Development, psychometric properties, and associations with stress, distress, and psychiatric symptoms. *Journal of Psychoeducational Assessment*, *34*(7), 634–652.

Flett, G. L., Hewitt, P. L., Nepon, T., Sherry, S. B., & Smith, M. (2022). The destructiveness and public health significance of socially prescribed perfectionism: A review, analysis, and conceptual extension. *Clinical Psychology Review*, *93*(102130), 1–21. https://doi.org/10.1016/j.cpr.2022.102130

Ford, C. J., Usher, E. L., Scott, V. L., & Chen, X. Y. (2023). The' perfect' lens: Perfectionism and early adolescents' math self-efficacy development. *British Journal of Educational Psychology*, *93*, 211–228. https://doi.org/10.1111/bjep.12550

Frost, R. O., Marten, P., Lahart, C. M., & Rosenblate, R. (1990). The dimensions of perfectionism. *Cognitive Therapy and Research*, *14*, 449–468. https://doi.org/10.1007/BF01172967

García-Fernández, J. M., Inglés, C. J., Torregrosa, M. S., Ruiz-Esteban, C., Díaz-Herrero, A., Pérez-Fernández, E., & Martínez-Monteagudo, M. C. (2010). Propiedades psicométricas de la Escala de Autoeficacia Percibida Específica de Situaciones Académicas en una muestra de estudiantes españoles de Educación Secundaria Obligatoria. *European Journal of Education and Psychology*, *3*(1), 61–74. https://doi.org/10.30552/ejep.v3i1.51

Goulet-Pelletier, J. G., Gaudreau, P., & Cousineau, D. (2022). Is perfectionism a killer of creative thinking? A test of the model of excellencism and perfectionism. *British Journal of Psychology*, *113*(1), 176–207. https://doi.org/10.1111/bjop.12530

Greenspon, T. S. (2014). Is there an antidote to perfectionism? *Psychology in the Schools*, *51*(9), 986–998. https://doi.org/10.1002/pits.21797

Gustafsson, H., Hill, A. P., Stenling, A., & Wagnsson, S. (2016). Profiles of perfectionism, parental climate, and burnout among competitive junior athletes. *Scandinavian Journal of Medicine & Science in Sports*, *26*(10), 1256–1264. https://doi.org/10.1111/sms.12553

Haraldsen, H. M., Ivarsson, A., Solstad, B. E., Abrahamsen, F. E., & Halvari, H. (2021). Composites of perfectionism and inauthenticity in relation to controlled motivation, performance anxiety and exhaustion among elite junior performers. *European Journal of Sport Science*, *21*(3), 428–438. https://doi.org/10.1080/17461391.2020.1763478

Jeong, S. S. Y., & Ryan, C. (2022). A critical review of child perfectionism as it relates to music pedagogy. *Psychology of Music*, *50*(4), 1312–1337. https://doi.org/10.1177/03057356211042080

Kamushadze, T., Martskvishvili, K., Mestvirishvili, M., & Odilavadze, M. (2021). Does perfectionism lead to well-being? The role of flow and personality traits. *Europe's Journal of Psychology*, *17*(2), 43–57. https://doi.org/10.5964/ejop.1987

Kinman, G., & Grant, L. (2022). Being 'good enough': Perfectionism and well-being in social workers. *British Journal of Social Work*, *52*(7), 4171–4188. https://doi.org/10.1093/bjsw/bcac010

Kurtovic, A., Vrdoljak, G., & Idzanovic, A. (2019). Predicting procrastination: The role of academic achievement, self-efficacy, and perfectionism. *International Journal of Educational Psychology*, *8*(1), 1–26. https://doi.org/10.17583/ijep.2019.2993

Limburg, K., Watson, H. J., Hagger, M. S., & Egan, S. J. (2017). The relationship between perfectionism and psychopathology: A meta-analysis. *Journal of Clinical Psychology*, *73*(10), 1301–1326. https://doi.org/10.1002/jclp.22435

Lin, S., & Muenks, K. (2022). Perfectionism profiles among college students: A person-centered approach to motivation, behavior, and emotion. *Contemporary Educational Psychology*, *71*(102110), 1–15. https://doi.org/10.1016/j.cedpsych.2022.102110

Liu, L. M., Han, Y. C., Lu, Z., Cao, C. J., & Wang, W. C. (2023). The relationship between perfectionism and depressive symptoms among Chinese college students: The mediating roles of self-compassion and impostor syndrome. *Current Psychology*, *42*, 18823–18831. https://doi.org/10.1007/s12144-022-03036-8

Lundh, L., Saboonchi, F., & Wangby, M. (2008). The role of personal standards in clinically significant perfectionism. A person-oriented approach to the study of patterns of perfectionism. *Cognitive Therapy and Research*, *32*, 333–350. https://doi.org/10.1007/s10608-006-9109-7

Madigan, D. J. (2019). A meta-analysis of perfectionism and academic achievement. *Educational Psychology Review*, *31*, 967–989. https://doi.org/10.1007/s10648-019-09484-2

Martínez, á. M., Jurado, M. D. M., Pérez-Fuentes, M. C., Martín, A. B. B., Márquez, M. D. S, Martínez, B. M. T., Sisto, M., & Gázquez-Linares, J. J. G. (2021). Self-efficacy, positive future outlook and school burnout in Spanish adolescents. *Sustainability*, *13*(8), 1–10. https://doi.org/10.3390/su13084575

Martínez-Pérez, J. A, & Pérez-Martín, P. S. (2023). La Curva ROC. *Medicina en Familia, SEMERGEN*, *49*(1), 1–3. https://doi.org/10.1016/j.semerg.2022.101821

Pázozdy, C., Askew, J., Dyer, J., Gately, P., Martin, L., Mavor, K., & Brown, G. R. (2023). The imposter phenomenon and its relationship with self-efficacy, perfectionism, and happiness in university students. *Current Psychology*, 1–10. https://doi.org/10.1007/s12144-023-04672-4

Postigo, Á., Cuesta, M., Fernández-Alonso, R., García-Cueto, E., & Muñiz, J. (2021). La tenacidad académica modula la evaluación del rendimiento escolar: Un análisis de transiciones latentes. *Revista de Psicodidáctica*, *26*(2), 87–95. https://doi.org/10.1016/j.psicod.2021.02.002

Seo, E. H. (2008). Self-efficacy as a mediator in the relationship between self-oriented perfectionism and academic procrastination. *Social Behavior and Personality: An International Journal*, *36*(6), 753–764. https://doi.org/10.2224/sbp.2008.36.6.753

Seong, H., & Chang, E. (2021). Profiles of perfectionism, achievement emotions, and academic burnout in South Korean adolescents: Testing the 2 × 2 model of Perfectionism. *Learning and Individual Differences*, *90*(102045), 1–12. https://doi.org/10.1016/j.lindif.2021.102045

Serrano, C., Murgui, S., & Andreu, Y. (2022). Mejorando la predicción y comprensión del éxito académico: El rol de las facetas de personalidad y el compromiso académico. *Revista de Psicodidáctica*, *27*(1), 21–28. https://doi.org/10.1016/j.psicod.2021.11.002

Smith, M. M., Hewitt, P. L., Sherry, S. B., Flett, G. L., & Ray, C. (2022). Parenting behaviors and trait perfectionism: A meta-analytic test of the social expectations and social learning models. *Journal of Research in Personality*, *96*(104180), 1–16. https://doi.org/10.1016/j.jrp.2021.104180

Song, H., & Kim, H. (2019). Value-based profiles of visitors to a world heritage site: The case of Suwon Hwaseong fortress (in South Korea). *Sustainability*, *11*(1), 1–19. https://doi.org/10.3390/su11010132

Stornaes, A. V., Rosenvinge, J. H., Sundgot-Borgen, J., Pettersen, G., & Friborg, O. (2019). Profiles of perfectionism among adolescents attending specialized elite - and ordinary lower secondary schools: A Norwegian cross-sectional comparative study. *Frontiers in Psychology*, *10*(2039), 1–12. https://doi.org/10.3389/fpsyg.2019.02039

Vicent, M., Inglés, C. J., González, C., Sanmartín, R., Aparicio-Flores, M. P., & García-Fernández, J. M. (2019). Perfiles de perfeccionismo y autoatribuciones causales académicas en estudiantes españoles de Educación Primaria. *Revista de Psicodidáctica*, *24*(2), 103–110. https://doi.org/10.1016/j.psicod.2019.01.001

Vicent, M., Inglés, C. J., González, C., Sanmartín, R., Ortega-Sandoval, V. N., & García-Fernández, J. M. (2019). Testing the 2 × 2 model of perfectionism in Ecuadorian adolescent population. *Journal of Health Psychology*, *25*(6), 791–797. https://doi.org/10.1177/1359105317733536

Vicent, M., Inglés, C. J., Sanmartín, R., González, C., & García-Fernández, J. M. (2017). Perfectionism and aggression: Identifying risk profiles in children. *Personality and Individual Differences*, *112*, 106–112. https://doi.org/10.1016/j.paid.2017.02.061

Vicent, M., Inglés, C. J., Sanmartín, R., González, C., Delgado, B., & García-Fernández, J. M. (2019). Spanish validation of the Child and Adolescent Perfectionism Scale: Factorial invariance and latent means differences across sex and age. *Brain Sciences*, *9*(310), 1–18. https://doi.org/10.3390/brainsci9110310

Vicent, M., Sanmartín, R., Cargua-García, N. I., & García-Fernández, J. M. (2022). Perfectionism and emotional intelligence: A person-centered approach. *International Journal of Clinical Practice*, *2022*(8660575), 1–9. https://doi.org/10.1155/2022/8660575

Vicent, M., Sanmartín, R., Vásconez-Rubio, O., & García-Fernández, J. M. (2021). Perfectionism profiles and motivation to exercise based on self-determination theory. *International Journal of Environmental Research and Public Health*, *17*(9), 1–12. https://doi.org/10.3390/ijerph17093206

Wang, Y. H., Wang, Y. L., Misener, K., & Libben, M. (2023). Examining the effectiveness of cognitive bias modification for perfectionism in exploration of the mediating and moderating effects of body dissatisfaction and self-efficacy. *Current Psychology: A Journal for Diverse Perspectives on Diverse Psychological Issues*, *42*, 1635–1651. https://doi.org/10.1007/s12144-021-01550-9

Weber, M., & Harzer, C. (2022). Relations between character strengths, school satisfaction, enjoyment of learning, academic self-efficacy, and school achievement: An examination of various aspects of positive schooling. *Frontiers in Psychology*, *13*(826960), 1–15. https://doi.org/10.3389/fpsyg.2022.826960

Willians, M. N., & Edwards, S. R. (2022). Conceptual replication of Seo (2008), Šelf-efficacy as a mediator in the relationship between self-oriented perfectionism and academic procrastination. *Current Issues in Personality Psychology*, *10*(2), 98–111. https://doi.org/10.5114/cipp.2021.110948

Wuthrich, V. M., Belcher, J., Kilby, C., Jagiello, T., & Lowe, C. (2021). Tracking stress, depression, and anxiety across the final year of secondary school: A longitudinal study. *Journal of School Psychology*, *88*, 18–30. https://doi.org/10.1016/j.jsp.2021.07.004

Yang, J. M., Xu, J. Y., & Zhang, H. (2022). Resiliency and academic engagement: A moderated mediation model. *Psychology in the Schools*, *59*(5), 900–914. https://doi.org/10.1002/pits.22654

Zeinalipour, H. (2022). School connectedness, academic self-efficacy, and academic performance: Mediating role of hope. *Psychological Reports*, *125*(4), 2052–2068. https://doi.org/10.1177/00332941211006926