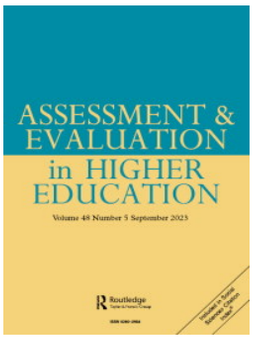

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Psychometric properties of the academic procrastination scale in Spanish university students

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ABSTRACT

Procrastination in academic activities is common amongst university students, and has negative consequences for their personal as well as academic development. As a result, there is a need for valid –yet at the same time brief and clear-cut– measurement tools that enable the specific procrastinating behaviour of university students to be measured. This work explores in depth the psychometric properties of the Spanish version of the Academic Procrastination Scale, a widely used brief tool in secondary and higher education in the Spanish speaking world. The scale was applied to a total of 1734 university students, together with the Procrastination Assessment Scale-Students (PASS), the Unintentional Procrastination Scale (UPS) and the Active Procrastination Scale (APS). Factor analyses indicate the best fit is a structure involving four interrelated factors (task aversion, poor time management, low emotional and motivational self-control, and risk assumption) compared to other proposed models. The model presents factorial invariance between men and women, and adequate convergent validity. We discuss the implications of using this scale in higher education, since differentiating the four factors might help to identify different support measures depending on university student needs.

KEYWORDS

academic procrastination; confirmatory factor analysis; measurement invariance; higher education

Introduction

Procrastination in academic activities and tasks is common amongst students at all stages of education (Kim and Seo 2015), yet is particularly prevalent in secondary and higher education (Goroshit and Hen 2021). According to certain studies, such behaviour is common amongst 30% of students (Bäulke, Daumiller, and Dresel 2021), whether it involves putting off task commencement, and/or checking it once the task has been started (Svartdal et al. 2020). Procrastination may be defined as the voluntary but irrational deferral of tasks or actions to later than planned, which has negative consequences for the person involved (Steel 2007), such as poor academic performance (Cormack, Eagle, and Davies 2020; Hen and Goroshit 2020), problems of depression and anxiety (Fernie et al. 2017; Gil, De Besa, and Garzón-Umerenkova 2020; Wartberg, Thomasius, and Paschke 2021), or problems of insomnia and daytime sleepiness (Li et al. 2020).

The search for the causes of academic procrastination has been addressed from a multifactorial approach, with a number of underlying reasons (Montgomery et al. 2019) and links to other

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variables (Díez-Morales 2019) having been identified. Procrastination seems to be linked to certain personality traits such as neuroticism (Ocansey et al. 2022), student learning styles (Visser, Korthagen, and Schoonenboom 2018), and even contextual factors related to teaching styles (Valenzuela et al. 2018). Yet the greatest consensus emerges when identifying it as a problem concerning the self-regulation of learning (Kamphorst et al. 2013; Limone et al. 2020; Mohammadi-Bytamar, Saed, and Khakpoor 2020; Suárez and Feliciano-García 2020; Martín-Antón et al. 2022), which might be caused by metacognitive deficits that lead to difficulties in time management (Garzón-Umerenkova and Gil 2017), task aversion (Solomon and Rothblum 1984; Steel 2007; Visser, Korthagen, and Schoonenboom 2018), perfectionism (Osenk, Williamson, and Wade 2020), or fear of failure (Solomon and Rothblum 1984; Abdi Zarrin, Gracia, and Paixão 2020; Gil, De Besa, and Garzón-Umerenkova 2020). Other students, however, seek a form of self-motivation through this behaviour by aiming to boost arousal (Fernie et al. 2017).

A number of procedures have been put forward to measure procrastination behaviour, such as continuous assessment during task execution or conducting final interviews (Goroshit and Hen 2021). The most common method, however, is through the use of self-reports via various approaches, although this kind of measure tends to overestimate levels of procrastination (Kim and Seo 2015). There are various instruments, such as the General Procrastination Scale (GPS, Lay 1986), the Pure Procrastination Scale (PPS, Steel 2010), the Academic Procrastination Scale (APS, McCloskey 2012), and its abbreviated version the Short-Form of the Academic Procrastination Scale (APS-S, Yockey 2016), the Active Procrastination Scale (APS, Choi and Moran 2009), the Unintentional Procrastination Scale (UPS, Fernie et al. 2017), or the Brief Inventory of Academic Procrastination (Geara et al. 2019). The most widely used, however, are the Tuckman Procrastination Scale (TPS, Tuckman 1991) and the Procrastination Assessment Scale-Student (PASS, Solomon and Rothblum 1984), together with the Academic Procrastination Scale (Busko 1998), which are widely applied in research in Spanish speaking contexts.

The PASS scale is very comprehensive and provides information concerning the frequency and impact of academic procrastination amongst students on a range of tasks, in addition to offering information underlying the cause of this behaviour. However, this scale covers a large number of items (44) whose formulation is wide ranging, which makes it useful for gaining a deep insight into student behaviour but not quite so appropriate for initial and large-scale identification amongst large groups of students. The Tuckman Procrastination Scale (TPS) is concise (16 items) yet is highly focused on the process of self-regulation, which thereby justifies its single-factor structure. Moreover, the formulation of the items could be applicable to activities that are not necessarily academic.

In contrast, the Academic Procrastination Scale is a succinct scale (16 items), the statements of which are straightforward and refer to specific academic behaviour. Furthermore, it spans an array of different aspects or causes underlying procrastination such as task aversion, the need to seek help, emotional regulation, and even self-motivation as a motive to procrastinate.

The academic procrastination scale

Busko (1998) devised the Academic Procrastination Scale, together with the General Academic Scale, in order to link procrastination with perfectionism in higher education. This scale is made up of 16 items, with Likert type responses that address planning, time management, task aversion or self-regulation. It is a very widely used scale in Latin America, given that it is a general measure of academic procrastination (Domínguez-Lara 2018), is short and contains items that are concise and easy to understand, added to which it can be applied both to secondary as well as higher education students. It has been used to explore the link between procrastination and other variables, such as emotional regulation (Moreta-Herrera, Durán-Rodríguez, and Villegas-Villacrés 2018), the attributional style of achievement motivation (Quispe-Bendezú et al. 2020), self-efficiency (Alegre and Universidad de Lima 2013), self-esteem (Uribe et al. 2020),

satisfaction with studies (Domínguez-Lara & Campos-Uscanga 2017), and stress and anxiety when faced with studying (Barraza and Barraza 2019).

The scale was designed with a single-factor structure in order to gauge its capacity to measure procrastination in perfectionism. The reliability data provided by the author are acceptable (α = .86). Nevertheless, more in-depth analyses were carried out to ascertain the instrument's factorial validity. Álvarez (2010) adapted the instrument to Spanish, and obtained a single-factor structure, in accordance with the original design of the scale, based on exploratory factor analysis, with an internal consistency coefficient of α = .87. A number of subsequent studies have expanded the analysis of the instrument's psychometric properties applied to an array of fields and participants. Different factor structures have emerged, generally based on the abbreviated version proposed by Domínguez-Lara, Villegas, and Centeno (2014), yet no generalised consensus has been reached. Table 1 shows the findings to emerge from the various studies, specifying the target population, the items removed and the factorization results.

The present study

There is a need to have available instruments for evaluating academic procrastination that are valid and reliable, whilst at the same time being succinct and readily applicable as well as easy to understand for students. Used in large-scale applications, they may help to provide a general description of the groups as well as a screening of students who display procrastinating behaviours that are more problematic and which require a more thorough evaluation that employs more specific measurement tools.

In this regard, the Academic Procrastination Scale meets all of these requirements. Yet, many of these studies into psychometric properties have been performed with limited samples, from a specific field and with abbreviated versions, such that the aim of the present study was to

Table 1. Summary of the different factorization proposals put forward by the Academic Procrastination Scale.

Authors	Target sample	Items	Factors	*N*	Context and Remarks
Busko (1998)	University	16	Single-factor		No validity study provided. Trujillo-Chumán, Noé-Grijalva, and Universidad César Vallejo-Perú (2020) do not obtain good fit scores
Álvarez (2010)	Secondary	16	Single-factor	239	Students from a private university at Lima city (Peru) Only EFA, also Alegre and Universidad de Lima (2013) with university students (348)
Domínguez-Lara, Villegas, and Centeno (2014)	University	12	Related two-factor	379	Students from a private university at Lima city (Peru). Two factors: • Academic self-regulation • Delaying activities
Trujillo-Chumán, Noé-Grijalva, and Universidad César Vallejo-Perú (2020)	Secondary	13	Single-factor	366	High school students from the Chimbote district (Peru). They also propose a smaller version, with eight items, with a better fit
Barraza and Barraza (2018)	Secondary	10	Two-factor	361	High school students from a Technological and Industrial Baccalaureate Center and Services of the city of Durango (Mexico). Two factors: • Academic self-regulation • Delaying activities
Arias and Rivera (2018)	University	10	Single-factor	152	University students of Psychology career from a private university at Arequipa city (Peru)

examine the psychometric properties of the Spanish version of the academic procrastination scale, applied to a broad and diverse sample of Spanish university students. The whole of the scale is taken into consideration, embracing the 16 items proposed by the author of the original version, and analysing the factorial structure obtained, the model's goodness of fit indices, reliability and convergent validity.

Method

Participants

The sample is made up of a total of $N = 1734$ Spanish university students, divided into two subsamples (Table 2). In a first study, data were collected from $n = 824$ university students (640 female), who were studying bachelor's and master's degrees on university campuses located in the regions of Castilla y León, Galicia, Andalusia and Cantabria. Participants were aged between 18 and 49 years of age ($M = 22$, $SD = 5.26$). Once the exploratory factorial analysis was carried out with this subsample, a second study was carried out, testing the model obtained in another sample of $n = 910$ university students (637 female) from university campuses located in the regions of Andalusia, Aragón, Basque Country, Cantabria, Castilla y León, Galicia, Madrid, Navarre and Valencia.

Instruments

A range of tools have been used that measure different types or approaches to procrastination.

Academic procrastination scale

The Spanish version of the *Academic Procrastination Scale* (Busko 1998; translated and adapted by Álvarez 2010). This is a 16-item scale with five-point Likert responses, ranging from 1 (*always, it always happens to me*) to 5 (*never, it never happens to me*), and originally with a single-factor structure, with an internal consistency coefficient of α = .80.

Procrastination assessment scale-students

The Procrastination Assessment Scale-Students (PASS, Solomon and Rothblum 1984) is made up of two parts. The first is composed of 18 items on a five-point Likert scale, ranging from 1 (*never*) to 5 (*always*), identifying how often the student postpones tasks, whether this proves to be a problem, and whether they would like to reduce this behaviour. The second part involves 26 items with the same response format, corresponding to 13 reasons why they

Table 2. Sample distribution according to factor analysis.

	EFA ($n = 824$)		CFA ($n = 910$)	
Demographics	*n*	%	*n*	%
Age				
< 21 years old	527	64%	537	59%
22-25 years old	172	21%	207	23%
>25 years old	125	15%	166	18%
Gender				
Female	640	78%	637	70%
Male	184	22%	273	30%
Study years				
1st or 2nd year	524	64%	473	42%
3rd or higher	300	36%	437	48%

procrastinate. The factorial analysis carried out by the authors identified two principal factors: fear of failure and task aversion, although it did not include all the reasons, which has given rise to various studies into psychometric properties depending on the countries and academic levels to which it has been applied (Mortazavi, Mortazavi, and Khosrorad 2015; Garzón-Umerenkova and Gil 2017), as well as abbreviated versions (Yockey 2016). In this study, we use the factorization carried out by Gil, De Besa, and Garzón-Umerenkova (2020), differentiating three factors: (a) *fear and insecurity*, which includes reasons such as anxiety when faced with being evaluated, perfectionism or little self-confidence; (b) *inadequate response to task demands*, due to a tendency to feel overwhelmed, coupled with inadequate time management, or task aversion; and (c) *excitement seeking and dependence on others*, the reasons for which are rooted in risk-taking, peer pressure and dependence and help-seeking. The scale evidences appropriate psychometric properties, with internal consistency indices of between .70 and .80 in the authors' original study.

Unintentional procrastination scale

The Unintentional Procrastination Scale (UPS, Fernie et al. 2017) assesses the general behaviour of postponing activities that are not necessarily academic, even if the subject does not initially intend to do so. It consists of six items with a four-point Likert response option, ranging from 1 (*I do not agree*) to 4 (*I totally agree*), with a single-factor structure, a Cronbach Alpha of .89, and an acceptable fit in the confirmatory factorial analyses.

Active procrastination scale

The Active Procrastination Scale (APS, Choi and Moran 2009; adapted to Spanish by Suárez and Feliciano-García 2020) identifies those whose procrastinating behaviour is aimed at optimizing performance. It is made up of 16 items with a seven-point Likert response option, ranging from 1 (*I totally disagree*) to 7 (*I totally agree*), grouped into four factors: (a) satisfaction with outcomes, (b) preference for pressure, (c) intentional decision, and (d) ability to meet deadlines. This same structure is obtained in the adaptation to Spanish, with internal consistency indices between .70 and .80, and adequate fit values, Comparative fit index (CFI) = .97, Goodness-of-fit (GFI) = .95, Root mean square of residuals (RMSR) = .046, Standarized root mean square residual (SRMR) = .029.

Procedure

A message was sent to the students informing them of the aims of the research and requesting their cooperation in filling out some questionnaires through a link in which the first screen to appear informed them of the ethical guarantees, the approval code of the research ethics committee, together with their informed consent which, unless given by the student, did not allow them to go on to complete the questionnaire.

Data analysis

We first conducted an exploratory factorial analysis (EFA) in order to pinpoint the specific internal structure of the Academic Procrastination Scale. We first analysed multivariate normality through Mardia's coefficient, which should not exceed the value of 5 in order to assume multivariate normality. Diagonally weighted least squares (DWLS) was applied, selecting components with self-values above 1, using two rotation methods to ensure a better fit: one based on an orthogonal varimax model, and the other oblique, promin, based on polychoric correlations by considering the items to be of an ordinal nature. Exploratory factorial analyses were carried out using FACTOR v.12.01.02 statistical software. Various multivariate goodness of fit indices were

estimated in this analysis, such as estimating the maximum robust likelihood (χ^2, $p > .05$), the Comparative Fit Index (CFI >.90), the Non-Normed Fit Index (NNFI > .90), and the robust Root Mean-Square Error of Approximation (RMSEA < .08). All items with a factor loading below .30 were removed, or whose Kaiser's single-variable Measure of Sampling Adequacy (MSA, based on the square partial correlations) had values lower than .50 (Kaiser and Rice 1974).

The existence of doublets (items with correlated residuals) was also analyzed using the Robust EREC (Expected Residual correlation direct Change index, Ferrando, Hernandez-Dorado, and Lorenzo-Seva 2022). We also calculated internal consistency with the Overall Reliability of fully Informative prior Oblique N-EAP scores (ORION) and the McDonald's Omega coefficient (acceptable for values above .70), factor simplicity indices by means of Bentler's simplicity index (*S*), the Root Mean Square of Residuals (RMSR) taking Kelley's proposed criterion, and the Weighted Root Mean Square Residual (WRMR) where a value of below one indicates a good fit.

We subsequently tested the resulting factorial structure using confirmatory factor analysis (CFA) by applying EQS 6.2 statistical software. Since these are ordinal variables and the condition of multivariate normality is not fulfilled, we used the maximum robust likelihood estimation (the Satorra-Bentler Scaled Statistic or S-B χ^2, $p>.05$), although since this is strongly conditioned by sample size, it was complemented with other indices that assess the model fit. These included using the relative χ^2 index (S-B χ^2/df), whose values must be below 2 or 3, although a value of below five may also be deemed acceptable; the Normed Fit Index (NFI > .90), as well as the CFI, NNFI and RMSEA.

The model was also compared with other possible models in order to determine which offered the best fit: (a) the same factors obtained with our sample, but considered independent, (b) the original scale structure of 16 single-factor items (Busko 1998; Álvarez 2010), (c) the reduced 13-item scale with a two-factor structure (Domínguez-Lara, Villegas, and Centeno 2014), (d) the reduced 13-item scale with a single-factor structure (Trujillo-Chumán, Noé-Grijalva, and Universidad César Vallejo-Perú 2020); (e) the reduced 10-item scale with a two-factor structure (Barraza and Barraza 2018); (f) the reduced 10-item scale with a single-factor structure (Arias and Rivera 2018), and (g) the reduced 8-item scale with a single-factor structure (Trujillo-Chumán, Noé-Grijalva, and Universidad César Vallejo-Perú 2020). For this, we used the Akaike Information Criterion (AIC), taking the model with the lowest value to be the most appropriate.

To determine whether the model is also valid for men and women, we studied the configural, metric, scalar and factor mean invariance through multigroup analysis, with the Satorra-Bentler scaled chi square difference test. We adopted the criterion of Cheung and Rensvold (2002), calculated as the difference between the CFI values, and considering that invariance can be accepted if this difference is less than or equal to .01 in favor of the less restrictive model.

In order to estimate convergent validity, we calculated the Pearson correlation coefficients between the factors of the Academic Procrastination Scale and the dimensions of the Procrastination Assessment Scale-Students (PASS), Unintentional Procrastination Scale (UPS) and Active Procrastination Scale (APS). For this purpose, we used the statistical package IBM SPSS Statistics, version 28. All statistical analyses used a 95% confidence level.

Results

Exploratory factor analysis

Mardia's coefficient is 16.71, thereby violating the assumption of multivariate normality, which is to be expected when working with categorical variables, even though they are considered ordinal, such that robust estimators were calculated. Item 4 (when I am given reading to do, I go over it on the day of class) had a low MSA coefficient (.49), in addition to not obtaining factor loadings above .30. On the other hand, item 15 (I rarely leave for tomorrow what I can

do today) also did not obtain factor loadings above .30. Consequently, both items were eliminated. No items have a saturation of over .30 in more than one factor. Data are adequate for the use of an EFA as indicated by the Kaiser-Meyer-Olkin index (.83) and Bartlett sphericity test, χ^2 (105) = 3116.1, p = <.001. Moreover, the skewness or kurtosis values are within normal parameters since none of the items evidenced values of over 2 or 7, respectively, although item six does display skewness and kurtosis values above the rest of the items (Table 3).

The best rotated solution is found with the Promin method, obtaining four related factors (Table 4), with a total explained variance of 60.8%. We have: (a) items 8 and 9, which explain 34.1% of variance, and which refer to dislike as the reason for not performing the task, and which might be termed *task aversion*; (b) items 1, 6, 7, 13 and 14, with a percentage of explained variance of 11.7%, and which refer to *bad time management*; (c) items 5, 10, 11 and 12, which explain 8% of variance, and which include aspects related to difficulty when self-regulating study

Table 3. Descriptive statistics of the items on the academic procrastination scale.

Abbreviated item [item in Spanish (Álvarez, 2010)]	Range	Mean	SD	Skew	Kurt
1. Leaving tasks until the last minute [Cuando tengo que hacer una tarea, normalmente la dejo para el último minuto]	1-5	2.90 (2.92)	0.99 (1.06)	0.09 (–0.00)	–0.60 (–0.73)
2. Preparing examinations in advance* [Generalmente me preparo por adelantado para los exámenes]	1-5	2.51 (2.54)	1.07 (1.11)	0.20 (0.34)	–0.85 (–0.81)
3. Reading assigned texts the night before [Cuando me asignan lecturas, las leo la noche anterior]	1-5	2.91 (2.76)	1.11 (1.03)	0.03 (0.00)	–0.69 (–0.80)
5. Seeking help when not understanding something* [Cuando tengo problemas para entender algo, inmediatamente trato de buscar ayuda]	1-5	2.30 (2.62)	0.98 (1.06)	0.40 (0.22)	–0.51 (–0.69)
6. Attending lessons regularly* [Asisto regularmente a clase]	1-5	1.57 (1.55)	0.77 (0.88)	1.47 (1.74)	2.56 (2.72)
7. Completing work as soon as possible* [Trato de completar el trabajo asignado lo más pronto posible]	1-5	2.42 (2.57)	0.93 (1.07)	0.27 (0.29)	–0.38 (–0.60)
8. Putting off tasks I don't like4 [Postergo los trabajos de los cursos que no me gustan]	1-5	2.98 (3.12)	1.10 (1.17)	–0.05 (–0.11)	–0.62 (–0.79)
9. Putting off reading assignments I don't like [Postergo las lecturas de los cursos que no me gustan]	1-5	3.08 (3.13)	1.13 (1.17)	–0.10 (–0.07)	–0.67 (–0.81)
10. Attempting to improve study habits* [Constantemente intento mejorar mis hábitos de estudio]	1-5	2.45 (2.54)	1.02 (1.06)	0.37 (0.24)	–0.45 (–0.65)
11. Investing time, even in boring subjects* [Invierto el tiempo necesario en estudiar aun cuando el tema sea aburrido]	1-5	2.48 (2.54)	1.08 (1.08)	0.26 (0.33)	–0.84 (–0.66)
12. Motivating oneself to maintain a study rhythm* [Trato de motivarme para mantener mi ritmo de estudio]	1-5	2.31 (2.31)	0.99 (1.03)	0.53 (0.54)	–0.17 (–0.34)
13. Completing important assignments in good time* [Trato de terminar mis trabajos importantes con tiempo de sobra]	1-5	2.34 (2.46)	0.99 (1.10)	0.41 (0.37)	–0.52 (–0.72)
14. Devoting time to going over tasks* [Me tomo el tiempo de revisar mis tareas antes de entregarlas]	1-5	2.23 (2.13)	1.07 (1.05)	0.55 (0.64)	–0.53 (–0.45)
16. Enjoying leaving tasks until the last minute [Disfruto la mezcla de desafío con emoción de esperar hasta el último minuto para completar una tarea]	1-5	2.29 (2.08)	1.24 (1.20)	0.60 (0.87)	–0.73 (–0.24)

Note: *Items scored on the inverse scale. Without parentheses the results of sample 1 (n = 824). In parentheses, the results of sample 2 (n = 910). Skew = Skewness, Kurt = Kurtosis.

Table 4. EFA factor loadings, ORION (Sample 1, $n = 824$), McDonald's omega reliability coefficients and CFA factor loadings (Sample 2, $n = 910$).

	EFA Factor Loadings							CFA Factor Loadings			
Item	F_1	F_2	F_3	F_4	h^2	ORION	ω	St. Est. F_1	St. Est. F_2	St. Est. F_3	St. Est. F_4
F_1 Task aversion						.94	.91				
8. Putting off tasks I don't like	.87				.79			.91			
9. Putting off reading assignments I don't like	.97				.91			.91			
F_2 Bad time management						.85	.81				
1. Leaving tasks until the last minute		.66			.66				.74		
6. Attending lessons regularly*		.33			.20				.39		
7. Completing work as soon as possible*		.92			.66				.75		
13. Completing important assignments in good time*		.63			.57				.77		
14. Devoting time to going over tasks*		.45			.28				.50		
F_3 Low self-control						.75	.71				
5. Seeking help when not understanding something*			.31		.23					.42	
10. Attempting to improve study habits*			.58		.35					.57	
11. Investing time, even in boring subjects*			.56		.56					.65	
12. Motivating oneself to maintain a study rhythm*			.65		.55					.75	
F_4 Risk taking						.72	.70				
2. Preparing examinations in advance*				.54	.41						.61
3. Reading assigned texts the night before				.37	.19						.40
16. Enjoying leaving tasks until the last minute				.50	.37						.52

Note: *Items scored on the inverse scale. St. Est. = Standardized estimations. No substantial EFA factor loadings below .30 have been removed.

activities, self-motivation, resistance to failure or social strategies, and which we call *low motivational and emotional self-control*; and (d) items 2, 3 and 16, which explain 7% of variance, and which refer to delaying tasks in general, but which are also linked to *risk taking*. The reliability coefficients measured using the ORION index lie within the range [.72, .94]. The factor simplicity index, and the model's goodness of fit values are very high: S = .90 and RMSR = .0210 (Kelly criterion <.0400). The Weighted Root Mean Square Residual (WRMR) was = 0.0192, indicating a good fit, since it is below 1. The goodness of fit indices are acceptable, χ^2 (41) = 70.97, p = .272, CFI = .999, GFI = .997, AGFI = 0.994, NNFI = .998, RMSEA = .014, 90% CI [.012, .016].

Confirmatory factor analysis

The scale was administered to a second sample of 910 university students. As in the other sample, the assumption of multivariate normality was violated (Mardia's coefficient = *25.95*), therefore robust tests are still applied. Moreover, the skewness or kurtosis values are within normal parameters since none of the items evidenced values of over 2 or 7, respectively, although item 6, again, does display skewness and kurtosis values above the rest of the items (Table 3). Kaiser-Meyer-Olkin index (.87) and Bartlett sphericity test, χ^2 (91) = 4853.4, p = <.001.

The indices exhibit an acceptable fit, S-B χ^2 (71) = 197.71, p < .001; S-B χ^2/df = 2.78, CFI = .987, NFI = .979, NNFI = .983, RMSEA = .044, 90% CI [.037, .052]. Combined reliability is high (.84), and the reliability indices measured with the omega coefficient lie within the range [.70, .91] (Table 4). The Lagrange multiplier test and the Wald test offer no significant improvement, such that no re-specifications are required.

We then compared the fit of the previous model with other alternatives proposed by various authors. The fit indices of the different models are shown in Table 5. It can be seen that the fit is not satisfactory in any of the alternative models proposed, added to which there is a higher AIC score.

Measurement invariance

We subsequently analyzed the factorial invariance, conducting a multigroup analysis without any restrictions. The configural model will serve as a baseline for the comparison with the nested models on which successive restrictions will be imposed. The fit indices of this model were also acceptable: S-B χ^2 (142) = 363.86, $p < .001$; S-B $\chi^2/df = 2.56$, CFI = .975, NFI = .959, NNFI = .968, RMSEA = .059, 90% CI [.051, .066]. If we restrict the factor loadings of the items of this model (metric invariance), we obtained acceptable data: S-B χ^2 (152) = 372.76, $p < .001$; S-B $\chi^2/df = 2.45$, CFI = .975, NFI = .958, NNFI = .970, RMSEA = .057, 90% CI [.049, .064]. The difference between the CFI values of the models was acceptable (ΔCFI = .000) and the Satorra-Bentler scaled difference test was nonsignificant, $\chi^2(10) = 6.25$, $p = .793$, showing that metric invariance was fulfilled. The following nested model adds to the former models the restriction of the intercepts, in order to determine possible scalar invariance. We also get acceptable data: S-B χ^2 (162) = 403.26, $p < .001$; S-B $\chi^2/df = 2.48$, CFI = .970, NFI = .952, NNFI = .961, RMSEA = .061, 90% CI [.052, .068]. The difference between the CFI values of the models was acceptable (ΔCFI = .005) and the Satorra-Bentler scaled difference test was nonsignificant, $\chi^2(20) = 21.72$, $p = .355$. Scalar invariance holds. Consequently, the model is valid for the comparison of academic procrastination between women and men.

Convergent validity

In order to estimate convergent validity, the factors obtained from the Academic Procrastination Scale were correlated with those from the PASS, UPS and APS scales. As regards the first part of the test, which measures the frequency of procrastination behaviour (Table 6), significant correlation indices were obtained with all the dimensions of the Academic Procrastination Scale, although these were not above .70. Particularly noteworthy is the high procrastination frequency correlation with the bad time management factor. The same occurs with the correlation between involuntary procrastination and the dimensions of the Academic Procrastination Scale. As for the reasons underlying procrastination, significant correlations were also found in almost all of them, albeit to a lesser degree. There were no significant correlations between the factors of the Academic Procrastination Scale and the fear and insecurity dimension on the PASS scale, except with the aversion task. As a result, although the two tests measure the same construct, the reasons behind procrastinating behaviour are not exactly the same.

There is a negative correlation between the factors of the Academic Procrastination Scale and most of the APS dimensions, particularly with regard to the ability to meet deadlines. A significant positive correlation was only found with the risk-taking dimension of the Academic Procrastination Scale and the preference for pressure on the APS. In sum, it should be pointed out that the Academic Procrastination Scale mainly measures passive procrastination.

Table 5. Fit indices of the eight possible models (sample 2, $n = 910$).

Model	S-B χ^2	*df*	S-B χ^2/df	CFI	NFI	NNFI	RMSEA, [90% CI]	AIC
1	197.71, p <.001	71	2.78	.987	.979	.983	.044, [.037, .052]	55.72
2	453.55, p <.001	77	5.89	.960	.953	.953	.073, [.067, .080]	299.55
3	515.52, p <.001	53	9.72	.943	.937	.929	.098, [.090, .106]	409.52
4	269.40, p <.001	34	7.92	.960	.955	.947	.087, [.078, .097]	201.40
5	225.03, p <.001	20	11.25	.946	.941	.925	.106, [.094, .119]	185.03
6	182.32, p <.001	35	5.21	.967	.960	.958	.068, [.058, .078]	112.33
7	822.63, p <.001	65	12.66	.914	.907	.897	.113, [.106, .120]	692.63
8	926.18, p <.001	90	10.18	.911	.902	.896	.101, [.095, .107]	746.18

Note. Model 1 = Four oblique factors, Model 2 = Four orthogonal factors, Model 3 = Two-factor oblique of 12 items, Model 4 = Two-factor oblique of 10 items, Model 5 = Single-factor of eight items, Model 6 = Single-factor with 10 items, Model 7 = Single-factor with 13 items, and Model 8 = Single-factor with the full 16-item scale.

Table 6. Pearson correlations between the factors of the academic procrastination scale and PASS, UPS, and APS ($n = 1734$).

	Task aversion	Bad time management	Low motivational self-regulation	Risk-taking
Procrastination	.54**	.70**	.51**	.54**
FI	.13*	.04	.01	.05
IRDT	.30**	.23**	.12*	.17**
ESDO	.21**	.25**	.13**	.38**
IP	.52**	.60**	.38**	.44**
SO	.06	−.22**	−.15*	−.25**
PP	−.08	.07	.09	.26**
ID	−.28**	−.37**	−.15*	.33**
AMD	−.45**	−.51**	−.31**	−.33**

Note. FI: Fear of insecurity, IRDT = Inadequate response to the demands of the task, ESDO = Excitement seeking and dependence on others, IP = Involuntary procrastination, SO = Satisfaction with outcomes, PP = Preference for pressure, ID = Intended decision, AMD = Ability to meet deadlines.
* $p < .05$, ** $p < .01$

Discussion

This work seeks to provide further insights into the psychometric properties of the Academic Procrastination Scale in young Spanish adults, drawing on the scale originally designed by Busko (1998), and which heralded a conceptual distinction between the construct of general procrastination and that which deals exclusively with academic tasks. Despite being a widely used scale, few studies have been aimed at adapting and validating it to the Spanish context, unlike those designed in Spanish but in the context of Latin America, with the latter being mostly analytical works employing small and diverse samples in both higher (Álvarez 2010; Domínguez-Lara, Villegas, and Centeno 2014; Arias and Rivera 2018; Domínguez-Lara 2018; Moreta-Herrera, Durán-Rodríguez, and Villegas-Villacrés 2018; Geara et al. 2019) and secondary education (Trujillo-Chumán, Noé-Grijalva, and Universidad César Vallejo-Perú 2020). There is also a lack of factors that provide any concrete and specific approach to the construct when attempting to explain academic procrastination in the area of university education. Research carried out based on the initial proposal of Busko (1998) has evidenced the existence of a single factor (Arias and Rivera 2018) or two-factor structure (Domínguez-Lara, Villegas, and Centeno 2014; Domínguez-Lara & Campos-Uscanga 2017) and removed various items. In contrast, this article applies a broader structure which allows us to pinpoint more accurately the set of variables that predict the behaviour inherent to academic procrastination amongst university students in Spain.

Given that procrastinating behaviour is shaped by the characteristics of the learning context as well as by the type of content, the educational level or the teaching method applied by the teacher (Díez-Morales 2019; Montgomery et al. 2019), such that some items cannot be discriminated in certain contexts, we opted to use a very broad and diversified sample of university students in Spain covering an array of degree courses and centres, which leads to a greater effect size (Olsson-Collentine, Wicherts, and van Assen 2020).

Exploratory factor analyses point to the elimination of two items (4 and 15) as a result of their obtaining low factor loadings, and a multifactor structure with four inter-related factors: (a) task aversion, (b) bad time management, (c) low motivational and emotional self-control, and (d) risk taking. These results differ from the two-factor structure (academic self-regulation and deferral of activities) obtained in studies conducted in Latin-America (Domínguez-Lara, Villegas, and Centeno 2014). The indices obtained with the confirmatory factor analysis evidence a good fit of the four-factor model, with high goodness of fit and internal consistency indices. However, this fit does not prove satisfactory when applied on the basis of other factor structures. The most acceptable is the one proposed by Barraza and Barraza (2018), made up of 10 items, although the AIC score is higher than was found in our study (AIC = 55.72), considering

that, in addition to the loss of indicators, it was composed of fewer items. With regard to other issues, noteworthy is the single-factor structure of the original version (16 items), which gives the worst fit indices (AIC = 746.18), indicating that procrastinating behaviour is not a single reality. On the other hand, the assumption of factorial invariance between females and males is fulfilled, so the instrument is valid to compare the levels of academic procrastination according to the gender in university students.

Finally, the results of the convergent validity analyses indicate that the four factors in the proposed model correlate significantly with high levels of involuntary procrastination (Fernie et al. 2017) and with the frequency of procrastination measured on the PASS scale (Solomon and Rothblum 1984), and differently from active procrastination, with significant negative correlations to satisfaction with performance and the ability to meet deadlines. Time management is related to aspects concerning self-regulation and metacognition (Garzón-Umerenkova and Gil 2017), and the factor of task aversion or risk-taking is related with variables of an emotional nature (Mohammadi-Bytamar, Saed, and Khakpoor 2020; Wartberg, Thomasius, and Paschke 2021).

The adaptation and validation of the Academic Procrastination Scale to the Spanish university context evidences good psychometric indicators of accuracy and validity. These results make this scale a robust instrument as well as one with a high level of applicability when assessing procrastination, since it includes discriminatory factors without containing a high number of items, added to which it is easy to understand. Through its four-factor structure it also operates some causal aspects of academic procrastination, which proves relevant when planning support for students in terms of their specific needs.

Nevertheless, this work does evidence certain key limitations which mainly affect the use of very general samples. One drawback is that, despite the advantages of subject heterogeneity, the number of students belonging to the area of social and legal sciences is larger, added to which there is also a noticeably greater number of female students. It would be advisable to have a greater specialization of the sample elements in terms of university degrees and to increase the sample size by using clusters so as to be able to test the validity in terms of said groups. Furthermore, having used self-reports as the data gathering technique might have led to an interpretative bias in some of the items posited. It might also prove wise to add another item to the dimension of task aversion.

Finally, it should be remembered that students enter university having already acquired certain well-drilled study habits from secondary education, where there is greater educational follow-up and student control than is found at university. As a result, it is particularly important to implement actions during the first year of the degree that are geared towards reducing procrastination, once the causes and intensity thereof have been evaluated. Since the problem is essentially one of self-regulation – related to the lack of time control, task aversion and anxiety when faced with evaluation (Martín-Antón et al. 2022) – it is possible to introduce training programmes in learning strategies, particularly metacognitive programmes. Action could include; diversifying teaching methods in order to embrace gamification activities and so enhance motivation; providing clear and detailed information concerning assessment criteria and methods, and even carrying out simulations as a means of training; not giving out long-term academic assignments early in the year, but splitting them up so that students receive feedback from the teacher, which will help them to gauge how effective their learning processes are proving, and which may even be aided by technological tools integrated into university learning management systems (e.g. Moodle, Blackboard Learn or Canvas), and which monitor all of the student's activities (Sáiz-Manzanares et al. 2021).

Disclosure statement

No potential conflict of interest was reported by the authors.

Ethical approval

This study was approved by the Committee on Ethics in Non-Clinical Research Involving Human Subjects and their Data or Samples (CEISH, University of Valladolid, Spain), delegate in CEIm Research Ethics Committee (Drug Research Ethical Committee, East Valladolid Health Area, University Clinical Hospital of Valladolid, SACYL, Spain), code PI 21-2258.

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