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Psychometric Evaluation of Two Procrastination Measures in University Students: Irrational Procrastination Scale and Academic Procrastination Scale Short Form

Evaluación psicométrica de dos medidas de procrastinación en estudiantes universitarios: Escala de Procrastinación Irracional y Escala de Procrastinación Académica Breve

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Abstract. *Objective.* This study evaluated the psychometric properties of two procrastination scales: the Irrational Procrastination Scale (IPS) and the Academic Procrastination Scale-Short Form (APS-SF). *Method.* A total of 397 undergraduate students from Peru completed virtual questionnaires that included the IPS and APS-SF scales as well as assessments of academic burnout and mindfulness. *Results.* The IPS and the APS-SF have strong psychometric properties and unidimensional structures, indicating their effectiveness in assessing academic procrastination. Additionally, the instruments exhibited reliable internal consistency, as evidenced by consistent alpha and omega coefficients. Significant associations were identified between academic procrastination, burnout, and mindfulness. These findings significantly contribute to the comprehension and management of academic procrastination in the university context, establishing a solid foundation for future research and intervention strategies.

Keywords. Irrational procrastination, academic procrastination, burnout, mindfulness, psychometric properties

Resumen. *Objetivo*. Este estudio evaluó las propiedades psicométricas de dos escalas de procrastinación: la Escala de Procrastinación Irracional (IPS) y la Escala de Procrastinación Académica - Forma Acortada (APS-SF). *Método*. Un total de 397 estudiantes universitarios de Perú completaron cuestionarios virtuales que incluían las escalas IPS y APS-SF, así como evaluaciones de agotamiento académico y atención plena. *Resultados.* La IPS y la APS-SF tienen sólidas propiedades psicométricas y estructuras unidimensionales, lo que indica su eficacia para evaluar la procrastinación académica. Además, los instrumentos mostraron una consistencia interna fiable, como lo demuestran los coeficientes alfa y omega consistentes. Se identificaron asociaciones significativas entre la procrastinación académica, el agotamiento y la atención plena. Estos hallazgos contribuyen de manera significativa a la comprensión y el manejo de la procrastinación académica en el contexto universitario, estableciendo una base sólida para futuras investigaciones y estrategias de intervención.

Palabras clave. Procrastinación irracional, procrastinación académica, agotamiento, atención plena, propiedades psicométricas

Introduction

Procrastination is the intentional act of delaying tasks until the last moment despite being aware of potential negative consequences (Steel, 2007). This disrupts the self-regulation process, hindering learners from efficiently organizing and managing their time (Balkis & Duru, 2009). Procrastinators may experience dissatisfaction, psychological vulnerability, and an increased likelihood of academic abandonment (Elemo & Dule, 2023; Lindner et al., 2023). Ferrari (2001) found that chronic procrastinators often underestimate the time required to complete a task, prepare inadequately, and allocate insufficient time to gather information for their assignments. This deficiency in self-regulatory capacity becomes problematic as procrastinators encounter challenges in knowledge regulation and cognitive and metacognitive processes (Howell & Watson, 2007), as well as issues related to self-efficacy, self-esteem (Haycock et al., 1998), stress, fear of failure, and anxiety (de Palo et al., 2017).

In addition, research has shown that procrastination has high predictive power for burnout (Hosseinpour & Ghanizadeh, 2023). Procrastinators tend to experience elevated stress levels, leading to exhaustion, difficulty concentrating, physical discomfort, and increased emotional distress (Qu et al., 2022). On the other hand, mindfulness is a psychological factor that can reduce procrastination. Mindfulness motivates individuals to focus on the present and perceive all feelings with honesty and an open mind (Li et al., 2023). Furthermore, mindfulness training significantly reduced academic procrastination, while enhancing self-regulation and mindfulness in procrastinating students. Mindfulness training effectively reduces all three components of procrastination: procrastination behavior, negative emotions, and perceived negative consequences (Rad et al., 2023). Therefore, a suitable measurement of procrastination should show positive correlations with burnout and negative correlations with mindfulness.

Several scales have been developed and validated to assess this phenomenon. Nevertheless, there is a lack of consensus on the most appropriate and valid measures for determining procrastination. Thus, this study presents empirical evidence supporting the reliability and validity of the Irrational Procrastination Scale (IPS) and the Academic Procrastination Scale-Short Form (APS-SF). These measures can be useful for researchers and professionals to accurately determine academic procrastination.

In the Latin American context, academic procrastination has primarily been assessed using the Tuckman Procrastination Scale (Tuckman, 1990) and the Academic Procrastination Scale (Busko, 1998), which have been adapted and validated in several countries. However, these measures present limitations such as extended item lengths and ongoing debate regarding whether they adequately capture procrastination or broader aspects of self-regulation. In Peru, research on academic procrastination remains limited and has similarly relied on these instruments, mainly to explore associations with academic or psychological variables rather than to examine their psychometric performance. Consequently, there is insufficient evidence about the internal structure, reliability, and measurement invariance of procrastination scales among Peruvian university students. This gap constrains the validity and cultural generalization of findings, as the construct may manifest differently across sociocultural and educational settings. Therefore, the present study proposes to examine alternative measures of procrastination, the Irrational Procrastination Scale (IPS) and the Academic Procrastination Scale–Short Form (APS-SF), and to provide the first empirical evidence of their reliability and validity in a Peruvian context.

Irrational Procrastination Scale (IPS)

The Irrational Procrastination Scale (IPS) is one of the most widely used instruments for assessing dysfunctional delay, although studies have applied different statistical approaches to examine its structure. Most validations have used Exploratory Factor

Analysis (EFA) based on the maximum likelihood (ML) estimator (Blázquez & Guzmán, 2022; Guilera et al., 2018; Svartdal et al., 2016), while others have adopted the Diagonally Weighted Least Squares (DWLS) method to better address the ordinal nature of the response format (Rocha et al., 2021). In some cases, Principal Component Analysis (PCA) was used during early validation stages (Rozental et al., 2014; Shaw & Zhang, 2021b), although this approach is now considered an exploratory data-reduction technique rather than a true factorial model (Lloret-Segura et al., 2014)

Despite these methodological variations, the majority of studies converge on a unidimensional solution, indicating that the IPS measures a single latent factor of irrational delay (Prayitno et al., 2013; Rocha et al., 2021; Shaw & Zhang, 2021b; Svartdal & Steel, 2017). However, a few studies have proposed two-factor models, differentiating behavioral delays from difficulties in time organization (Kim et al., 2020; Svartdal et al., 2016). Both approaches have shown adequate psychometric performance, although models grounded in Item Response Theory (IRT) tend to favor the unifactorial structure due to its greater accuracy and parameter stability (Shaw & Zhang, 2021a; Svartdal & Steel, 2017).

Therefore, because of the consistency in the metric structure, applying the principle of parsimony is appropriate, suggesting that less complex models are more optimal for psychometric analysis (Meneses et al., 2013). Despite the apparent consensus on the unidimensional structure of the IPS, methodological challenges related to its psychometric performance persist. These challenges include the limited use of robust indices at response-measurement levels (DiStefano et al., 2018). Moreover, there is a notable lack of studies in the Iberoamerican context, and in particular, inherent limitations in using reliability coefficients (Dominguez-Lara, 2016).

Given the variability observed in previous validations of the Irrational Procrastination Scale (IPS), including differences in item retention, factorial structures, and estimation methods, there is still no consensus regarding its optimal internal configuration. As summarized in Table 1, prior studies have proposed both one- and two-factor solutions and have retained different subsets of the nine original items, this heterogeneity underscores the need for a systematic comparison of the most representative confirmatory models available in the literature to determine which factorial structure best fits a Iberoamerican university sample. Such comparisons are essential to verify the structural stability of the IPS across cultural contexts and to ensure that the retained model is theoretically parsimonious and psychometrically robust.

Academic Procrastination Scale - Short Form (APS-SF)

Relatively few studies have been conducted on the APS-SF. McCloskey (2011), the original author of the APS-SF, initially used Principal Component Analysis (PCA) as a first step in the analysis. However, it is important to note that using PCA as a factor analysis method has certain limitations; therefore, its application to explore factor structures is not widely recommended (Lloret-Segura et al., 2014). Nevertheless, despite these limitations, these studies concluded that a single factor underlies academic procrastination, as measured by the APS-SF.

For example, one study supports the idea of a unidimensional structure (Yockey, 2016), which is consistent with the first analysis conducted in developing the APS (McCloskey, 2011). On the other hand, a later study validated the APS-SF in a Spanish context (Brando-Garrido et al., 2020) by conducting a confirmatory factor analysis (CFA) using the maximum likelihood (ML) estimator, which confirmed the unifactorial structure and obtained an alpha coefficient of 0.87 as a measure of reliability. Finally, a recent Brazilian study examined the instrument using Item Response Theory (IRT) analysis and found adequate discrimination indices together with a homogeneous evolution in item difficulty (Silva et al., 2022). Although studies related to the APS-SF are limited in number, they consistently

Table 1. Comparative factorial composition of the Irrational Procrastination Scale (IPS) models previously validated in the scientific literature

Irrational Procrastination Scale	Steel (2010)	Rozental et al. (2014)	Svartdal & Steel (2017)	Kim et al. (2020)	Prayitno et al. (2013)[a]	Prayitno et al. (2013)[b]	Prayitno et al. (2013)[c]	Blásquez & Guzman (2022)
1. Pospongo tanto las cosas que mi bienestar o eficiencia se ven afectados innecesariamente. [I put things off so long that my well-being or efficiency unnecessarily suffers].	F1	F1	F1	F1	F1	F1	F1	F1
2. Si hay algo que debo hacer, lo hago antes que atender a tareas menos importantes. [If there is something I should do, I get to it before attending lesser tasks].	F1	F2	F2*	X	F2	X	X	X
3. Si algunas cosas las hubiera hecho antes, mi vida sería mejor. [My life would be better if I did some activities or tasks earlier].	F1	F1	F1	F1	F1	F1	F1	F1
4. Cuando debería estar haciendo una cosa, me pongo a hacer otra. [When I should be doing one thing, I will do another].	F1	F1	F1	F1	F1	F1	F1	F1
5. Al final del día, sé que podría haberme distribuido mejor el tiempo. [At the end of the day, I know I could have spent the time better].	F1	F1	F1	F1	F2	X	X	F1
6. Me organizo el tiempo adecuadamente. [I spend my time wisely].	F1	F2	F2*	X	F1	F1	F1	F1
7. Retraso las tareas más de lo que sería razonable. [I delay tasks beyond what is reasonable]	F1	F1	F1	F1	F1	F1	F1	F1
8. Dejo para mañana lo que tendría que hacer hoy. [I procrastinate].	F1	F1	F1	F1	F1	X	F1	F1
9. Hago las cosas cuando creo que hay que hacerlas. [I do everything when I believe it needs to be done].	F1	F2	F2*	X	F1	F1	F1	X

Note. The three alternative configurations derived from Prayitno et al. (2013) correspond to reduced versions of the original nine-item IPS structure identified in their exploratory analysis. Specifically: (a) includes all nine items with a single latent factor; (b) retains six items representing the highest-loading indicators of irrational delay; and (c) retains seven items and allows correlated residuals between semantically similar statements. These adaptations were included in the present comparison to evaluate whether any of the reduced structures proposed by Prayitno et al. (2013) provided a more parsimonious and better-fitting model in the current sample. F1 = first factor; F2 = second factor; X = item removed; * = correlated items.

suggest the presence of a single factor in academic procrastination, as assessed by this scale.

The Present Study

Psychometric properties are essential to ensure the reliability, validity, and invariance of a psychological measure. To determine these properties, it is necessary to use appropriate statistical techniques to analyze the data collected. Psychometric reporting techniques are used to accurately and concisely describe and present the measurement analysis results. These techniques include descriptive statistics that summarize data. In addition, inferential statistics such as correlation, factor analysis, and reliability make it possible to explore the relationships between different variables and determine the internal consistency and stability of the measure over time. Using these techniques, researchers can systematically and objectively determine the psychometric properties of a measure and provide valuable information about its quality and suitability for use in various contexts.

Consequently, the main objective of this study was to review the psychometric properties of the IPS and APS-SF in a sample of undergraduate students. For this purpose, specific analysis objectives were formulated: a) to report on the validity based on the internal structure of the IPS and APS-SF instruments through confirmatory factor analysis, b) to establish the factorial invariance of the instruments according to the gender of the participants, c) to determine the reliability through internal consistency of the IPS and APS-SF instruments, and d) to report on the validity based on their association with other variables.

Method

Participants

To determine the sample size, the general rule of having at least 20 participants per item was applied (Schumacker & Lomax, 2016). Given that the larger instrument consisted of nine items, a minimum sample of 180 participants was required. Initially, 400 individuals were obtained. Three specific cases were excluded: case 223, who was a professional graduate; case 311, who was an individual who did not enroll in the university; and case 376, who did not provide data on his or her career (missing data). Thus, we obtained a sample of 397 undergraduate students aged 18–53 years (M=24.1 years, SD= 6 years). The sample was composed of both sexes, with 42.3% males and 57.7% females. Only 57.9% were dedicated to their studies, while 42.1% worked and studied simultaneously. Regarding marital status, the majority were single (95.2%), with a small percentage of married (3.3%) and cohabiting (1.5%). All participants resided in urban areas of Peru, primarily in metropolitan contexts.

Instruments

Irrational Procrastination Scale (IPS). The IPS, developed by Steel (2010) and adapted to Spanish by Guilera et al. (2018), was subsequently validated in the Mexican context by Blázquez and Guzmán in 2022 (used in this study). It assesses irrational procrastination by means of 9 items ("I put off until tomorrow what I would have to do today") with five response options ranging from 1 ("It does not describe me at all") to 5 ("It describes me totally"). The scale has demonstrated adequate psychometric properties, with a unidimensional model and Cronbach's alpha coefficient of 0.80 (Blázquez & Guzmán, 2022).

Academic Procrastination Scale-Short Form (APS-SF). This abbreviated version of the APS-25 (McCloskey, 2011) was adapted for Spanish by Brando-Garrido et al. (2020). It consists of five items, with a Likert-type response scale ranging from 1 (Strongly Agree) to 5 (Strongly Disagree), with a total score ranging from 5 to 25. A higher score indicated a greater tendency to procrastinate on academic tasks. This instrument has demonstrated good psychometric properties, with a Cronbach's alpha coefficient of 0.87 (Brando-Garrido et al., 2020).

Single-item Academic Burnout (UIBA). It is a screening instrument consisting of a single question with five response options, focused on academic

burnout (Merino-Soto & Fernández-Arata, 2017). The instrument had a cutoff score of ≥3 to identify burnout symptoms.

Spanish version of the 5-item Mindful Attention Awareness Scale (MAAS-5). It consists of five items grouped as unidimensional (Caycho-Rodríguez et al., 2019). Regarding validity based on internal structure through confirmatory factor analysis, absolute fit indices were obtained, such as χ^2/df = 1.97, RMSEA = 0.05, CFI = 0.99, and WRMR = 0.42, indicating a good fit. In addition, reliability, measured by the omega coefficient, yielded a value of ω = 0.83, suggesting that the scale was a reliable and acceptable measure.

Procedure

This study was approved by the Ethics Committee of the Universidad Universidad de Ciencias y Humanidades (Acta CEI N° 085. Code-087-22). Peruvian students from several universities participated in this study. A virtual form was developed consisting of five sections: 1) informed consent (explanation of the purpose of the study, participants' anonymity, researchers' contact, and the option to participate); 2) sociodemographic data (age, gender, marital status, educational and work situation, undergraduate program, and university name); 3) an academic burnout instrument; 4) a mindfulness instrument; and 5) a procrastination instrument (IPS and APS-SF). The form was distributed online via virtual classroom platforms. All participants responded voluntarily and anonymously with the possibility of opting out according to their choice. Data was collected during January and February 2023.

Data analysis

First, item determinations were conducted using descriptive statistics including mean, standard deviation, skewness, kurtosis, and corrected item homogeneity. Absolute values of skewness (g_1 < 3) and kurtosis (g_2 < 10) were considered indicators of the approximation of a normal distribution (Kline, 2016). Additionally, Mardia's coefficient was used to determine the approximation of a multivariate normal distribution (g_2 < 70; Rodriguez & Ruiz, 2008). In the item-test correlation analysis, two interpretive categories were considered: a) the presence of multicollinearity (*rit* > .90; Brown, 2015), and b) items with discriminative ability below the threshold (*rit* < .20; Kline, 1986).

Second, validity evidence based on internal structure was assessed through a series of confirmatory factor analyses using models previously established in scientific literature. The robust maximum likelihood (MLR) method was applied because of its effectiveness in structures with five response styles (Rhemtulla et al., 2012). Model fit was assessed using several indices including the comparative fit index (CFI), Tucker-Lewis index (TLI), root mean square error of approximation (RMSEA), standardized root mean square residual (SRMR), and Akaike's information criterion (AIC). Acceptable fit values were considered when CFI > .90, TLI > .90 (Xia & Yang, 2019), SRMR < .09 (Hair et al., 2009), RMSEA values close to 0.08 (Browne & Cudeck, 1992; West et al., 2012), and a lower AIC value between models to determine the best of these. Additionally, optimal values were identified as CFI > .95, TLI > .95, RMSEA < .06, SRMR < .08 (Hu & Bentler, 1999).

An exploratory structural equation analysis (ESEM) was performed to complement these analyses by combining the beneficial aspects of restrictive and nonrestrictive factor analyses. This analysis allowed for a more accurate search for the optimal factor solution, including cross-loadings and item rotations (van Zyl & ten Klooster, 2022). We began by identifying rotated factor loadings using the GeominQ method with a delta coefficient set at 0.5, followed by segmentation of the structure into two components to establish and fix the most robust loadings on each dimension (Marsh et al., 2014; Morin et al., 2013). Model fit was assessed using a robust maximum likelihood estimator (MLR) and the indices mentioned above.

In a sense, considering that previous research has proposed multiple factorial solutions for the Irrational Procrastination Scale (IPS), several confirmatory

models reported in the literature were tested in this study. These models were selected based on theoretical and empirical evidence from prior validations (Blázquez & Guzmán, 2022; Kim et al., 2020; Prayitno et al., 2013; Rozental et al., 2014; Steel, 2010) and are summarized in Table 1. The comparative analysis aimed to evaluate the structural stability of the IPS across alternative item configurations and to identify the most parsimonious and best-fitting model for the Peruvian university context. This approach follows international psychometric recommendations for cross-cultural validation, emphasizing the assessment of alternative models to ensure conceptual equivalence and measurement robustness (Hair et al., 2009; Marsh et al., 2014).

In contrast, for the Academic Procrastination Scale–Short Form (APS-SF), only the unidimensional model proposed by McCloskey (2011) and validated in Spanish by Brando-Garrido et al. (2020) was evaluated, as previous evidence consistently supports its single-factor structure.

Third, reliability was estimated by the internal consistency method using ω coefficient. Acceptable values were considered above 0.65 (Katz, 2011), and optimal values within the range of 0.70 to 0.90 (Campo-Arias & Oviedo, 2008).

Fourth, the measurement invariance of the scores was analyzed using multigroup analysis (Putnick & Bornstein, 2016; Van De Schoot et al., 2015). Graded restrictions were established at four levels according to the sociodemographic variables of sex, addressing configural, metric, scalar, and strict invariance. The fit of the measures according to sex was assessed using tests of independence of measurements (χ2), absolute differences in RMSEA (ΔRMSEA), and ΔCFI. Acceptable values of ΔRMSEA ≥ .015 and Δ CFI < -.01 were considered acceptable (Chen, 2007), and a criterion for model efficiency of more than 20% invariant parameters was established (Dimitrov, 2010). During the evaluation of the invariance levels, modification indices were used to adjust the models and obtain partial invariance.

Finally, evidence of the validity of the other variables was assessed using null hypothesis significance tests, Pearson correlation coefficients, and their 95% confidence intervals. Cut-off points were established to interpret the strength of the correlations as insignificant (r < .10), weak (r < .39), moderate (r < .69), strong (r < .89), or very strong (r < 1.00) (Schober et al., 2018).

Results

As shown in Table 2, the skewness and kurtosis coefficients of the test items approached univariate normality, and Mardia's test indicated an approximation of multivariate normality for the IPS (g_1= 440.397; g_2= 10.751) and APS (g_1= 132.964; g_2= 7.013) scores. In addition, the correlation coefficients indicate the absence of multicollinearity among the items. However, in the IPS, item 2 had a value that represented a low discriminative capacity and an inverse relationship with the other items; consequently, it was pertinent to eliminate the item for further analysis.

In Table 3, the confirmatory factor analyses show good fits in the TLI and CFI indices, with optimal fits in the SRMR coefficients. Among the IPS models, three alternative configurations based on Prayitno et al. (2013), labeled (a), (b), and (c), were tested. These correspond respectively to (a) the full nine-item unidimensional version, (b) a six-item reduced model emphasizing the strongest indicators of irrational delay, and (c) a seven-item model including correlated residuals between semantically related items. The models of Prayitno et al. (2013)[b], Prayitno et al. (2013)[c], and the ESEM solution are notable for their optimal CFI and TLI indices. The Prayitno et al. (2013)[b] model also showed an optimal RMSEA index and the lowest AIC value, making it the most suitable configuration for representing the IPS structure in this sample. Nevertheless, difficulties were encountered in estimating the covariance matrices of the latent variables in the Rozental et al. (2014) model and convergence problems appeared in the model proposed by Svartdal (2017). By contrast, the unidimensional solution of the APS-SF demonstrated excellent fit indices across all parameters.

Table 2. Descriptive statistics of the IPS and APS-SF items

Items	*M*	*SD*	g_1	g_2	*rit*	Polychoric Matrix							
						1	2	3	4	5	6	7	8
IPS													
Ips1	3.30	1.16	-0.31	-0.78	0.78								
Ips2*	2.64	1.04	0.25	-0.53	-0.20	-0.19							
Ips3	3.68	1.12	-0.67	-0.18	0.54	0.52	-0.12						
Ips4	3.55	1.13	-0.53	-0.44	0.74	0.65	-0.23	0.46					
Ips5	3.86	1.06	-0.71	-0.24	0.68	0.56	-0.22	0.56	0.61				
Ips6*	2.85	1.15	0.09	-0.77	0.40	0.30	0.17	0.11	0.34	0.36			
Ips7	3.17	1.27	-0.11	-1.03	0.78	0.69	-0.24	0.42	0.61	0.55	0.27		
Ips8	3.36	1.21	-0.35	-0.77	0.77	0.66	-0.27	0.43	0.64	0.57	0.28	0.78	
Ips9*	2.75	1.08	0.22	-0.74	0.29	0.31	-0.07	0.17	0.23	0.13	0.08	0.33	0.26
APS													
Aps1	3.03	1.28	-0.20	-1.14	0.77								
Aps2	3.26	1.31	-0.20	-1.12	0.76	0.70							
Aps3	3.44	1.16	-0.55	-0.56	0.70	0.67	0.73						
Aps4	2.75	1.36	0.19	-1.23	0.74	0.73	0.70	0.62					
Aps5	3.20	1.28	-0.19	-1.08	0.71	0.68	0.65	0.61	0.70				

Note. IPS: Irrational Procrastination Scale; APS-SF: Academic Procrastination Scale Short Form; *Reverse wording; *M*= mean; *SD* = standard deviation; g_1 = skew; g_2 = kurtosis; *rit* = corrected item homogeneity.

Table 4 presents the factor loadings of the resulting models at both scales, with acceptable values (λ > .30) supporting the factor structure of the solutions. In addition, reliability was determined through the internal consistency of the IPS and APS-SF scores, obtaining indices in the acceptable range for the models suggested by Prayitno et al. (2013)[b] and Prayitno et al. (2013)[c], which indicates that both models possess evidence of validity related to the internal structure and reliability of the scores.

Table 5 presents the levels of invariance for the IPS and APS factor solutions. The IPS scores showed that the CFI and TLI were optimally adjusted; however, when restricting the factor loadings, the model showed a mismatch between men and women. Moreover, in the APS-SF scores, the levels of invariance were adequate as the components of the unifactorial structure were restricted. Despite its optimal fit, partial invariance was established for Item 4 according to sex.

Finally, regarding the validity evidence in relation to other variables, the IPS models were examined using the APS-SF and a statistically significant, strong, and direct correlation was found (Table 6). Statistically significant direct and weak correlation coefficients were obtained for procrastination scores on both scales in relation to academic burnout. Furthermore, when analyzing procrastination scales

Table 3. APS-SF

Models	χ^2	*df*	TLI	CFI	SRMR	RMSEA	LI	LS	AIC
IPS									
Steel (2010)	83.6	20	.909	.935	.047	.099	.078	.122	8762.9
Rozental et al. (2014)	83.8	19	.903	.934	.047	.102	.081	.125	8764.5
Svartdal (2017)									
Kim et al. (2020)	51.2	9	.911	.947	.047	.129	.096	.164	6411.3
Prayitno et al. (2013)[a]	83.6	20	.909	.935	.047	.099	.078	.122	8762.9
Prayitno et al. (2013)[b]	14.8	9	.981	.989	.029	.042	.000	.080	6833.8
Prayitno et al. (2013)[c]	40.9	14	.949	.966	.035	.077	.050	.105	7778.6
Blázquez & Guzmán (2022)	876.4	21	.906	.937	.049	.115	.089	.142	7607.0
ESEM	36.8	13	.980	.958	.029	.068	.043	.094	8711.2
APS-SF									
Unidimensional	18.1	5	.973	.986	.020	.086	.045	.130	5566.9

Note. Models (a), (b), and (c) correspond to alternative IPS configurations derived from Prayitno et al. (2013): (a) = nine-item single-factor version; (b) = six-item reduced version; (c) = seven-item model with correlated residuals. CFI = Comparative Fit Index; TLI = Tucker–Lewis Index; SRMR = Standardized Root Mean Square Residual; RMSEA = Root Mean Square Error of Approximation; AIC = Akaike Information Criterion.

Table 4. Factor loadings and reliability of IPS and APS-SF scores

IPS	Prayitno et al. (2013)[b]	Prayitno et al. (2013)[c]	APS-SF	Unidimensional
Ips1	.836	.780	Aps1	.823
Ips3	.533	.502	Aps2	.818
Ips4	.741	.728	Aps3	.754
Ips5			Aps4	.798
Ips6*	.330	.319	Aps5	.760
Ips7	.758	.832		
Ips8		.830		
Ips9*	.329	.321		
ω	.779	.830	ω	.894
95% IC	[.746; .808]	[.802; .854]	95% IC	[.876; .908]

Table 5. Invariance of IPS and APS-SF models

	CFI	TLI	RMSEA	SRMR	ΔRMSEA	ΔCFI	ΔSRMR	χ^2
IPS								
I. Config.	.967	.951	.070	.043				
I. Métrica	.935	.919	.090	.107	.021	-0.032	0.064	0.000
APS-SF								
Configural	.987	.975	.076	.022				
Metric	.984	.978	.072	.045	-.005	-.003	.022	0.143
Scalar*	.986	.982	.065	.041	-.008	.001	-0.004	0.674
Strict*	.983	.984	.064	.045	-.003	-.003	.005	0.238

Note. *Partial invariance was performed through parameter restriction: m1 =~ aps4 y aps4 ~1.

Table 6. Validity evidence of IPS and APS-SF based on the relationship with other variables

	IPS - Prayitno et al. (2013)[b]	IPS - Prayitno et al. (2013)[c]	APS-SF	MAAS	Burnout
IPS - Prayitno et al. (2013)[b]	-				
	-				
IPS - Prayitno et al. (2013)[c]	0.988				
	[.985; .911]				
APS-SF	0.774	0.814			
	[.727; .817]	[.777; .849]			
MAAS	-0.457	-0.468	-0.562		
	[-.543; -.369]	[-.550; -.382]	[-.637; -.483]		
Burnout	0.453	0.451	0.416	-0.348	
	[.380; .531]	[.527; .379]	[.339; .495]	[-.438; -.251]	-

Note. All the correlation coefficients were statistically significant. Confidence intervals were calculated based on 1000 replicable resamples.

in relation to mindfulness, a statistically significant, weak, and inverse correlation was observed.

Discussion

This study aimed to comprehensively determine the psychometric properties of the IPS and APS-SF, focusing on aspects such as their internal structure, reliability, measurement invariance, and relationships with other variables. A distinctive aspect of this study is its focus on a Peruvian sample, which marks an important milestone in evaluating these instruments in this context. Several analyses were conducted to identify the most appropriate structure for each instrument to achieve this objective.

The results of the IPS and APS-SF psychometric properties provided important findings. Regarding the IPS, confirmatory factor analyses supported the unifactorial structure of this scale, which is consistent with previous research (Prayitno et al., 2013; Rocha et al., 2021; Shaw & Zhang, 2021b). However, it should be highlighted that Prayitno et al. 's (2013) b structure is composed of six items. However, it is relevant to remark that some previous studies have identified a possible two-factor structure (Kim et al., 2020; Svartdal et al., 2016). Despite this variability in factor structure, the results indicate that the IPS is a psychometrically sound measure for determining academic procrastination among college adults. Internal consistency was also adequate (Blázquez & Guzmán, 2022), supporting the reliability of the scale.

Furthermore, the APS-SF demonstrated a robust unifactorial structure in line with its more extended version, the APS-25 (McCloskey, 2011), and previous studies in the Spanish context. The internal consistency of the APS-SF is excellent (Brando-Garrido et al., 2020), suggesting that it is a reliable measure for determining academic procrastination more quickly and efficiently. These results support the usefulness of the APS-SF as an assessment tool in studies that require a more concise measure of academic procrastination.

However, a fundamental aspect was the evaluation of the invariance of the IPS and APS-SF as a function of the sex of the participants. The results showed that the APS-SF managed to maintain invariance at all levels, indicating that this scale maintains its structure and psychometric properties for both men and women. This finding is significant because it suggests that the APS-SF is equally applicable and valid for determining academic procrastination in both sexes. It facilitates its usefulness in contexts that aim to understand and compare procrastination patterns between sexes.

Moreover, in the case of the IPS, challenges in invariance were observed when factor loadings were restricted between males and females. These mismatches may be due to underlying differences in the experience of procrastination between genders, raising important questions about the nature of this behavior in different populations. These results indicate that caution should be exercised when comparing procrastination scores between men and women using the IPS, as the scale structure may vary by gender. This highlights the importance of considering sociocultural and gender contexts when determining and addressing academic procrastination in undergraduate students. Some studies had explored the differences in sexes. One meta-analysis revealed that males tend to exhibit stronger general and academic procrastination tendencies compared to females (Lu et al., 2022). Similarly, another study reported that men showed higher levels of procrastination, positive affect, and subjective well-being, along with lower levels of negative affect compared to women (Duru et al., 2023). However, contradictory findings exist. Several studies found no significant gender differences in procrastination behaviors. For example, research conducted at Qingdao Agricultural University revealed no discernible variation in study procrastination behaviors between male and female college students (Shi, 2023). Another study focusing on academic procrastination among undergraduate students found that gender does not influence the excuses provided for procrastination (Vij, 2016).

The relationship between academic procrastination and burnout yielded interesting results. A statistically significant correlation was observed between procrastination scores on the IPS and APS-SF and academic burnout symptoms, although this correlation was weak. While procrastination can lead to increased stress and anxiety, which could potentially contribute to burnout, burnout symptoms, such as lack of energy and demotivation, may also lead to increased procrastination of academic tasks (Qu et al., 2022). This bidirectional relationship warrants further investigation to better understand how these two constructs influence each other in an academic context (Rahimi et al., 2023).

The relationship between procrastination and mindfulness showed a statistically significant but weak negative correlation. This indicated that students who reported higher levels of mindfulness tended to procrastinate less in their academic tasks. This is consistent with the idea that mindfulness, which involves being present at the moment and being fully aware of actions and thoughts, could help students reduce procrastination by improving their ability to manage their time and focus on academic responsibilities. Nevertheless, it is important to note that the relationship between procrastination and mindfulness may be mutual as chronic procrastination may hinder mindfulness practice. Therefore, promoting mindfulness strategies could be beneficial for addressing academic procrastination. However, further research is required to fully understand the nature of this relationship, and how mindfulness can be used as an effective tool to reduce procrastination in academic settings.

Overall, the evidence obtained in this study suggests that the APS-SF exhibited the most robust psychometric performance among the two instruments evaluated. This short version showed excellent internal consistency, full measurement invariance across sex, and a clear unifactorial structure aligned with previous validations in different cultural contexts. In contrast, the IPS, although psychometrically adequate and theoretically coherent, presented partial invariance across sex, which may limit its use in comparative analyses. It is worth noting that both instruments serve distinct assessment purposes: while the APS-SF is specifically designed for academic contexts, the IPS captures procrastination behaviors in general or everyday situations. Therefore, the APS-SF is recommended as the preferred measure for assessing academic procrastination in Peruvian university students, whereas the IPS remains a valuable tool for evaluating procrastination as a broader behavioral tendency in non-academic settings.

Despite these results, this study had several limitations that should be considered when interpreting the findings. First, the sample was non-probabilistic, limiting the generalizability of the results to other populations. Another difficulty was related to the sample size by sex, because the number of heterogeneous samples did not allow us to measure invariance with groups with the same sample conditions. In addition, one limitation of psychometric studies is the bias focused on the evaluation because a virtual form was used, and it was not possible to answer all questions or doubts about the items. Despite these limitations, this study provides evidence of the usefulness of the IPS and APS-SF scales in assessing academic procrastination. Moreover, a limitation of this study is that the validation was addressed exclusively through latent modeling methods, without incorporating alternative psychometric approaches such as Item Response Theory (IRT) or Network Analysis. Future studies are encouraged to apply these complementary frameworks to provide a more comprehensive understanding of the instrument's psychometric properties.

In conclusion, the results support the usefulness of the IPS and APS-SF as valid and reliable measures for determining academic procrastination in college students. These scales can be effective tools for identifying and understanding this behavior and its impact on academics. In addition, the relationships between academic pro-

crastination, academic burnout, and mindfulness were examined. Statistically significant correlations were found between procrastination, burnout, and mindfulness. These findings suggest that academic procrastination is related to students' academic well-being, and that mindfulness may play a role in reducing procrastination.

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Appendix

IPS – Irrational Procrastination Scale

N°	IPS	1 No me describe en absoluto	2 No es usual en mí	3 A veces sí a veces no	4 Es usual en mí	5 Me describe totalmente
1	Pospongo tanto las cosas que mi bienestar o eficiencia se ven afectados innecesariamente. [I put things off so long that my well-being or efficiency unnecessarily suffers]					
2*	Si hay algo que debo hacer, lo hago antes que atender a tareas menos importantes. [If there is something I should do, I get to it before attending to lesser tasks]					
3	Si algunas cosas las hubiera hecho antes, mi vida sería mejor. [My life would be better if I did some activities or tasks earlier]					
4	Cuando debería estar haciendo una cosa, me pongo a hacer otra. [When I should be doing one thing, I will do another]					
5	Al final del día, sé que podría haberme distribuido mejor el tiempo. [At the end of the day, I know I could have spent the time better]					
6	Me organizo el tiempo adecuadamente. [I spend my time wisely]					
7	Retraso las tareas más de lo que sería razonable. [I delay tasks beyond what is reasonable]					
8	Dejo para mañana lo que tendría que hacer hoy. [I procrastinate]					
9*	Hago las cosas cuando creo que hay que hacerlas. [I do everything when I believe it needs to be done]					

*Items inversos

Appendix

APS-SF – Acacdemic Procrastination Scale Short Form

N°	APS-SF	1 Muy en desacuerdo	2 Desacuerdo	3 Ni de acuerdo ni en desacuerdo	4 De acuerdo	5 Totalmente de acuerdo
1	Pospongo los proyectos hasta el último minuto. [I put off projects until the last minute]					
2	Soy consciente de que debería trabajar en mis tareas académicas, pero, simplemente, no lo hago. [I know I should work on schoolwork, but I just don't do it]					
3	Me distraigo con cosas más interesantes, cuando se supone que debería dedicarme a mis tareas académicas. [I get distracted by other, more fun, things when I amsupposed to work on schoolwork]					
4	Cuando se me asigna una tarea, por lo general, me olvido de ella hasta la fecha de entrega. [When given an assignment, I usually put it away and forgetabout it until it is due]					
5	Con frecuencia, me encuentro agotando fechas límite importantes. [I frequently find myself putting important deadlines off]					