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Evidence of Validity and Measurement Invariance of the AAQ-US among Mexican University Students

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Abstract

Psychological flexibility is a transdiagnostic construct associated with psychological well-being and academic success. The Acceptance and Action Questionnaire for University Students (AAQ-US) is a tool designed to measure psychological inflexibility in educational contexts. This study aimed to evaluate the psychometric properties of the AAQ-US in Mexican university students. The research comprised a sample of 959 Mexican university students who completed the AAQ-US and measures of psychological inflexibility, emotional symptoms, academic self-efficacy, and academic burnout. The AAQ-US demonstrated excellent internal consistency. Factor analyses supported a unidimensional structure, consistent with the original instrument. Measurement invariance was established across gender, university sector, prior mental health care, and levels of emotional symptoms. The AAQ-US showed the expected correlations with related constructs and discriminated between groups with and without elevated emotional symptoms. The Mexican adaptation of the AAQ-US demonstrates strong psychometric properties to assess psychological inflexibility in academic contexts among Mexican university students.
Key words: Acceptance and Commitment Therapy, university students, Confirmatory Factor Analysis, psychometric properties, invariance.

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Novelty and Significance

What is already known about the topic?

- University students present high rates of depression, anxiety, and stress, affecting academic performance and retention.
- Psychological inflexibility is a transdiagnostic factor strongly associated with emotional symptoms and academic maladjustment.
- The AAQ-US has shown good psychometric properties in its original validation, but evidence in Spanish-speaking populations is limit.

What this paper adds?

- Provides the first validation of the AAQ-US in Mexican university stul.
- The AAQ-US demonstrated excellent internal consistency, unidimensional structure, and measurement invariance across relevant groups.
- The findings support the use of the AAQ-US as a culturally adapted and reliable tool to assess psychological inflexibility in academic contexts in Mexico.

Mental health among the university population is a critical public health issue due to the high prevalence of psychological problems. Approximately 21% of university students worldwide meet the criteria for depression and suicidal ideation; furthermore,

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12.9% exhibit higher levels of depression compared to the general population (Sheldon *et alii*, 2021), and one in three first-year university students report mental health issues (Bruffaerts *et alii*, 2018). The presence of depressive and anxious symptoms in university students can pose risks to academic and psychosocial functioning, and they are considered predictors of poor academic performance and increased dropout rates (Vera Cala *et alii*, 2020).

The onset of university life involves facing challenges related to adapting to the academic environment, transitioning to adulthood, and assuming new and varied academic responsibilities (Galhardo, Neto, Monteiro, Massano Cardoso, Ferreira, & Cunha, 2023). These challenges, combined with changes in family dynamics and economic factors, can act as stressors leading to psychological distress in students (March Amengual *et alii*, 2022).

Given the above, it is important to analyze the mechanisms of change that contribute to reducing psychological distress. Among them, psychological flexibility constitutes a central process, defined as the ability to remain consciously in contact with the present experience, accept difficult thoughts and emotions, and act in accordance with personal values (Hayes, Strosahl, & Wilson, 2012). Its absence, namely psychological inflexibility, is associated with higher levels of anxiety, depression, and stress in university students (Tavakoli, Broyles, Reid, Sandoval, & Correa Fernández, 2019; Wang, Fang, Yang, Tang, Zhu, & Nie, 2023) and also predicts suicidal tendency in this context. In addition, low psychological flexibility has been linked to greater psychological distress and academic burnout (Arslan & Allen, 2021; Ye, Chen, Zhang, & Yang, 2022), as well as lower academic self-efficacy and subjective well-being (Bi & Li, 2021; Jeffords, Bayly, Bampus & Hill, 2020).

Psychological flexibility is a construct of the transdiagnostic model (Faustino, Vasco, Farinha Fernandes, & Delgado, 2023), which has gained prominence recently due to the unmet global demand for mental health care, multiple comorbidities, and the need for evidence-based interventions (Barlow, Harris, Eustis, & Farchione, 2020). Other important transdiagnostic components include experiential avoidance, which represents a basic functional dimension in the development of psychopathologies, and rumination, which is associated with lower well-being in university students (Im & Kahler, 2020).

Given the importance of these constructs, numerous studies have focused on their assessment. The Acceptance and Action Questionnaire (AAQ) was the first instrument developed to measure these constructs, consisting of 32 items designed to assess various aspects related to experiential avoidance, emotional and cognitive control, and avoidance of negative internal experiences (Hayes *et alii*, 2004).

To date, two validations of the AAQ-II have been conducted in Mexico. The first study by Patrón (2010) adapted the 10-item version, demonstrating good internal consistency (α= .89) and a unifactorial structure as suggested by exploratory factor analysis (EFA). These findings provide evidence of the scale's validity in relation to constructs such as depression and anxiety. In a follow-up study, Mellin and Padrós (2021) reduced Patrón's (2010) 10-item version to a 7-item scale. Confirmatory factor analysis supported a unidimensional structure for this reduced version (*NFI*= .92, *NNFI*= .90, *CFI*= .93, *RMSEA*= .10), and the scale demonstrated good internal consistency (α= .89).

Several authors have noted that the AAQ-II is the most widely used instrument to measure psychological inflexibility (Benoy, Knitter, Schumann, Bader, Walter, & Gloster, 2019; Ong, Lee, Levin, & Twohing, 2019). This instrument has been adapted in various countries and populations, most of which have demonstrated good psychometric

properties (Ong, Lee, Levin, & Twohig, 2019). In response to the increasing number of psychological problems in school contexts, the recent creation of the Acceptance and Action Questionnaire for University Students (AAQ-US) was proposed (Levin, Krafft, Pistorello, & Seeley, 2018). The AAQ-US was developed by Levin, Krafft, Pistorello, and Seeley (2018) in the United States with a sample of 425 university students. In this study, exploratory factor analysis and principal component analysis were conducted, as well as evidence of validity in relation to other academic and mental health constructs.

Two studies were identified in Latin America and the Caribbean. Barbosa (2020) conducted the validation of the AAQ-US scale with a sample of 352 Colombian university students. The study reported excellent internal consistency (α= .90), and a unidimensional structure composed of 12 items, along with evidence of validity in relation to other variables. Correlation coefficients were found to be greater than .5 with emotional distress, including depression, anxiety, stress, and psychological inflexibility. Similarly, Collares, Zanza & da Silva (2021) adapted the AAQ-US to the Brazilian context in a sample of 123 undergraduate and graduate students. The scale demonstrated good internal consistency (α= .87, ω= .70) and a unidimensional factor structure. Additionally, it exhibited convergent and discriminant validity, positively correlating (r >.4) with academic procrastination, psychological flexibility, and emotional distress (depression, anxiety, and stress), and negatively correlating with ACT processes: openness to experience, behavioral awareness, and committed actions.

In Turkey, Kuru, Karadere, Burhan, and Safak (2021) analyzed the reliability and validity of the AAQ-US in a sample of 189 university students. The study reported excellent internal consistency (α= .93) and confirmed a single-factor structure through confirmatory factor analysis (CFA) with good fit indices (*RMSEA*= .043, *CFI*= .95, *TLI*= .93, *NNFI*= .993, *NFI*= .980, *SRMR*= .071). Additionally, evidence of validity concerning other variables was reported, with positive correlations (r >.5) with psychological flexibility, anxiety, and emotional symptomatology, and negative correlations (r >-.5) with mindfulness.

Finally, Galhardo *et alii* (2023) examined the psychometric properties of the AAQ-US in a sample of 522 students from Portugal. Regarding the internal structure, they suggested a two-dimensional model, experiential avoidance and cognitive fusion, plus a second-order factor, based on exploratory factor analysis (EFA) results and excellent fit indices for the CFA (*CFI*= 1.00, *TFI*= 1.00, *GFI*= .99, *RMSEA*= .03, *SRMR*= .06). They also reported a good composite reliability coefficient for the total scale (.93) and for the dimensions (.91 and .83 for factors 1 and 2, respectively). Concerning reliability, the instrument presented an excellent α (.94) for the general scale and the factors (αFactor1=.92; αFactor2= .87). Regarding evidence of convergent validity, it positively correlated (r >.4) with other constructs such as psychological inflexibility, depression, anxiety, and stress.

Given the above, it is crucial to have valid and reliable instruments that are culturally adapted to the Mexican context to measure mental health constructs, such as psychological flexibility, among the university population (Hernández Torrano *et alii*, 2020; Ong, Pierce, Woods, Twohig & Levin, 2018). These instruments could contribute to understanding how students adapt to the challenges of university life, enable screening of at-risk students, and support the development of early interventions to improve their psychological well-being and academic performance (Galante *et alii*, 2016). This simultaneously enhances their quality of life.

Based on the evidence, this study aimed to investigate the psychometric properties

of the AAQ-US, including its reliability, validity, and dimensionality. Given the conflicting findings regarding the scale's factor structure in previous studies, an exploratory factor analysis (EFA) was conducted, followed by a confirmatory factor analysis (CFA) in two different subsamples. The confirmed structure was then subjected to structural invariance analysis according to gender, type of university, mental health care status, and emotional symptomatology. Internal consistency and item discrimination (item-total correlation) were assessed to evaluate the reliability of the test. Additionally, evidence of validity was examined in relation to other variables: depression, anxiety, stress, academic self-efficacy, academic burnout, psychological flexibility, and life satisfaction. Finally, mean comparisons were performed solely for groups that exhibited configural, metric, scalar and strict invariance.

Method

Participants

The final sample consisted of 959 Mexican adults (aged 18 to 54 years, M= 21.03, SD= 3.14) who voluntarily consented to participate. The majority were women (62.25%), single (94.47%), and residents of urban areas (86.13%). Most participants reported having no children (96.77%) and were not employed (68.41%).

A total of 79.67% reported studying at a public university, with study modes being in-person (89.89%), hybrid (9%), and online (1%). The majority were in the first three semesters of their degree (59.96%), followed by those between the third and sixth semesters (34.62%). Additionally, 13.35% identified as belonging to a specific population, primarily LGBTIQ+ (11.37%).

Regarding health-related aspects, 14.08% (n= 135) reported a medical diagnosis, and 35.56% (n= 341) a diagnosis related to mental health. A total of 80 students (8.34%) reported having a prescription for psychotropic medications, and 547 (57%) reported a history of receiving psychological or psychiatric care at some point in their lives.

Instruments and Measures

Acceptance and Action Questionnaire-II (AAQ-II; Bond *et alii*, 2011). This instrument was created to measure psychological inflexibility, originally in the North American population. The Mexican version by Patrón (2010) was used, which employs a Likert scale with 10 items and seven response options (from 1: completely false, to 7: completely true). The score is obtained by summing the values of the responses to the items, with higher scores indicating greater psychological inflexibility. The study by Mellín and Padrós (2021) confirmed a unidimensional structure of the AAQ-II in the Mexican population, showing excellent internal consistency with α= .89 and mixed fit indices (*NFI*= .92; *NNFI*= .90; *CFI*= .93, *RMSEA*= .10) for the unidimensional model.

Acceptance and Action Questionnaire for University Students (AAQ-US, Levin *et alii*, 2018). The instrument aims to measure psychological inflexibility in university students. The instrument is unidimensional, consisting of 12 items, with a Likert scale ranging from 1 (never true) to 7 (always true). Higher scores indicate greater psychological inflexibility. The instrument showed evidence of validity in relation to other variables: To provide evidence of validity in relation to other variables, the study examined correlations with measures of psychological flexibility, academic performance, academic stress, test anxiety, and procrastination, as well as known group, convergent, and incremental validity. Finally, an excellent level of internal consistency was found (α= .91).

Depression, Anxiety, and Stress Scale-21 (DASS-21; Lovibond & Lovibond, 1995; Spanish version by (Bados, Solana, & Andrés, 2005). The DASS-21 scale is designed to assess

the presence of emotional symptoms related to depression, anxiety, and stress. It consists of 21 items, distributed across three subscales of 7 items each, corresponding to the three mentioned factors. The response options are presented in a four-point Likert format. In terms of psychometric properties in the Mexican context, Salinas Rodríguez, Argumedo, Hernández Alcaraz and Correa Fernández (2023) report excellent reliability for the overall scale (α= .95) and for the depression factor (α= .90), while reliability is good for the anxiety (α= .85) and stress (α= .87) factors. Additionally, good fit indices have been found for bifactorial, unidimensional, and three-factor models with one second-order factor.

Escala Unidimensional de Burnout Estudiantil [*Unidimensional Student Burnout Scale*] (Barraza, 2008). This instrument aims to measure academic burnout syndrome among university students. The questionnaire consists of 15 items divided into two subdimensions: Student Burnout and Attitudinal Indicators of Student Burnout Syndrome. The score is obtained using a four-point response scale (1= Never, 4= Always) and is transformed into a percentage. This percentage is interpreted in four levels: 0% to 25% None, 26% to 50% Mild, 51% to 75% Moderate and 76% to 100% Severe. The instrument, validated in the Mexican population by Barraza (2011), shows excellent reliability (α= .91) in the analysis of contrasting groups.

Self-Efficacy Questionnaire in Academic Behaviors (EACA; Blanco, Marín, Enríquez, & Cuadras, 2011). This instrument aims to measure perceived self-efficacy in academic behaviors among university students. The questionnaire consists of 13 items divided into three dimensions: Communication (α= .83), Attention (α= .82), and Excellence (α= .78). Scoring is done by summing the items for each dimension, and for the overall factor, the total of all items is summed. The general scale, which was validated in the Mexican population, as well as the three-factor model, is optimal (*GFI*= .996, *RMSR*= .102, and *RMSEA*= .050).

Satisfaction With Life Scale (SWLS; Diener, Emmons, Larsen, & Griffín, 1985). This scale consists of five items that assess life satisfaction through a global judgment that individuals make about it, using the Spanish-adapted version. In this version, the response options were reduced, with values ranging from 1 to 5, where 1 is "strongly disagree" and 5 is "strongly agree." The total score ranges from 5 (low satisfaction) to 25 (high satisfaction). Validation in a Mexican sample (Padrós et alii, 2015) showed good reliability (α= .83), and the unidimensional model fit is adequate, and consistent with the original version.

Procedure

To validate the scale, a review was conducted following the methodological recommendations of International Test Commission (2017), which suggest two stages for the construction and validation of psychometric instruments. As a first step, the instrument was translated from its original English version into Spanish by a bilingual expert. Subsequently, a second translation from Spanish back into English was performed by another bilingual expert, to compare the translated instrument with its original version to identify any discrepancies in meaning between the two versions. Upon comparing the Spanish version, it was found to align with the version adapted to the Colombian context by Barbosa (2020).

As a second step, an intentional sample of six participants from the target population was used. Cognitive interviews were conducted to assess the clarity, cultural appropriateness, and comprehension of the instrument. After the interviews, participants provided feedback on the clarity, ease of use, and length of the instrument, which did not result in modifications to the adapted items.

With the final version of the instrument in Google Forms, participant recruitment began online through flyers on social media platforms such as Instagram, Facebook, and WhatsApp. The form started with an informed consent section, which described the nature and purpose of the research, provided contact information for the responsible

researcher, outlined participants' rights regarding voluntary participation, and detailed the risks and benefits involved.

Once the consent form was accepted, participants accessed the demographic data section and the battery of instruments, which took an average of 18 minutes to complete. At the end of the form, participants were provided with contact information for mental health services and available helplines, as well as the option to receive feedback on their participation in the study.

Data Analysis

Considering the possibility of cultural differences in the factor structure of the instrument and given the divergent results obtained in a Portuguese study, we decided to divide the sample into two subsamples to conduct exploratory and confirmatory factor analyses. This is to evaluate the adequacy of the original factor structure for our population. Exploratory Factor Analysis (EFA) was conducted on the first subsample (n= 453) using polychoric correlations, the robust unweighted least squares (*ULS*) estimation method, and direct oblimin rotation. The optimal implementation of parallel analysis (PA) with minimum rank factor analysis (Timmerman & Lorenzo Seva, 2011) and the Hull method using robust *CFI* (Lorenzo Seva, Timerman, & Kiers, 2011) were employed to determine the number of factors to retain in the EFA. Additionally, the unidimensional congruence index (*UniCo*), explained common variance (ECV), and mean of item residual absolute loadings (*MIREAL*) were evaluated to assess essential unidimensionality. Values greater than .95 and .85 for *UniCo* and *ECV*, respectively, suggest that the data can be treated as essentially unidimensional, while a *MIREAL* value below .30 suggests unidimensionality (Ferrando & Lorenzo Seva, 2018).

For the second subsample (n= 506), the robust *ULS* estimation method was used to perform Confirmatory Factor Analysis (CFA). The following goodness-of-fit indices were calculated: (a) root mean square error of approximation (*RMSEA*), (b) comparative fit index (*CFI*), (c) non-normed fit index (*NNFI*), (d) standardized root mean square residual (*SRMR*), and (e) parsimony normed fit index (*PNFI*). According to Hu and Bentler (1999), *RMSEA* values below 0.08 represent a good fit, and values below 0.05 indicate that the model fits the data very well. For *SRMR*, values below 0.08 represent a reasonable fit, and values below 0.05 indicate a good fit. Regarding *CFI* and *NNFI*, values above 0.90 indicate a good fit, and values above 0.95 indicate that the model fits the data very well. Finally, higher *PNFI* values indicate a more parsimonious model.

Multigroup CFAs were conducted to test the configural, metric, scalar, and residual factorial invariance (Elosua, 2005) of the model with respect to gender, public or private university, Previous Mental Health Care, and With or Without Clinically Relevant Symptoms. The criteria suggested by Lippke, Nigg, and Maddock (2007), ΔTLI >0.050; Putnick and Bornstein (2016), $\Delta SRMR$ >0.015; and Chen (20 ΔCFI >-0.010 and $\Delta RMSEA$ >.015, were used to reject the models.

Reliability was assessed using McDonald's omega (ω) and Cronbach's alpha (α) internal consistency indices. ω values were classified as follows: less than .7 are considered questionable, between .7 and .9 are acceptable (Ventura & Caycho, 2017). Regarding α, values above .9 are rated as excellent, between .8 and .9 as good, between .7 and .79 as acceptable, between .6 and .69 as questionable, between .5 and .59 as poor, and below .5 as unacceptable (George & Mallery, 2003). Additionally, the discrimination index (*DI*) was calculated, with values below .3 considered inadequate (Cohen & Manion, 1990).

For evidence of validity in relation to other variables, correlations between the AAQ-US and the scores of the other instruments were estimated. Since the distributions

were non-normal, Spearman's rho correlations were obtained. According to Goss-Sampson (2019), values between 0 and .09 are considered irrelevant, from .10 to .29 small, between .30 and .49 moderate, and >.5 large.

To evaluate the discriminant validity of the AAQ-US scores in relation to the AAQ-II, EUBE, and DASS-21 dimensions, the HeteroTrait-MonoTrait ratio of correlations (HTMT) was computed. Values below 0.90 are generally considered indicative of adequate discriminant validity (Lim, 2024).

In order to collect evidence of criterion-related validity for the AAQ-US scores in relation to sociodemographic and clinical variables, comparisons were made between male and female participants, students attending public versus private universities. Individuals with and without a history of mental health treatment. Also, those exhibiting elevated versus non-elevated emotional symptoms. Having established factorial invariance across comparison groups, mean score comparisons were conducted using Mann-Whitney U tests. Given the non-normal distributions and unequal variances, this non-parametric test was deemed appropriate. Effect sizes were calculated using rank biserial correlation (*rbc*), as suggested by Goss-Sampson (2018).

We examined the predictive validity of the AAQ-US, conceptualized as psychological inflexibility (higher scores indicate greater inflexibility). We fitted separate simple linear regressions with standardized variables (z, two-tailed α= .05) in which AAQ-US scores predicted, in turn, Communication, Attention, Excellence, Student Burnout (EstrAcad), general emotional symptomatology (DASS-21), and life satisfaction (SWLS). For each model we report the standardized beta (β), 95% confidence interval (CI), *p*-value, and R^2. Model assumptions (linearity, normality, and homoscedasticity of residuals) were routinely inspected. All analyses used *n*= 963.

EFA was conducted using the Factor 10.5 software (Lorenzo Seva & Ferrando, 2011). The free software Jeffrey's Amazing Statistics Program (JASP) version 0.18.3 (2022) was used for the remaining statistical, graphics, and psychometric analyses.

Results

An Exploratory Factor Analysis (EFA) was conducted on the first subsample (*n*= 453). Bartlett's test of sphericity was statistically significant (χ^2 (66)= 4382.2; p <.001), and the KMO results were excellent (.93, 95% CI [.93, .94]). The parallel analysis recommended extracting one factor, which explained 65.65% of the variance. The Hull method results applied with robust *CFI* (0.975) also suggested retaining one factor to achieve a good fit. The *UniCo* (.982, 95%*CI* [.973, .991]), ECV (.884, 95%*CI* [.860, .910]), and MIREAL (.240, 95%*CI* [.201, .270]) values indicated that the data should be treated as essentially unidimensional.

In conclusion, the EFA results suggest that the AAQ-US in Mexico should be considered unidimensional. Table 1 presents the factor loadings for each of the items.

The results from the EFA were confirmed through a CFA with the second subsample (*n*= 506). The one-dimensional model demonstrated excellent fit indices (*CFI*= 0.983, *TLI*= 0.980, *NFI*= 0.978, and *IFI*= 0.983), and the absolute fit was satisfactory [*RMSEA*= 0.076, 90%*CI* (0.065, 0.086) and *SRMR*= 0.073]. The parsimony index was good (*PNFI*= 0.800). Figure 1 presents the standardized solution of the unidimensional model. The factor loadings were strong, ranging from .45 (Item 1) to .88 (Item 9).

The unidimensional model showed invariance regarding the variables "Gender" (Female *n*= 597, Male *n*= 362), "Type" of university (public sector *n*= 764 or private sector *n*= 195), "Mental health care" (Previous care *n*= 547 or No previous care *n*=

Table 1. Factor Loadings from the EFA of the AAQ-US

Item	F1	Commonality
1. I put off schoolwork when I feel bad. [Pospongo los trabajos académicos cuando me siento mal].	0.641	0.410
2.It seems like I'm just "going through the motions" at school. [Cuando estoy en clase me dejo llevar por mis pensamientos].	0.703	0.494
3. I struggle with my thoughts about school. [Lucho con mis pensamientos relacionados con la universidad].	0.680	0.463
4. I find myself avoiding going to classes when I feel anxious or depressed. [Evito ir a clases cuando me siento ansioso o deprimido].	0.626	0.392
5. When I think an assignment is too hard or confusing, I give up. [Cuando pienso que una tarea es muy difícil o confusa, me rindo].	0.749	0.561
6. It's hard for me to focus on what my professors are saying in classes. [Se me dificulta concentrarme en lo que mis profesores están diciendo en las clases].	0.825	0.681
7. I get so worried about upcoming exams that I feel paralyzed and can't study. [Me preocupo tanto acerca de los exámenes que están por venir, que me siento paralizado y no puedo estudiar].	0.788	0.621
8. Worries get in the way of my success at school. [Las preocupaciones impiden que me vaya bien en la universidad].	0.855	0.731
9. My thoughts and feelings get in the way of studying. [Mis pensamientos y sentimientos interfieren con mi estudio].	0.887	0.788
10. I don't get anything out of a class when I'm having negative thoughts. [No puedo aprender nada en clase cuando estoy teniendo pensamientos negativos].	0.829	0.688
11. I often believe that I'm not smart enough to be in college or in this major. [Considero que no soy lo suficientemente inteligente para estar en la universidad o en esta carrera].	0.746	0.557
12. I get so caught up in my worries during tests that I have trouble focusing on the test itself. [Me enredo tanto en mis preocupaciones durante los exámenes que tengo problemas, concentrándome en la prueba que estoy presentando].	0.792	0.628

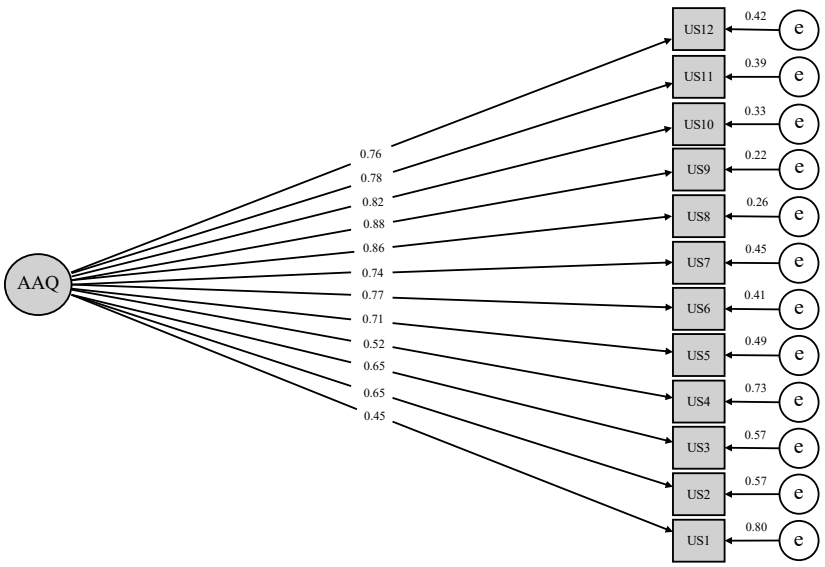

Figure 1. Standardized Solution of the Unidimensional Model of the AAQ-US.

412) and "Symptoms" (With clinically relevant emotional symptoms n= 410 and Without emotional symptoms n= 549). Table 2 shows that the differences in the fit indices were less than 0.01.

The Mexican version of the AAQ-US demonstrated excellent internal consistency [α= .92, 95%*CI* (.92, .93), ω= .92, 95%*CI* (.91, .93)]. Table 3 shows that the item discrimination indexes (*ID*) were good, with values ranging between .50 and .81.

As shown in Table 4, correlations in the expected direction and magnitude were found between the AAQ-US and other variables. The AAQ-US exhibited a strong and

Table 2. Factorial invariance with the variables "gender," "type of university," "mental health care," and "symptoms" for the AAQ-US (*N*= 959).

Variable	Invariance	*RMSEA*	Δ*RMSEA*	*CFI*	Δ*CFI*	*TLI*	Δ*TLI*	*SRMR*	Δ*SRMR*
Gender	Configural	0.075		0.985		0.982		0.073	
	Metric	0.074	0.001	0.984	0.001	0.982	0.000	0.076	-0.003
	Scalar	0.073	0.001	0.977	0.007	0.983	-0.001	0.077	-0.001
	Residual	0.073	0.000	0.977	0.000	0.983	0.000	0.077	0.000
Univ. Type	Configural	0.074		0.985		0.982		0.073	
	Metric	0.071	0.003	0.985	0.000	0.983	-0.001	0.074	-0.001
	Scalar	0.066	0.005	0.981	0.004	0.986	-0.003	0.072	0.002
	Residual	0.066	0.000	0.981	0.000	0.986	0.000	0.074	-0.002
MH Care	Configural	0.075		0.985		0.982		0.073	
	Metric	0.073	0.002	0.984	0.001	0.982	0.000	0.075	-0.002
	Scalar	0.067	0.006	0.980	0.004	0.985	-0.003	0.074	0.001
	Residual	0.067	0.000	0.980	0.000	0.985	0.000	0.074	0.000
Symp	Configural	0.084		0.978		0.973		0.079	
	Metric	0.086	-0.002	0.975	0.003	0.972	0.001	0.083	-0.004
	Scalar	0.082	0.004	0.966	-0.001	0.974	0.002	0.087	-0.004
	Residual	0.082	0.000	0.966	0.000	0.974	0.000	0.087	0.000

Notes: Univ. Type= Public or Private University; MH Care= Previous Mental Health Care; Symp= with or without Clinically Relevant Symptoms.

Table 3. Descriptive Statistics and Internal Consistency of the AAQ-US.

Item	Reliability Analysis If the item dropped		*DI*	*M*	*SD*
	ω	*α*			
1	0.922	0.920	0.512	3.643	1.740
2	0.918	0.915	0.629	3.749	1.670
3	0.918	0.916	0.615	3.717	1.819
4	0.922	0.920	0.496	2.218	1.703
5	0.917	0.914	0.647	2.355	1.624
6	0.913	0.911	0.732	2.962	1.685
7	0.915	0.912	0.689	3.021	1.932
8	0.911	0.909	0.779	2.784	1.812
9	0.910	0.907	0.809	2.879	1.823
10	0.912	0.910	0.747	3.158	2.028
11	0.915	0.913	0.683	2.958	2.035
12	0.914	0.912	0.695	3.025	1.962

Note: *DI*= Discrimination Index.

Table 4. Spearman Correlations of AAQ-US Score with other variables.

Instrument		AAQ-US
DASS-21	Depression	0.507***
	Anxiety	0.472***
	Estress	0.501***
	Total	0.530***
AAQ-II	Total	0.588***
EACA	Communication	-0.334***
	Excellence	-0.219***
	Attention	-0.233***
EUBE	Total	0.669***
SWLS	Total	-0.265***

Notes: ***= p <.001; DASS-21= Depression, Anxiety, and Stress Scale; Depression= subscale of the DASS-21; Anxiety= subscale of the DASS-21; Stress= subscale of the DASS-21; AAQ-II= Acceptance and Action Questionnaire; EACA= Academic Self-Efficacy Scale; EUBE= Escala Unidimensional de Burnout Estudiantil; SWLS= Satisfaction with Life Scale.

significant positive correlation (p <.001) with the AAQ-II. Emotional symptomatology was associated with medium to large direct relationships (r values between 0.47 and 0.53). Notably high correlations were observed between the AAQ-US score and academic burnout (0.669) and psychological inflexibility (0.588).

Heterotrait-heteromethod (*HTMT*) ratios were calculated to provide evidence of discriminant validity for psychological inflexibility in college students (AAQ-US) in relation to general psychological inflexibility (AAQ-US), academic burnout (EUBE), and specific emotional symptoms (dimensions of the DASS-21). As shown in Table 5, all *HTMT* values were ≤0.695, meeting the strict criterion of *HTMT* values <0.85. The evidence found supports the discriminant validity between these constructs related to inflexibility in college students, as assessed by the AAQ-US (Table 5).

Table 5. HTMT Values.

	AAQ II	Burnout	Depression	Anxiety	Stress
AAQ US	0.580	0.695	0.563	0.506	0.541

Given the invariance of the AAQ-US internal structure across gender, college type, prior or current mental health care, and elevated emotional symptomatology, scores were compared across these variables. Due to the non-normal distribution of the data (Shapiro-Wilk test, p <.001; see Table 6), a Mann-Whitney *U* test was conducted.

Table 6. Comparison of AAQ-US scores.

Groups		*n*	*M*	*SD*	*Mdn*	Assumptions		Comparisons	
						W	*F* (*df*= 957)	*U*	*ES rbc*
Sex	Male	362	34.60	15.69	31	0.940***	1.029	95558.5**	-0.116
	Female	597	37.60	16.04	36	0.967***			
University	Private	195	34.71	16.30	31	0.929***	.056	67378.5*	-0.095
	Public	764	36.92	15.86	35	0.964**			
MH Care	No	412	33.99	15.30	31	0.942***	5.06*	94574.0***	-0.161
	Yes	547	38.34	16.22	36	0.968***			
Sympt	No	549	30.67	13.71	28	0.924***	14.43***	55995.5***	0.502
	Yes	410	44.23	15.49	43	0.984***			

Notes: *ES rbc*= Biserial Rank Correlation Effect Size of Spearman; *F*= Levenne *F*; Mdn = Median; MH Care= Mental Health Care; Sympt= Clinically Relevant Emotional Symptoms; *U*= Mann Whitney *U*; *W*= Shapiro-Wilk *W*; *= p <.05; **= p <.01; ***= p <.001.

The results indicated significant differences (p <.05) in psychological inflexibility associated with the academic context, with higher scores observed among women and individuals with a history of mental health care. However, the effect sizes were small (*rbc* <-0.161). Emotional symptomatology also exhibited significant differences (p < .001), with higher scores for individuals with elevated symptoms (*Mdn*= 43.5) compared to those without (*Mdn*= 28). The effect size for this association was large (*rbc* >.50). While significant differences were observed in AAQ-US scores between students from public and private universities, the effect size was insignificant (*rbc* <.10).

Regarding predictive validity, greater inflexibility was associated with lower academic self-efficacy and poorer well-being. Specifically, the AAQ-US predicted lower Communication [β= -.337, 95%*CI* (-.396, -.277), p <.001, R^2= .113], lower Attention [β= -.236, 95%*CI* (-.298, -.175), p <.001, R^2= .056], and lower Excellence [β= -.223, 95%*CI* (-.285, -.161), p <.001, R^2= .050]. AAQ-US scores also predicted higher student burnout [EstrAcad; β= .670, 95%*CI* (.623, .717), p <.001, R^2= .448] and higher general emotional symptomatology [DASS-21; β= .532, 95%*CI* (.479, .586), p <.001, R^2= .283], as well as lower life satisfaction [SWLS; β= -.268, 95%*CI* (-.329, -.207), p <.001, R^2= .072).

Discussion

This study evaluated the psychometric properties of the AAQ-US among Mexican university students. Validity evidence obtained through exploratory factor analysis (EFA) with parallel analysis and Hull's method related to the internal structure of the AAQ-US suggests a unidimensional structure. All items showed good loadings (>.62). Additionally, indices of unidimensionality (*UniCo*, *MIREAL*, and *ECV*) support a unifactorial model for the AAQ-US. Confirmatory factor analysis (CFA) confirmed the unidimensional internal structure proposed by Levin *et alii* (2018) in the original study. Fit indices were excellent, including comparative indices (*CFI* and *TLI*) and incremental fit indices (NFI and IFI), while absolute fit was adequate (*RMSEA* and *SRMR*). This unidimensional structure was proposed in the original study (Levin *et alii*, 2018) and in various adaptations in Latin America (Barbosa, 2020; Collares, Zancan, & da Silva, 2021) and Turkey (Kuru, Karadere, Burhan, & Safak, 2021). However, Galhardo *et alii* (2023) in Portugal suggested a two-factor model plus a second-order factor: experiential avoidance and cognitive fusion. Our EFA results support the unidimensional structure of the scale.

Invariance analysis met the criteria of Lippke, Nigg, & Maddock (2007), Putnick and Bornstein (2016), and Chen (2007). This indicates that there are no differences in the factorial structure of the AAQ-US regarding sex, public versus private university, previous mental health treatment, and levels of clinically relevant emotional symptomatology. Measurement invariance or equivalence is a necessary condition for allowing meaningful comparisons of means or associations such as covariances and unstandardized regression coefficients across groups (Pokropek, Davidov, & Schmidt, 2019). This relevance is evident in the variables of sex, previous mental health treatment, and levels of emotional symptomatology. However, in Latin America, studying at a public university is a factor along with low economic income and limited coping strategies that contribute to the maintenance and exacerbation of emotional symptomatology (Montero, López, & Higareda, 2022). The AAQ-II (a general measure of psychological inflexibility) has shown invariance with respect to sex and race/ethnicity (Paladines Costa et alii, 2021) and between clinical/non-clinical samples (Ruiz, Suárez Falcón, Cárdenas Sierra, Durán, Guerrero, & Riaño Hernández, 2016); however, no reports of invariance evaluation for the unidimensional AAQ-US with the analyzed variables were found in the search.

The reliability of the AAQ-US was excellent, with Alpha and Omega values exceeding .90. These findings are consistent with previous research conducted in Europe (Galhardo *et alii*, 2023; Kuru *et alii*, 2021), as well as in Colombia (Barbosa, 2020) and Brazil (Collares *et alii*, 2021). Internal consistency did not improve with the removal of any items. Regarding item discrimination indices, item-total correlations of .50 or higher were found, demonstrating adequate item discrimination capacity.

Consistent with prior work, psychological inflexibility correlated strongly with academic burnout (r >.60) and negatively with both life satisfaction (r >-.20) and academic self-efficacy (r >-.30). These patterns align with reports linking flexibility to lower burnout and stress (Ye, Chen, Zhang, & Yang, 2022) and higher well-being, with social support acting protectively (Asikainen & Katajavuori, 2023). Importantly, our predictive models converged with the correlational results while quantifying their practical impact: inflexibility accounted for a substantial share of variance in burnout (R^2 >.40), a moderate share in general emotional symptoms (DASS-21; R^2 >.20), a small share in life satisfaction (SWLS; R^2 >.05), and small shares in the self-efficacy indicators ($R^2\approx$

.05, .11). This profile is consistent with evidence that psychological flexibility predicts life satisfaction (Arslan & Allen, 2021) and may mediate stress well-being links (Kato, 2023), plausibly via more adaptive coping (Dawson & Golijani-Moghaddam, 2020; Kabasakal & Akkoç, 2021; Klassen, Krawchuk, & Rajani, 2008). It also fits the theory on academic self-efficacy, beliefs about one's capacity to succeed academically (Blanco, Marín, Enríquez, & Cuadras, 2011; Jeffords, Bayly, Geiger, Backhaus, & Gillis, 2020), and prior findings that higher flexibility co-occurs with higher self-efficacy (Jeffords *et alii*, 2020; Villaruel & Cueva, 2023) and better academic engagement (Delgado *et alii*, 2019). Overall, the convergence between correlations and variance explained by the bivariate regressions strengthens the case for the predictive validity of the AAQ-US (inflexibility) in undergraduates.

The discriminant validity of the AAQ-US for measuring psychological inflexibility in university students was examined in relation to the AAQ-II, EUBE, and specific emotional symptoms. HTMT analyses supported the discriminant validity of the AAQ-US, exceeding the stringent criterion of 0.85 (Henseler et alii, 2015). Although a more lenient threshold of 0.90 is often used for closely related constructs (Lim, 2024), the AAQ-US demonstrated even stronger evidence of discriminant validity. These findings suggest that the AAQ-US effectively measures distinct aspects of psychological inflexibility and academic burnout. Given the paucity of research on the discriminant validity of the AAQ-US, this study represents a novel contribution to literature.

Comparative analyses revealed significant differences in total AAQ-US scores between groups with and without indicators of high emotional symptomatology (DASS-21>23). These results suggest that individuals with clinically relevant emotional symptomatology tend to exhibit notably higher levels of psychological inflexibility (Delgado *et alii,* 2020) compared to those without such symptomatology (Flores Guerrero, Romero Ogawa, Espinosa de Santillana, & Torres Escoba, 2023). This evidence supports the notion that greater psychological inflexibility in the academic context is associated with higher presence of emotional symptomatology (Zancan, Machado, Boff, & Da Silva Oliveira, 2021); thus, psychological inflexibility would be a distinguishing marker in individuals with emotional distress, as well as those with higher levels of comorbid depression and anxiety, which aligns with previous studies (Kumar, Nirmal, Veerabalajikumar, Ramasubramanian, & Bijulakshmi, 2023; Wang, Fang, Yang, Tang, Zhu, & Nie 2023).

It is important to note the limitations related to the sample composition. First, there was a higher representation of women (62.25%), which limits the generalization of results to the overall student population. Second, the sample was predominantly from the state of Jalisco, which may introduce geographical bias that does not accurately represent the diversity of university students in Mexico. Lastly, our sample did not provide an equitable representation of all academic semesters. Most participants (59.96%) were from the first three semesters, with a lower representation (34.62%) from semesters three to six, and minimal participation from later semesters. This unequal distribution throughout the academic progression may limit our ability to conclude psychological inflexibility across the entire university experience. These sampling limitations suggest that the results should be interpreted with caution concerning the broader Mexican university student population and highlight the need for future studies with more diverse and representative samples.

Additionally, comparisons based on the criterion of the presence or absence of emotional symptomatology, which would account for discrimination of scale scores in

clinical and non-clinical samples, were based on criteria used in studies from Colombia (Ruiz, García Martín, Suaréz Falcón, & Odriozola González, 2017) and Spain, not Mexico. Systematic information on participants' clinical diagnoses was not considered.

Future research should examine the temporal stability of the AAQ-US through test-retest reliability studies. While internal consistency is a relevant aspect, it does not address temporal fluctuations in scores, which are essential for understanding the reliability of observed changes in measurements (Polit, 2014). Additionally, investigating the AAQ-US's ability to detect changes in response to various therapeutic interventions could provide valuable information about its clinical utility and validity as an assessment tool in different therapeutic contexts. This would contribute to the analysis of its sensitivity to treatment.

Similarly, it would be pertinent for subsequent studies to assess the possibility that some items in the instrument may operate differently according to sociodemographic or contextual variables (e.g., gender or type of university). Although this analysis exceeds the scope of the present study, its inclusion in future research would facilitate a deeper understanding of the validity of the AAQ-US and enhance the comparability of scores across different groups. It has been reported that the AAQ-II is invariant by gender in the Latin American university population (Paladines Costa *et alii*, 2021), which supports the importance of examining its equivalence between groups. However, differential item functioning analysis would allow for the detection of more specific biases and ensure equitable measurement in different contexts (Scott *et alii*, 2010).

Furthermore, conducting cross-cultural validation studies to compare the psychometric properties of the AAQ-US in Mexico with those in other Spanish-speaking countries is recommended. Longitudinal studies are also suggested to examine how psychological flexibility in academic contexts relates to academic and mental health variables over time. Evaluating its utility in various educational contexts in Mexico, such as secondary education and high school, would be beneficial. Finally, investigating the AAQ-US's predictive validity concerning academic and psychological outcomes among Mexican university students would contribute to generating studies on mental health promotion and student retention in the university context. Expanding the sample and continuing to consider gender variance as an important criterion, as some studies have identified it as a determining factor (Panayiotou, Karekla, & Leonidou, 2017), is also recommended.

Future studies could explore the possibility of two dimensions in the AAQ-US, with two factors and one second-order factor, as in the study in Portugal, due to the potential influence of cultural context.

The AAQ-US demonstrated excellent reliability and validity in relation to other variables within the Mexican context. Both exploratory factor analysis (EFA) and confirmatory factor analysis (CFA) support a unidimensional structure for the AAQ-US in the Mexican sample. This finding aligns with the original study and confirmations from other countries. The study found high internal consistency with Alpha and Omega values exceeding .90. The AAQ-US also exhibited measurement invariance across sex, public/private university sector, previous mental health treatment, and levels of clinically relevant emotional symptomatology.

The AAQ-US showed expected correlations with measures of psychological inflexibility, emotional symptomatology, academic self-efficacy behaviors, and academic burnout, providing evidence of its association with related constructs. The instrument effectively differentiated between groups with and without elevated emotional symptomatology, supporting its discriminant validity. This validation study contributes

to the growing body of literature on psychological flexibility and its measurement across different cultures and contexts, particularly among Mexican university students.

The AAQ-US can be recommended for use in clinical and research settings in Mexico. This instrument has proven to be reliable and valid, offering a comprehensive assessment of psychological flexibility in academic contexts. Its use can significantly contribute to the effective evaluation and treatment of emotional symptomatology, academic performance, and other psychological conditions in the Mexican population.

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