





## Article

# PLS-SEM Validation for Burnout Measures in Latino College Students: A Socially Sustainable Educational Return

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**Abstract:** Health care is an essential factor in the social sustainability of the university; therefore, it is a challenge and a responsibility to monitor a safe return to school that ensures the support of the physical and emotional well-being of students. In this sense, the Maslach Burnout Inventory-Student Survey (MBI-SS) is a validated resource with robust techniques in several regions of the world to diagnose school burnout. However, few efforts appear in the literature to validate it from a predictive approach in the Latin region. This study aims to validate, from a predictive approach, measures of school burnout in Latino university students from Mexico and Colombia. A total of 235 surveys were administered (Mx.  $n = 127$ , Co.  $n = 108$ ), and a Partial Least Squares (PLS) measurement model was validated using the statistical program SmartPLS 3.3.7. As a result, 22 valid items were obtained in four reliable subconstructs: burnout, family cynicism, inefficacy, and somatization. The value of this research is its contribution to filling two gaps related to the MBI-SS scale (1) to contribute to the validation of the MBI-SS in a Latin context and (2) the use of the nonparametric statistical technique PLS focused on prediction.

**Keywords:** validation of measurement model; PLS-SEM; burnout; university students; Latin America; social sustainability; MBI-SS; EMEDO



**Citation:** Reyna-Castillo, M.; Pulgarín-Rodríguez, M.A.; Ríos-Serna, A.H.; Santiago, A. PLS-SEM Validation for Burnout Measures in Latino College Students: A Socially Sustainable Educational Return. *Sustainability* **2022**, *14*, 14635. <https://doi.org/10.3390/su142114635>

Academic Editor: Athanasios Mogias

Received: 23 September 2022

Accepted: 31 October 2022

Published: 7 November 2022

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## 1. Introduction

In Any sphere, whether individual, community or organizational, health has been considered an essential factor in the social dimension of sustainability [1–3] and especially in the search for a safe return to the new normality [4] since it is not possible to aspire to long-term development without conditions that guarantee the health of the community. For decades, Amartya Sen [5], philosopher and economist, has affirmed that the only path to sustained development in a nation, region, or community is the cultivation of crucial capabilities that empower citizens: education, decent work, fair wages, health, and gender equity. Likewise, and recently, in the report on the progress of the Sustainable Development Goals, the warning continues not to lower our guard in the social aspects of sustainability. The Inter-American Development Bank [6], in its report “How to Rebuild Education after the Pandemic,” [6] the Inter-American Development Bank found that by 2021, 165 million students in Latin America and the Caribbean were disconnected from their school life, more than anywhere else in the world. The evidence collected in the report shows that the effects of school disengagement mean that students have not accumulated significant human capital skills, which will have immediate and long-term consequences. Returning to the classroom requires institutions willing to address academic challenges exacerbated in confinement [7,8] and provide a nurturing, safe, and stimulating space for students to

grow personally and socioemotionally. It insists on the call for social sustainability, paying particular attention to issues such as those mentioned in Goal 2 on health and well-being, Goal 4 on quality education, and Goal 8 on decent work and economic growth [1]. Forging a healthy occupational context is essential when talking about socially sustainable well-being in young people, both in their academic work as well as in their first job opportunities [9]. Today there is greater awareness of the importance of social aspects and their influence on occupational well-being because interaction networks build a social capital that is fundamental for decent and socially sustainable workplaces [10].

Aspects such as teleworking, technostress [11–13], academic activity at a distance, and conditions of loneliness were a stressor [14] for the educational community during confinement, bringing with it effects such as anxiety, [15,16], neurosis [17], and occupational burnout [4,18,19]. As described by Uribe Prado [20] and other research [21,22], taking up Maslach [23], burnout syndrome consists of the permanence and development of psychosomatic symptoms and illnesses after a stressor event, manifested in emotional fatigue, cynicism, and occupational efficiency. The Mexican version of Uribe Prado's MBI scale [20] pays special attention to the somatization factor. Anecdotal and case evidence expressed by university psychological counselors has shown that it is imperative to pay emotional attention to students returning to the classroom post-COVID-19 since signs of emotional exhaustion are beginning to arise in students [4]. In the current context, occupational burnout went from being a predominant issue in health care workers (doctors and nurses) to a growing issue in the educational field and, increasingly, in students [24].

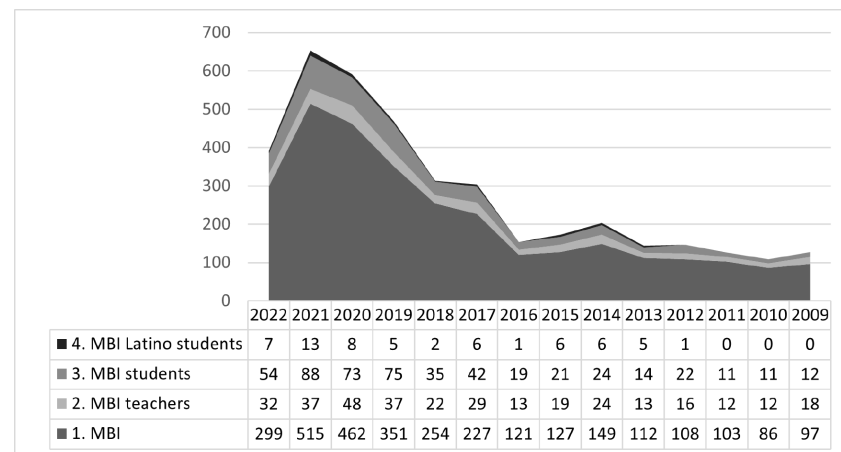
The post-COVID-19 face-to-face return to the classroom is a challenge for universities as they must ensure socially sustainable health conditions regarding emotional health. In this sense, it is not convenient to take intervention initiatives without first having a reliable and valid diagnosis that gives us an accurate x-ray of the current socioemotional situation of university students who return to the classroom [25]. Therefore, instrumental resources that allow us to carry out such diagnoses become essential. In the peak period of the SARS-CoV2 pandemic (2020–2021), multiple investigations focused on the measurement of occupational burnout in the school context, and there has been a growing focus and readjustment of traditional instruments with a focus on students. The Maslach Burnout Inventory (MBI) [26] has proven to be a viable and reliable instrument in different contexts around the world, and it has its student version, the Maslach Burnout Inventory-Student Survey (MBI-SS) [27–29].

Although the validation of PLS-SEM instruments on burnout has grown, it has been less in students and more in terms of exploration in Latin American students. Therefore, this study aims to validate, from a predictive approach, measures of school burnout in Latino university students from Mexico and Colombia. Consequently, the distinctive contribution of the research is the contribution to diminishing two gaps regarding burnout scales in the school context: (1) exploring the validation of the MBI-SS measurement model in the Latin context, (2) further exploring EMEDO measures in the university setting, and (3) the use of PLS-SEM as a non-parametric statistical technique to validate and distinguish the preponderant dimension with the highest predictive strength in both measures in the Mexican-Colombian context. This research seeks to answer the implicit question: Is there validity and reliability in adapting the burnout scale for Latino college students? In order to answer this question, the following sections are developed: (a) a review of the literature on validation of the burnout scale for students; (b) Materials and Methods; (c) Results; (d) Discussion; (e) Conclusion, implications, and limits of the research.

## 2. Review of the Literature: Validation of MBI-SS Dimensions

We performed a systematic search in the Web of Science (WOS) for the last 14 years where research on occupational burnout that has used the Maslach Burnout Inventory (MBI) has had a growing trend, and this has been exponential, especially in the context of confinement by COVID-19. The MBI-SS consists of 15 items in three dimensions: burnout, cynicism, and professional efficacy [27–29]. Although studies have confirmed its validity

for university student populations, different versions have emerged, such as Chinese, Japanese, Portuguese-Brazilian, Italian, German, and French [25,27,30,31]; studies on its use with Latin American students are still proportionally limited. In the years 2020, 2021, and 2022, 35% of the global production on MBI is concentrated, and, according to the search criteria used, research specifically related to teachers and students reaches almost 30% of the global total. Concerning research on MBI in students in Latin America, there are only 60 research studies (1.6%), with Brazil having 34 products, Mexico with 9, Chile with 7, and Colombia with 5 (Figure 1).



**Figure 1.** MBI research by year, WOS (2009–2022). Results WOS Core Collection as of 30 August 2022 with the criteria : (1) Maslach Burnout Inventory (topic),  $n = 3593$ ; (2) Maslach Burnout Inventory (topic) + teachers (topic),  $n = 438$ ; (3) Maslach Burnout Inventory (topic) + students (topic),  $n = 563$ , (4). Maslach Burnout Inventory (topic) + [Refined By : Brazil, Mexico, Chile, Colombia, Peru, Ecuador, Argentina, Paraguay],  $n = 60$ .

According to the systematic review carried out, it is noteworthy that more than a decade ago, emphasis was placed on valuing the contribution of second-generation statistics for the validation of various instruments that measure occupational burnout, which allows overcoming the weaknesses of previous techniques where the use of Cronbach's alpha reliability criterion and various multivariate techniques such as factor analysis and regression was common [32,33]. Today, it is possible to measure unobservable variables using indirect observation measures or indicators using the Structural Equation Modeling (SEM) technique [34]. A widely used SEM technique in the validation of MBI-SS is Covariance Based (CB-SEM), in students, for example, in Korea [35,36], Japan [31], Iran [37,38], USA [39]. This second-generation statistical technique has been useful to confirm or reject the theory, prioritizing the use of regressions based on the sum of scores and presupposing strict conditions on the sample that, in many cases, become unrealistic when measuring social behavior [34].

Within the SEM techniques, the one based on Partial Least Squares (PLS) allows the complexity of the use of multi-constructs and direct and indirect multi-relationships. Its measurement philosophy distinguishes PLS-SEM. It focuses on the exploration and detection of latent variables with a preponderant variance within the dimensions of the models, focusing, therefore, on the variance of a final construct and its predictive power concerning the constructs that influence it [40]. An example of this research is that carried out by Manzano García and Ayala Calvo [41] who validated a burnout construct in nursing professionals in Spain, or the work of Lin and colleagues [42] who validated the dimensions of the MIB as a construct in the Taiwanese tourism sector personnel. Furthermore, recently, Permarupan and colleagues [43] validated with PLS-SEM the depersonalization dimension of the MIB in Malaysian nursing staff.

Specifically in the educational sector, representative studies include Acaray et al. [44], who validated organizational cynicism as a construct in the educational sector in Istanbul,

Turkey, and Morales-Sánchez and colleagues [45], who validated and correlated the Spanish version of the Athlete Burnout Questionnaire as a construct in adolescent athletes in Malaga, Spain. Other research was focused on students, such as the work of Wang et al. [12], where they used and validated the Copenhagen Burnout Inventory in the university context in China. In the same educational sector, Parmar et al. [43] validated the dimensions of the MBI in a sample of private university teachers in Pakistan. Regarding current Burnout Research based explicitly on the Maslach Burnout Inventory-Student Survey (MBI-SS), several recent works have also demonstrated the usefulness of PLS-SEM to validate its dimensions. For example, in 2017, Acaray et al. [44] with Turkey students, and in 2021 the research of Smith and Emerson [22] where the three dimensions of the MBI-GS(S) were validated for US undergraduate accounting students. Later, the same group of researchers in 2022, Emerson, Hair, and Smith [21] correlated and confirmed the means of the MBI-GS(S) in a convenience sample of 1119 students pursuing various majors in business at four US universities using SmartPLS 3.3.7 program [46]. Table 1 specifies the tendency of research on college attrition to confirmatory statistics, and the few studies focused on prediction using second-generation techniques such as PLS-SEM, especially the lack of such studies in the Latino context.

**Table 1.** Multivariate techniques in the validation of MBI-SS dimensions.

Research	Technique	1st. Gen.	2nd. Gen.	Confirmatory	Prediction	Region/Country
Hu y Schaufeli [27]	CB-SEM	No	✓	✓	No	Asia/China
Campos et al. [47]	CB-SEM	No	✓	✓	No	Latin/Brazil
De Oliva et al. [48]	Logistic regression	✓	No	✓	No	Latin/Brazil
Noh et al. [35]	CB-SEM	No	✓	✓	No	Asia/Korea
Pagnin et al. [49]	Logistic regression	✓	No	✓	No	Latin/Brazil
Mafla et al. [33]	Logistic regression	✓	No	✓	No	Latin/Colombia
Gómez et al. [50]	Analysis of variance	✓	No	✓	No	Latin/Chile
Tsubakita y Shimazaki [31]	CB-SEM	No	✓	✓	No	Asia/Japan
Ghanizadeh et al. [38]	CB-SEM	No	✓	✓	No	Asia/Iran
Marengo y otros [51]	Analysis of variance	✓	No	✓	No	Latin/Colombia
Acaray et al. [44]	PLS-SEM	No	✓	No	✓	Eurasia/Turkey
Cho and Jeon [36]	CB-SEM	No	✓	✓	No	Asia/Korea
Suárez-Colorado et al. [52]	Analysis of variance	✓	No	✓	No	Latin/Colombia
Portoghese et al. [30]	Analysis of variance	✓	No	✓	No	Euro/Italy
Wickramasinghe et al. [53]	Analysis of variance	✓	No	✓	No	Asian/Sri Lanka
Shi et al. [54]	Rasch	✓	No	No	✓	American/U.S.
Obregón et al. [32]	Factor analysis	✓	No	✓	No	American/U.S.
Blanco Ornelas et al. [55]	Factor analysis	✓	No	✓	No	Latin/Mexico
Vasconcelos et al. [56]	Logistic regression	✓	No	✓	No	Latin/Brazil
De Lima et al. [57]	Analysis of variance	✓	No	✓	No	Latin/Brazil
Rosales-Ricardo et al. [58]	Analysis of variance	✓	No	✓	No	Latin/Ecuador
Puertas-Neyra et al. [59]	Analysis of variance	✓	No	✓	No	Latin/Peru
Turhan et al. [25]	Analysis of variance	✓	No	✓	No	Euro/Germany
Montoya-Restrepo et al. [60]	Factor analysis	✓	No	✓	No	Latin/Colombia
MacArthur et al. [39]	CB-SEM	No	✓	✓	No	American/U.S.
Dantas da Mota et al. [61]	Logistic regression	✓	No	✓	No	Latin/Brazil
Smith y Emerson [22]	PLS-SEM	No	✓	No	✓	American/U.S.
Estrada Araoz et al. [62]	Analysis of variance	✓	No	✓	No	Latin/Peru
Emerson et al. [21]	PLS-SEM	No	✓	No	✓	American/U.S.
Derakhshan et al. [37]	CB-SEM	No	✓	✓	No	Asia/Iran
Rosales-Ricardo et al. [63]	Analysis of variance	✓	No	✓	No	Latin/Ecuador
This Work	PLS-SEM	No	✓	No	✓	Latin/Mexico

The PLS-SEM technique, by its nature, has shown to contribute to reflecting and explaining the psychosocial phenomena of the population in the educational sector realistically. PLS-SEM, unlike other resources, allows assessing the partial weights of validity and reliability of each dimension as a construct, with robust criteria beyond Cronbach's alpha. Moreover, its prediction-centered approach has the robustness to predict intra- and extra-sample between subdimensions of the same model and, likewise, of one model with others. According to Hair and colleagues [34,64], in PLS-SEM, seven statistical conditions that test the reliability of a measurement model can be considered. Based on these criteria, the statistical hypotheses of this research are derived:

- Hi. 1. There is individual reliability in the MBI-SS and EMEDO indicators in the Latin context.
- Hi. 2. There is internal consistency in the MBI-SS and EMEDO constructs in the Latin context.
- Hi. 3. There is reliability in the constructs of the MBI-SS and EMEDO in the Latin context.
- Hi. 4. There is convergent validity in the constructs of the MBI-SS and EMEDO in the Latin context.
- Hi. 5. There is discriminant validity between the MBI-SS and EMEDO constructs in the Latin context.
- Hi. 6. There is relevant explained variance in the dependent constructs of the MBI-SS and EMEDO in the Latin context.
- Hi. 7. There are relevant effects in the relationships of the MBI-SS and EMEDO constructs in the Latin context.

Although this work's objective is not to assess the structural model or the contrast of relational hypotheses but to assess the measurement model using PLS-SEM, it is necessary to establish a model of relationships. Therefore, this model does not represent the hypothesis system of the work but justifies the logical connection between the variables used. These relationships are initially established based on the logic of the original instrument by Schaufeli and colleagues [27–29] and the Mexican version of the MBI by Uribe Prado [20], where the ultimate variable is inefficacy. As well as considering the correlation values between the dimensions as constructs of the MBI-SS obtained in recent works [40,41,43], resulting in the relational model shown in Figure 2. This connection is necessary for validating the measures' internal consistency in PLS-SEM.

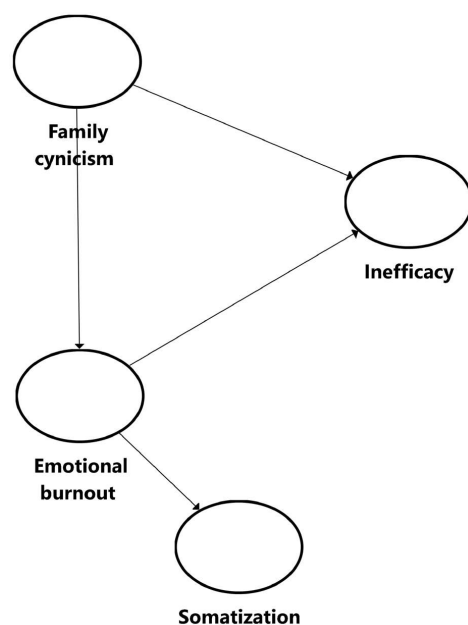


Figure 2. Structural model for valuation of measures.

### 3. Materials and Methods

The research was empirical-statistical, and the purpose of this methodology is to explore the theoretical relationships in samples of real organizations [65] empirically.

#### 3.1. Participants

The survey was applied to university students from private schools, one located in northeastern Mexico ( $n = 127$ ) and the other in northwestern Colombia ( $n = 108$ ). Both universities were surveyed in early July 2022, just as 100% face-to-face classes were resuming after more than two years of distance learning due to pandemic confinement. The survey distribution was authorized and overseen by the corresponding university authorities and coordination. Convenience sampling was used to extract relevant information from the sample group. Students were contacted by institutional mail using the snowball technique, totaling 235 valuable responses. They were included in the sample on the condition of: (1) Being from the enrolled student body. (2) They belonged to the higher level. Although it was not a process of experimentation or quasi-experimentation with humans, the following ethical principles were taken as ethical principles informed to the respondent: (a) freedom of participation, (b) confidentiality, and (c) the exclusive use of the information for academic purposes. Table 2 describes the characteristics of the sample analyzed.

**Table 2.** Sample characteristics ( $n = 235$ ).

Characteristic	Frequency	%
<b>Country</b>		
Mexico	127	54.04
Colombia	108	45.96
<b>Gender</b>		
Female	193	82.13
Male	39	16.60
Other	3	1.28
<b>Age</b>		
18 a 20	91	38.72
21 a 23	42	17.87
24 a 30	62	26.38
More than 30	40	17.02
<b>Grade(year)</b>		
1st	31	13.19
2nd	74	31.49
3rd	48	20.43
4th	11	4.68
5th	71	30.21
<b>Area of study</b>		
Accounting and administration	77	32.77
Area of design and arts	67	28.51
Early Childhood Education	91	38.72

#### 3.2. Measures

Two instruments were used as the basis for establishing the research constructs with three priority selection criteria: (1) use of measures sufficiently validated in the student context, (2) use of measures contextualized to school context in confinement by COVID-19, and (3) measures close to the Latino reality. In line with the priority criteria, two instruments were used. For its relevance to the university context, measures of the MBI-SS of Schaufeli and colleagues [27–29] were used, which they based on the version of the MBI that Maslach et al. [66] adapted for the student context (MBI-GSS). Because of its relevance to the Latin context, we went to the original basis of a Mexican version of the MBI, the Escala Mexicana de Desgaste Ocupacional (EMEDO) by Uribe Prado [20].

#### 3.3. Constructs of Emotional Exhaustion and Professional Efficacy

For the construct of emotional exhaustion and professional efficacy, items were taken from the MBI-SS of Schaufeli and colleagues [27–29], and the translation was contrasted with the style and language used in the EMEDO of Uribe Prado [20]. In the case of the measures of professional efficacy, the inverse score was used to reflect the student's school inefficacy [21].

### 3.4. Construct of Family Cynicism and Somatization

Given the contextualization of the classes in confinement, homes became part of the educational organization and the family, and therefore another member of the school dynamics, it was decided to explore the cynicism/depersonalization that Uribe Prado [20] uses to explore interpersonal relationships in the work environment. Given the importance of the family in influencing the student's life, both personally and academically [67], the items were adapted to generate a construct called "family cynicism". For example, an original item from EMEDO reads: "In my work, everyone seems strange to me, so I am not interested in interacting with them," and adapted to family cynicism, it reads: "In my family, everyone seems strange to me, so I am not interested in interacting with them". The dimensions used to explore somatization are also taken from EMEDO; this section is applied directly to questions that deal with sleeping problems, pain, anxiety, depression, or gastric problems.

### 3.5. Research Design

After the systematic review of the literature, establishing a delimitation of the instruments and dimensions, and delimiting 25 relevant items for the measurement instrument, the measures were reviewed by experts in the student area. The expert review involved two clinical psychologists, four educational psychologists, two guidance personnel, and two researchers to review the pertinence of the wording, language adapted to university students, the inculturation of the instrument for each country, and the decision to discard some items. After the corrections in these areas, the result was an instrument for application with four dimensions: emotional exhaustion (5 items), family cynicism (5 items), inefficiency (6 items), and somatization (7 items). To collect data, a digital survey was designed with a structured 5-point Likert scale questionnaire ("0" = null, while "4" = very high). Once the information was received, the information was downloaded into a database in .xlsx format, which was curated and prepared, and arranged with the necessary conditions for the statistical data processor.

### 3.6. Statistical Analysis

Since the purpose of this work is to start from a robust second-generation statistic with robust tests for the exploration of measures in little explored contexts, to seek to explore causal multi-relations of several latent variables, and to explore the predictive power of the variables [21,34,64], it was chosen to use the Structural Equation Modeling (SEM) technique based on Partial Least Squares (PLS), using the SmartPLS 3 software [46]. The condition to consider a PLS-SEM measurement model valid must consider six criteria: (1) the reliability of the indicators; (2) the internal consistency of the construct; (3) the reliability of the construct; (4) the convergent validity of the construct; (5) the discriminant validity between constructs; (6) explained variance; and (7) the standardized path coefficients. Given the imprecision of Cronbach's Alpha, it is discouraged as a reliable resource for measurement validation [34,64]. A structural model is established based on the logic of the original instrument by Schaufeli and colleagues [27–29] and based on the correlation values between the dimensions of the MBI-SS in recent works [36,37,39] and the antecedent of the correlation results between the dimensions of the Uribe Prado [20]. The research design can be seen in Figure 3.

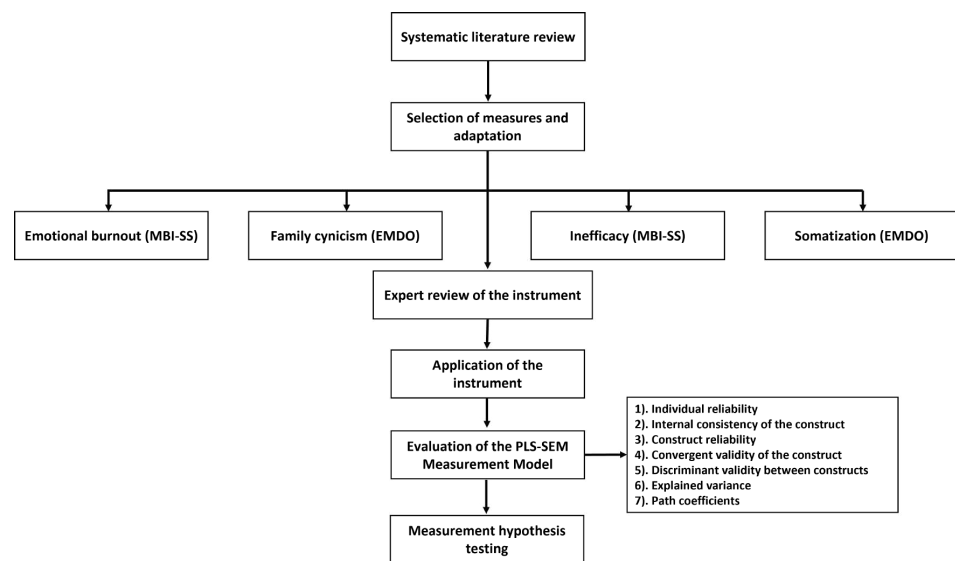


Figure 3. Research design.

## 4. Results

### 4.1. Individual Reliability

Using the statistical software SmartPLS 3.2.7 [46] the values of the external loadings were obtained, where thresholds of  $\lambda \geq 0.700$  are expected, in reflective model's values of  $\lambda \geq 0.400$  are acceptable, as long as their permanence in the model does not affect the validity values of the constructs. Otherwise, it is advisable to discard them [68]. In the first analysis, one item of the Family Cynicism construct (C5) was eliminated because it was below the threshold. After the discard stage, all external loading obtained acceptable values (Figure 3). Finally, a questionnaire with 22 valuable items distributed in 4 dimensions was obtained (Table A1).

### 4.2. Internal Consistency, Reliability, and Convergent Construct Validity

An indicator to evaluate the internal consistency of a construct, more robust than Cronbach's Alpha, is the composite reliability indicator where CR values  $> 0.700$  are expected. The Dijkstra-Henseler indicator ( $\rho A$ ) tests the reliability of the construct, and values  $> 0.708$  are expected. The average variance extracted (AVE) allows us to assess convergent validity, and the valid thresholds should be  $> 0.500$ . The reported results show that the four constructs range between expected values:  $\rho A = 0.791\text{--}0.866$ ,  $CR = 0.841\text{--}0.882$ ,  $AVE = 0.519\text{--}0.572$  (Table 3).

Table 3. Consistency, reliability, and construct validity.

Construct	No. Items	$\rho A$	Composite Reliability	AVE
1. Emotional burnout	5	0.844	0.865	0.563
2. Family cynicism	4	0.791	0.841	0.572
3. Inefficacy	6	0.855	0.882	0.560
4. Somatization	7	0.866	0.880	0.519

### 4.3. Discriminant Validity between Constructs (HTMT)

The discriminant validity of latent variables ensures that the constructs are empirically different from the other constructs included in the model. One criterion for measuring discriminant validity in A-mode (reflective) is the ratio of heterotrait-monotrait correlations (HTMT), i.e., the average of the correlations of indicators between constructs as well as within the same construct [69,70]. The threshold value for the HTMT criterion can be close to 1 with a cutoff  $\geq 0.800$  to conclude that discriminant validity exists. Table 4 shows the



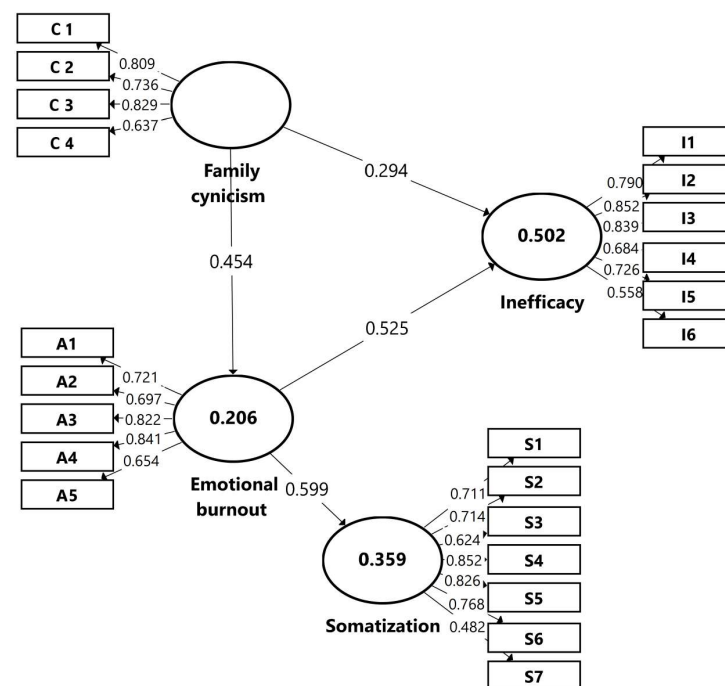
values are in the appropriate ranges, with a maximum value of 0.760 between the Inefficacy and Emotional burnout constructs.

**Table 4.** Heterotrait-monotrait correlation ratio (HTMT) criterion.

Construct	1	2	3	4
1. Emotional burnout				
2. Family cynicism	0.504			
3. Inefficacy	0.760	0.642		
4. Somatization	0.689	0.658	0.616	

#### 4.4. Explained Variance ( $R^2$ ) and Standardized Path Coefficients ( $\beta$ )

The values of the indicator ( $R^2$ ) allow us to know the variance explained, that is, the predictive power of the final construct and the other latent variables that are affected by others within the limits of the sample analyzed. This test also allows us to rank and place the constructs with the greatest predictive richness. A relevant  $R^2$  value is from 0.100 [71], and the higher the value, the greater the model's predictive power in relation to the exogenous variables that precede it. Although it is important to note that it is impossible to generalize to what extent this value is high or low since it will depend on the area of knowledge of study, for example, in the behavioral sciences, a value of  $R^2 = 0.200$  can be considered high [34]. In general, it can be considered as a rule of thumb in social sciences, the one used in marketing where  $R^2$  values of 0.750, 0.500, and 0.250 are considered, respectively, as important, moderate, and weak [68]. The model measured a weak value in Emotional burnout  $R^2 = 0.206$ , a moderate one in Somatization,  $R^2 = 0.359$  and a significant predictive value in the final dependent variable Inefficacy,  $R^2 = 0.502$  (Figure 4).



**Figure 4.** Nomogram of individual measurement model validation.

Figure 4 also allows us to appreciate the power of the relationship between constructs through the standardized path coefficients where it is expected to have values  $\beta > 0.200$ , ideally above 0.300, to be considered significant. As can be seen, the most substantial relationship is  $\beta = 0.599$ , between Emotional burnout and Somatization, and the lowest, but still relevant, is the relationship between Inefficacy and Family cynicism of  $\beta = 0.294$ .

#### 4.5. Measurement Hypothesis Testing

Table 5 allows us to observe values that allow us to accept the statistical hypotheses on the validation of the MBI-SS and EMDO measurement model from the SEM-PLS criteria and within the Latin context.

**Table 5.** Summary of results for hypothesis testing of the measurement model.

Hypotheses	Criteria	Ranges Obtained	Supported
Hi. 1. Individual reliability in indicators	$\lambda \geq 0.400$	0.463–0.855	Yes
Hi. 2. Internal consistency in constructs	$CR > 0.700$	0.841–0.882	Yes
Hi. 3. Reliability in constructs	$\rho A > 0.708$	0.791–0.866	Yes
Hi. 4. Convergent validity in constructs	$AVE > 0.500$	0.519–0.572	Yes
Hi. 5. Discriminant validity among constructs	$HTMT \leq 0.900$	0.499–0.752	Yes
Hi. 6. Relevant explained variance in dependents	$R^2 \geq 0.100$	0.206–0.502	Yes
Hi. 7. Relevant path in construct relationships	$\beta \geq 0.200$	0.294–0.599	Yes

## 5. Discussion

### 5.1. Emotional Burnout

The Emotional burnout construct, adapted to the Spanish and Latin context from the original by Schaufeli and colleagues [27–29], sustained its five items and held up to the individual, construct, and relationship tests. This result of permanence is consistent with those obtained in the validation of the Asian region in China from the work of Hu and Schaufeli in 2009 [27] to the recent one in Iran by Derakhshan et al. in 2022 [37], as well as in the American region of the U.S. with the work of MacArthur et al. in 2021 [39]. These works were contrasted with CB-SEM. As for specific statistical results of the Emotional burnout construct of the MBI-SS in Latin America, its five items had ranges of loading's  $\lambda = 0.654$ –0.841, the highest being item A4 "I feel emotionally exhausted by my studies". Such results align with those obtained in the individual measurement assessment conducted by SEM-PLS at U.S. Emerson et al. [21] in their 2022 paper and Smith and Emerson in 2021 [22] where their loading ranges were  $\lambda = 0.751$ –0.840 and  $\lambda = 0.751$ –0.840, with the same item also being highest. Regarding consistency, reliability, and construct validity tests, the dimension of Emotional burnout in Latino students obtained good values ( $\rho A$  0.844,  $CR = 0.865$ , and  $AVE$  0.563). The values obtained for this construct in the context of the American region, also validated through SmartPLS, were, respectively,  $CR = 0.917$ ,  $AVE = 0.687$  [22] and  $CR = 0.909$ ,  $AVE = 0.666$ . This implies that the original construct, despite the adaptation and reliability, explained slightly better variance in the U.S. context concerning the Latin context sample analyzed. The discriminant validity values had acceptable thresholds, with the  $HTMT$  being greater than 0.760. This manuscript's effect and prediction values differ from others conducted with SEM-PLS in that previous works related the MBI-SS model to other models, and this research related the MBI-SS to the Latin adaptation of its own subdimensions.

### 5.2. Inefficacy

The original Inefficacy constructs were adapted to the Spanish and Latin context from the original by Schaufeli and colleagues [27–29], maintained its six items, and held up to the individual, construct, and relationship tests. The permanence of the construct was consistent with the Asian [37] and American [39] contexts where CB-SEM recently validated the MBI-SS model. Regarding specific statistical results for the Inefficacy construct of the MBI-SS in Latin America, its six items had satisfactory loading ranges  $\lambda = 0.588$ –0.852. Those obtained in the individual measurement assessment performed through SEM-PLS in U.S. Emerson et al. [21] in their 2022 work and Smith and Emerson in 2021 [22] their loading ranges were  $\lambda = 0.690$ –0.761 and  $\lambda = 0.649$ –0.787, respectively. The above implies that, comparatively, the indicators explained the Inefficacy construct relatively better in the Latin region than the work of Smith and Emerson in 2021 [21]. Regarding consistency, reliability, and construct validity tests, the Inefficacy dimension in Latam students obtained good values ( $\rho A = 0.855$ ,  $CR = 0.882$ , and  $AVE = 0.560$ ). The values obtained for this construct

in the context of the American region, also validated through SmartPLS, were, respectively,  $CR = 0.842$ ,  $AVE = 0.518$  [22], and  $CR = 0.845$ ,  $AVE = 0.522$  [21]. This implies that this construct, adapted to the Latin region, explained slightly better variance than in the U.S. context in these investigations. The discriminant validity values had acceptable thresholds, with the *HTMT* being greater than 0.760. This manuscript's effect and prediction values also differ from the others performed with SEM-PLS in that previous works related the MBI-SS model to other models, and this research related the MBI-SS to the Latin adaptation of its subdimensions.

### 5.3. Family Cynicism

The Family cynicism dimension was based on the Mexican version of the MBI of Uribe Prado [20], adapted to the context of students in confinement where the family was part of the school interaction due to the permanence at home. After individual, construct, and relationship tests, this construct maintained its four valuable items. As for specific statistical results of the construct, its four items had satisfactory loading ranges  $\lambda = 0.637$ – $0.829$ . The item obtained the highest external loading value, "My family finds it very difficult to understand my school and personal problems," and the lowest, but valid, loading was obtained by the item, "I hardly establish communication with the members of my family." In terms of consistency, reliability, and construct validity tests, the Family cynicism dimension in Latam students obtained good values ( $\rho_A = 0.791$ ,  $CR = 0.841$ , and  $AVE = 0.572$ ). The discriminant validity values had acceptable thresholds, with the *HTMT* being greater than 0.658. This manuscript's effect and predictive values also stand out from the others performed with SEM-PLS. Its place within the model with a predictor approach served mainly as an exogenous latent variable that explained direct and indirect causal variance showing significant path values. It directly affected, for example, the Emotional burnout constructs with  $\beta = 0.454$ , and although it directly shows a weak effect on Inefficacy, when analyzing the total effect, it was significant concerning this same construct with a path value of  $\beta = 0.532$ .

### 5.4. Somatization

For this diagnosis of socially sustainable responsibility, it was considered essential to know the self-perception of the physiological effects of which Latina university students are aware. The Somatization dimension was also taken from the Mexican version of the MBI of Uribe Prado [20]. This construct sustained its seven useful items after the individual, construct, and relationship tests. In terms of construct-specific statistical results, its seven items had satisfactory loading ranges  $\lambda = 0.482$ – $0.852$ . Although the lowest external load value was below 0.707, as is generally recommended, the decision to keep the item was made given the flexibility that exists in Social Sciences and also because it did not affect the reliability tests of the constructs [68]. The highest external load values were obtained by items S4 "(in the last six months) Frequently had moments of depression" and the lowest load, but S5 "(in the last six months) Frequently had moments of anxiety."

Regarding consistency, reliability, and construct validity tests, the Somatization dimension in Latam students obtained good values ( $\rho_A = 0.866$ ,  $CR = 0.880$ , and  $AVE = 0.519$ ). The discriminant validity values had acceptable thresholds, with the *HTMT* being greater than 0.689. In turn, in its place within the model with a predictor approach, the Somatization construct served mainly as a latent dependent variable showing the most critical path value of the model. Directly affected by the Emotional burnout construct, it explains a direct effect with a value of  $\beta = 0.599$ , an indirect effect with the Family cynicism construct, and an  $R^2 = 0.359$ . This implies that under the analyzed sample, Emotional burnout and family depersonalization still have a physiological effect on Latino students returning to the university classroom.

## 6. Conclusions, Implications, and Limits

The question implicit in the objective of this research was: Is there validity and reliability in adapting the burnout scale for Latino college students? In the first instance, in the validated instrument, there is individual reliability in the indicators, internal consistency, reliability, convergent and discriminant validity among the constructs. Likewise, an explained variance and relevant effects in the relationships of the constructs. Therefore, it can be concluded that within the limits of the sample analyzed, the proposed instrument is valid, reliable, and useful to monitor the state of emotional health and thus procure a socially sustainable return, in terms of mental health, for Mexican-Colombian university students.

The evidence showed that in many Latino university students who return to face-to-face activity, school discouragement prevails, which is strongly influenced by emotional exhaustion that generates psychosomatic diseases in the student population. Emotional exhaustion showed a close and essential relationship with the generation of diseases experienced in the analyzed sample. In emotional exhaustion, aspects such as pressure and lack of energy due to burnout were relevant, generating somatizations among which depression, anxiety, and panic stand out. Therefore, it is recommended to manage emotional containment strategies in this return and to diagnose and channel cases where there is any disorder.

Another element that prevails within this burnout syndrome in university students is family cynicism, which is multifactorial driven at home by stress in the face of the COVID-19 crisis. The item "It is a challenge for my family to understand my school and personal problems" stood out regarding family cynicism. The above reflects that university students experience disunity with their families. Strategies that seek and encourage communication and bonding between parents and children are recommended.

At the end of the questionnaire, a qualitative question was left where students who wanted help were invited to leave their contact data. Thirty percent of the students left their contact information. This reflects an opportunity for intervention, but, on the other hand, it also means an urgency for students who wish to receive support. It is recommended to open spaces for students to ask for help and to follow up as soon as possible since not attending to them at a moment of vulnerability could result in a double impact on their openness to their current situation.

The present study has limits which, in turn, become an opportunity for future lines of research. On the one hand, the sample is not representative, so it is not possible to generalize the results. On the other hand, the predictive scope allowed by the PLS-SEM technique was only tested within the sample analyzed in both countries. As future lines of research, we invite future researchers to continue with the validation of school attrition factors in other Latin contexts and to use advanced PLS techniques to test hypotheses such as multigroup invariance, and to explore the predictive power of the model outside the sample, among others. It is also important to note as a limit that this analysis is limited to exploring relationships within the subdimensions of the model. It would be important to continue exploring relationships with other variables to approach the issue of school attrition in a multicausal and multifactorial manner. Finally, as a limit, it is recognized that the validations were in the context of the pandemic, it would be important to analyze the validity of the data outside the crisis by COVID-19.

In summary, mental health is a factor of social sustainability, and only in a way where students are guaranteed the healthy containment of their emotions can we move towards a sustainable education in return to our universities.

**Author Contributions:** Conceptualization, M.A.P.-R. and M.R.-C.; methodology, M.R.-C. and M.A.P.-R.; software, M.R.-C.; validation, M.R.-C., M.R.-C., A.H.R.-S. and A.S.; formal analysis, A.S. and M.R.-C.; investigation, M.R.-C. and A.S.; resources, M.R.-C., A.H.R.-S. and M.A.P.-R.; data curation, M.R.-C.; writing—original draft preparation, M.R.-C. and A.S.; writing—review and editing, M.R.-C., A.S., A.H.R.-S. and M.A.P.-R.; supervision, A.S.; project administration, A.H.R.-S. and M.A.P.-R.; funding acquisition, A.H.R.-S. and M.A.P.-R. All authors have read and agreed to the published version of the manuscript.

**Funding:** The APC was funded by the Corporación Universitaria Minuto de Dios.

**Institutional Review Board Statement:** Not applicable.

**Informed Consent Statement:** Informed consent was obtained from all subjects involved in the study.

**Data Availability Statement:** Educational institutions consider the content of the data to be sensitive, so the information is not made public.

**Conflicts of Interest:** The authors declare no conflict of interest.

## Appendix A

**Table A1.** Latin adaptation in Spanish of the University School Burnout Scale.

<p><b>Agotamiento Escolar (Based on Schaufeli and Colleagues [27–29])</b></p> <p>A1. Me siento emocionalmente agotado por mis estudios.            A2. Me siento agotado al final de un día en la universidad.            A3. Me siento cansado cuando me levanto por la mañana y tengo que afrontar otro día en la universidad.            A4. Estudiar o asistir a una clase es realmente un esfuerzo para mí.            A5. Me siento desgastado por mis estudios.</p> <p><b>Cinismo familiar (Adapted of Uribe-Prado [20])</b></p> <p>C1. En mi familia todos me parecen lejanos por lo cual no me interesa interactuar con ellos.            C2. Me cuesta mucho trabajo no ser grosero con los miembros de mi familia.            C3. A mi familia le cuesta mucho entender mis problemas escolares y personales.            C4. Establezco difícilmente comunicación con los miembros de mi familia.</p> <p><b>Ineficiencia escolar (Reverse based on Schaufeli and colleagues [27–29])</b></p> <p>I.1. Siento que no puedo resolver eficazmente los problemas que surgen en mis estudios.            I.2. Creo que no contribuyo eficazmente a las clases a las que asisto.            I.3. En mi opinión, últimamente no me considero un buen estudiante.            I.4. Últimamente no me siento estimulado con el logro de mis objetivos de estudio.            I.5. Últimamente no siento que he aprendido cosas interesantes a lo largo de mis estudios.            I.6. Durante las clases no me siento seguro de ser eficaz en la consecución de los objetivos.</p> <p><b>Somatización (Based on Uribe-Prado [20])</b></p> <p>S.1. Frecuentemente he tenido problemas para dormir.            S.2. Frecuentemente he tenido problemas de dolor.            S.3. Frecuentemente he tenido problemas gástricos.            S.4. Frecuentemente he tenido momentos de depresión.            S.5. Frecuentemente he tenido momentos de ansiedad.            S.6. Frecuentemente he tenido problemas de pánico.            S.7. Frecuentemente he sentido problemas con mi sexualidad.</p>
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Note: Given that one of the contributions is the adaptation to the Latin context, the decision was made to keep the items in Spanish.

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