



PERMA-Profiler for the Evaluation of well-being: Adaptation and Validation in a Sample of University Students and Employees in the Mexican Educational Context

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Abstract

Well-being research has increased in recent years, making it essential to have validated tools that allow its measurement. The objective of this study was to adapt and validate the PERMA-Profiler in a sample of university students and employees in the Mexican educational context. Through a back-translation, an adaptation of the PERMA-Profiler questionnaire into Spanish was obtained. This version and other well-being measures were administered to a sample of 23,723 students (mean age=21.50) and further to 2,783 employees (mean age=36.08). Results showed acceptable reliability and good convergent and discriminant validity between well-being variables. PERMA score was strongly correlated with general well-being, positive affect, and life satisfaction, and slightly correlated with growth mindset and physical well-being. Confirmatory factor analysis using exploratory structural equation modeling revealed a better fit for the original structure of five factors, both in the sample of students and employees. Also, the results provide first indications for measurement invariance for gender and age. Validation of the PERMA-Profiler in the Mexican context showed good psychometric properties. It can be recommended as a valid tool for assessing well-being in the Spanish-speaking population.

Keywords higher education · well-being · PERMA-Profiler · validation · psychometric properties · Mexico · flourishing

Introduction

In recent decades, the focus of study in psychology has expanded, with more attention being paid to positive functional aspects that are the basis of human well-being (Chou et al., 2013). The promotion of well-being has been associated with multiple physical and psychological benefits (Hoen et al., 2013; Czekierda et al., 2017). Moreover, well-being has been positively related to physical health and the implementation of healthy behaviors, especially in young people (Frisch, 2000). In the educational context, higher levels of well-being are associated with fewer behavioral problems in the school environment (McKnight et al., 2002) and a greater locus of control, self-esteem, and intrinsic motivation (Huebner, 1991). In fact, recent meta-analysis found positive correlations between academic performance and well-being (Bücker et al., 2018). However, some studies have shown that this relationship is low and inconsistent (Topham & Moller, 2011). Anyway, well-being and academic achievement are considered central indicators of positive psychological functioning in education systems (OECD, 2015). Similarly, several studies have shown that promoting employee well-being in the educational context is important. For instance, Kern et al. (2014) found that school staff with higher engagement and better relationships reported greater job satisfaction and organizational commitment.

Most of the proposed well-being models use a combination of hedonic and/or eudaimonic domains (Steptoe et al., 2015). The hedonic perspective of well-being (also called subjective well-being) includes, on the one hand, positive and negative affective aspects and, on the other hand, cognitive aspects, including overall satisfaction with life and specific domains such as education, health and housing (Diener et al., 1999; Vázquez et al., 2015). Eudaimonic well-being focuses on the development of natural or innate potential (Jongbloed & Andres, 2015) and stems from the implementation of actions consistent with personal values that imply a full commitment to oneself (Ryan & Deci, 2001). This movement toward the development of one's own maximum potential generates benefits not only for oneself but also for society (Waterman, 2008).

Currently, there is growing interest in measuring individual and community well-being (Helliwell et al., 2020). Improving quality of life has become a priority for many social, academic and political sectors (Layard, 2013). This interest has favored the development of tools to measure the well-being of the population (Layard, 2013).

PERMA Model

Seligman (2011) proposed the PERMA model, a renewed and expanded version of his previous model of multidimensional well-being (Seligman, 2002). The PERMA model identifies 5 elements: positive emotions (P), engagement (E), relationships (R), meaning (M); and accomplishment (A). This integrative theory proposes that optimal well-being requires the presence of both hedonic and eudaimonic dimensions. To make the PERMA model measurable, Butler and Kern (2016) developed the PERMA-Profiler. The English version was validated with a large international sample ($N=31,966$), resulting in a final set of 15 items (3 items for each dimension of PERMA). In addition, 8 items were added to evaluate negative emotions (NEs,

3 items), physical health (H, 3 items), loneliness (1 item) and happiness (1 item). Validation studies of the PERMA-Profilер indicated adequate reliability and validity of the scale (Butler & Kern, 2016). Confirmatory factor analysis showed that a five-factor model fit the data adequately and that all 5 factors were reliable. This short valid instrument based on the well-known Seligman's model has become one of the most commonly used tools in well-being research (Donaldson et al., 2021).

Currently, adaptations and validations of the PERMA-Profilер scale are being developed in different cultures. In general, previous studies report adequate indices of internal consistency. Regarding the factorial structure of the questionnaire, various structures are reported. For example, while the adaptations for Malaysia, Australia, Ecuador and Colombia report between 1 and 3 factors through exploratory analysis, confirmatory factor analyses corroborate a theoretical structure of 5 factors in the adaptations for Indonesia, India, Japan, Turkey, Germany, Greece, Chile, Venezuela, and Italy. Regarding population groups, the PERMA-Profilер has been validated in samples composed of students in the United States (Umucu et al., 2020), Turkey (Bülbül, 2018), Italy (Giangrasso, 2021), Indonesia (Hidayat, 2018), India (Singh & Raina, 2020), Chile (Cobo-Rendón et al., 2020) and Venezuela (Cobo-Rendon et al., 2021). Few studies have used adult samples, such as research conducted in Germany (Wammerl et al., 2019), Greece (Pezirkianidis et al., 2021) Australia (Ryan et al., 2019), Malaysia (Khaw & Kern, 2015), Japan (Watanabe et al., 2018), and Ecuador (Lima et al., 2017), and institutionalized seniors, in a Colombian study (Hernández-Suárez et al., 2018). PERMA-Profilер has been also validated for college students with disabilities (Tansey et al., 2018).

Although there are studies in which the PERMA-Profilер has been validated in Spanish (i.e., Ecuador, Chile, Venezuela and Colombia), the reliability, validity and factorial invariance of the PERMA-Profilер in other Spanish-speaking countries such as Mexico has not yet been proven. One of the main limitations of the previous versions of PERMA is that they were not created in universal Spanish, that is, with the intention of being valid for most Spanish-speaking countries. It is worth-mentioning that, beyond the linguistic differences between Mexico and other Spanish-speaking countries, these cultures vary in their levels of well-being and their determining factors (Helliwell et al., 2019). Also, these Spanish adaptations show difficulties regarding certain items. This is the case of E1 (i.e., 'How often do you become absorbed in what you are doing?') and E3 ('How often do you lose track of time while doing something you enjoy?') included in the Engagement factor. These items showed poor reliability in the translated versions (i.e., Chile, Venezuela, Colombia), probably due to the double meaning (positive and negative) in Spanish. Moreover, convergent and discriminant validity of PERMA-Profilер have been poorly examined. It is still unknown how PERMA-Profilер is related to other measures of general well-being widely used in Spanish-speaking countries. Similar to other validations (Butler & Kern, 2016; Wammerl et al., 2019), convergent validity may be tested using other well-being measures such as the Positive Emotions Scale (Watson et al., 1988), or the Satisfaction with life Scale (Diener et al., 1985), while discriminant validity may be tested using negative functioning variables, such as Negative Emotions Scale (Watson et al., 1988) or Fixed Mindset Scale (Dweck, 1999). As some well-being researchers have recognized, it is important to demonstrate that general well-being

and other related constructs are relatively independent (Donaldson et al., 2021). Moreover, although there is empirical evidence of the underlying PERMA structure for gender or age groups in different languages (eg., Pezirkianidis et al., 2021; Wammerl et al., 2019), the equivalence of the structure and factor loadings have not yet been explored in Spanish.

Therefore, more exhaustive analyses are needed to examine previously unanalyzed psychometric properties in the Spanish-speaking population (e.g., convergent and discriminant validity between variables), based on larger samples (the sample sizes of the studies conducted in Ecuador, Colombia, Chile and Venezuela were 1247, 130, 1462 and 202 participants, respectively), with a greater age range (the study conducted in Ecuador focused only on adult populations, the study conducted in Colombia focused only on institutionalized seniors, and the study conducted in Chile focuses only on adolescent students).

The Present Study

The PERMA model has been considered a useful framework for assisting clinicians (Carr et al., 2021) or school (Waters, 2011; Wingert et al., 2020) and work leaders (Larsen et al., 2021) to design well-being interventions. Thus, having a brief tool that evaluates these dimensions in the Spanish-speaking population is essential. The general objective of this study is to evaluate the psychometric properties of the PERMA-Profiler in a sample of students and employees (i.e., teachers and administrators) in a Mexican school environment. To address the general objective, the following specific objectives were established: (1) to determine and confirm the factorial structure of the measure; (2) to evaluate the reliability of the scale and subscales; (3) to analyze the content, convergent and discriminant validity; and (4) to explore the measurement invariance across gender and age. Given the mixed evidence on the correlation between well-being and academic achievement, the relationships between academic performance and the different PERMA dimensions were also examined. On the other hand, due to inconsistencies among previous studies regarding the factorial structure of PERMA-Profiler, it is not possible to establish a specific hypothesis with respect to which model will yield the best fit.

Methods

Participants

Two different samples were used in the study. Sample 1 was composed of 23,723 students (51% women). Sampling consisted of a non-probability sampling method via the use of a voluntary sample of students enrolled in high school programs, professional or master's degrees offered by a private Mexican university. Outliers were detected in the data on PERMA-Profiler and 36 students were excluded from the final sample. The ages of the participants in sample 1 ranged from 13 to 68 years ($M=21.50$; $SD=8.10$). Sample 2 was composed of 2,783 employees (i.e., teachers and administrators) from the same university (59.3% women); the ages of the par-

Table 1 Sociodemographic characteristics of the sample 1 ($N=23,723$)

		<i>N</i>	%
Gender	Male	11,490	49
	Female	11,952	51
Age	13–17	10,679	45.6
	18–24	6,972	29.7
	25–34	3,643	15.5
	35–68	2,145	9.2
Schooling	High School	10,522	44.4
	Undergraduate	8,542	36
	Postgraduate	4,659	19.6

Table 2 Sociodemographic characteristics of the sample 2 ($N=2,783$)

		<i>N</i>	%
Gender	Male	1118	40.7
	Female	1630	59.3
Age	20–25	286	10.3
	26–30	609	21.9
	31–35	600	21.6
	36–40	416	14.9
	41–45	364	13.1
	46–50	255	9.2
	51–55	159	5.7
	56–60	60	2.2
	61–65	22	0.8
	+ 65	12	0.4

ticipants were greater than 20 years ($M=36.08$). Tables 1 and 2 provide the details of these samples.

Measures

Participants in sample 1 completed the PERMA-Profiler, the Positive and Negative Affect Scale (PANAS), the Satisfaction with Life Scale (SWLS), the Pemberton Happiness Inventory (PHI), the Growth Mindset Scale (GMS), and the Physical Health Survey (SF-12). Participants in sample 2 completed the PERMA-Profiler and PHI. In addition, the average grades of the students were used as an indicator of academic performance. The evaluation protocol developed is described below.

PERMA-Profiler (Butler & Kern, 2016). The total scale consists of 23 items (15 items that evaluate the 5 dimensions of PERMA plus 8 filler items). Respondents answer using a Likert scale (0 = ‘never or not at all’ to 10 = ‘always or completely’). Mean scores were analyzed. The levels of internal consistency reported by the original study (Butler & Kern, 2016) range from 0.60 to 0.95 for the different dimensions and the total scale.

Positive and Negative Affect Scale (PANAS; Watson et al., 1988; Spanish validation by Lopez-Gomez et al., 2015). The PANAS includes 2 subscales with 10 items that evaluate positive affect (PA) and negative affect (NA). Respondents answer using

a Likert scale (0 = ‘*Nothing*’ to 4 = ‘*Always*’). In the present study, the reliability was $\alpha=0.80$ for the PANAS-PA and $\alpha=0.85$ for the PANAS-NA.

Satisfaction with Life Scale (SWLS; Diener et al., 1985; Spanish validation by Vázquez et al., 2013). The SWLS is composed of 5 items that evaluate life satisfaction. For this, the degree of agreement with each statement is indicated using a 7-point Likert scale (1 = ‘*strongly disagree*’ to 7 = ‘*strongly agree*’). Scores can range from 5 to 35 points, with higher scores indicating greater life satisfaction. In the present study, Cronbach’s alpha was 0.85.

Pemberton Happiness Index (PHI; Hervás & Vázquez, 2013). The PHI consists of 21 items, with 11 related to remembered well-being and 10 related to experienced well-being. The remembered well-being score is generated using a Likert scale, and the experienced well-being is assessed through a dichotomous response (yes/no), generating a score of 0–10 based on positive and negative experiences. In the present study, Cronbach’s alpha was 0.83.

Growth Mindset Scale (GMS; Dweck, 1999). The GMS consists of 16 items scored using a 6-point Likert scale (1 = “*strongly agree*” to 6 = “*strongly disagree*”). It has 2 subscales: growth mindset and fixed mindset. This scale has been previously used in Mexican populations, showing good reliability values (Ortiz Alvarado et al., 2019). In the present study, Cronbach alpha was 0.82 for growth mindset, and 0.82 for fixed mindset.

Short-Form Health Survey (SF-12; Ware, Kosinski, & Keller, 1996; Spanish validation by Vera-Villaruel et al., 2014). The SF-12 consists of 12 items that assess the intensity and/or frequency of the health condition of the respondent. The score ranges from 0 to 100, where higher scores indicate higher health-related quality of life. Scores for physical health (SF-P) and mental health (SF-M) can be extracted from the SF-12. The reliability of the scale presents levels above 0.70.

Academic performance: Student’s academic performance was determined by the average grade obtained in the semester of the survey. The grades ranged on a scale from 0 to 100 points. The mean performance was 86.93 ($SD=5.83$).

Translation Process

The translation of the PERMA-Profiler was based on the international guidelines for cross-cultural adaptation of self-report measures (Beaton et al., 2000). The translation process consisted of the following 5 stages: initial translation, synthesis of the translation, back-translation, expert validation, and testing of the pre-final version. A committee of two bilingual experts and two psychologists participated in the back-translation process for the PERMA-Profiler scale, evaluating the conceptual and semantic equivalence until reaching a consensus. The items that showed less consensus were E1 (‘*How often do you become absorbed in what you are doing?*’) and E3 (‘*How often do you lose track of time while doing something you enjoy?*’). After the preparation of the first translation and its application in a preliminary study with 1,499 students, the reliability of the subscales was satisfactory, with the exception of engagement (E) ($\alpha=0.48$). This index improved when item E3 was eliminated. The expert committee suggested that some participants may interpret ‘*losing track of*

time’ with a negative connotation. Therefore, a new translation for item E3 was proposed (i.e., “*How often does time go by very quickly when you are doing something you enjoy?*”). E1 was also nuanced (“*How often do you become absorbed, or are you into, what you are doing?*”). This final translation of E1 and E3 differed from the Spanish (Mexican) version used in the Butler & Kern (2016) study. The questionnaire was administered to a sample of 96 students. The reliability of the engagement factor improved substantially ($\alpha=0.77$). Therefore, this translation was used for the study. This preliminary sample was not included in the subsequent analysis.

Procedure

The evaluation protocol was applied online through Qualtrics. This study was approved by the ethics committee of the university and the Institute for Happiness Sciences, a research center of the university. Before answering the survey, participants signed an informed consent form. At the beginning of the academic year, the university requests parental consent for participation in academic surveys of any student under the age of 18. The survey was voluntary, and the participants did not receive any remuneration for participation. The survey was part of a broader evaluation protocol aimed at determining satisfaction with the university. All participants in sample 1 completed the PERMA-Profiler and another additional questionnaire, which was administered randomly among the participants (i.e., the PANAS, SWLS, PHI, GMS, or SF-12). This strategy ensured that the length of the evaluation protocol was adequate. The number of responses to each scale were: 4,625 for PANAS; 4,787 for SWLS; 4,692 for PHI; 4,817 for GMS; 4,802 for SF-12). Regarding sample 2, all participants completed the PERMA-Profiler and the PHI.

Data Analysis

First, a descriptive analysis was performed to examine demographic information for sample 1 and 2. To explore the differences in PERMA scores by age or gender, descriptive analyses of the PERMA-Profiler for sample 1 were also performed.

Next, to evaluate the factorial validity of the PERMA-Profiler, exploratory and confirmatory factor analysis was performed using Exploratory Structural Equation Modeling (ESEM). The ESEM takes into account both the exploratory and confirmatory factor analysis and it considers significant cross-factor loadings (Asparouhov & Muthén, 2009). Models fit and parameter estimates were evaluated based on the ESEM only; fit indices and parameter estimates for confirmatory factor analysis (CFA) models were presented for information. ESEM and CFA were carried out with sample 1 ($N=23,723$) and sample 2 ($N=2,783$).

To test for normality, an index for acceptable limits of skewness and kurtosis of ± 2 was used (Field 2009). Mardia’s coefficient was 1,195. Maximum likelihood estimation with robust (Huber-White) standard errors (MLR) was used as an estimator to address the potential results bias generated through non-normally distributed data (MLR; Yuan & Bentler, 2000; Finney & DiStefano, 2013). The global goodness-of-fit of the models is acceptable if (1) the comparative fit index (*CFI*) and Tucker-Lewis index (*TLI*) are ≥ 0.90 ; and (2) the root mean square error of approximation (*RMSEA*)

and standard root mean square residual (*SRMR*) are ≤ 0.06 ($90\% \text{ CI} \leq 0.10$; Hu & Bentler, 1999). Research on the validity of fit indices has indicated that the statistical power of the chi-squared test is highly dependent on sample size, where “in large samples, virtually any model tends to be rejected” (Bentler & Bonett 1980, p. 588). For this reason, the evaluation of the global model fit using the 4 goodness-of-fit indices is critical. For model comparisons of the competing models (i.e., the 1-factor, 2-factor, 3-factor and 5-factor structures), we used the goodness-of-fit indices and the Bayes information criterion (BIC), where smaller values indicate a better model fit (Raftery, 1995).

Subsequently, to evaluate the internal consistency of the questionnaire, Cronbach’s alpha values were calculated for the total score and for each factor score of the PERMA-Profiler in sample 1. The item-test relationship was also analyzed.

Content, convergent and discriminant validity between variables were examined using a comprehensive protocol of well-being measures. First, PHI was included (Hervas & Vazquez, 2013). This measure has been widely used in Spanish-speaking countries and has not been previously used to evaluate the validity of the PERMA-Profiler. In addition, correlational analyses were carried out between the PERMA-Profiler and the other tools included in the protocol administered to sample 1 (i.e., PANAS, SWLS, GMS, and SF-12). A correlation analysis was also performed between the PERMA-Profiler and academic performance.

Finally, in order to test for measurement invariance, gender (males and females) and age group (i.e., under 18 vs. 18 or more) were taken into account. The procedure for multi-group CFA’s with increasingly restricted nested models was used (Kline 2015). We tested for the following restrictions: configural (M1; no restrictions), metric (M2; adding equal factor loadings), scalar (M3; adding equal intercepts), and strict uniqueness (M4; adding equal residual variances) measurement invariance. The pairwise comparisons were made with its less restrictive predecessor (i.e., M1 vs. M2, M2 vs. M3, etc.). For model comparison of these nested models, changes in the *CFI* as well as the *RMSEA* were used, where lack of invariance is defined as $\Delta CFI \geq 0.01$ (Cheung & Rensvold, 2002) and $\Delta RMSEA \geq 0.015$ (Chen, 2007).

The lavaan R package (version 0.6–2; Rosseel 2012) in RStudio (version 4.0.5; RStudio 2016) was used for ESEM, CFA and measurement invariance analyses. All other statistical analyses were conducted in SPSS 25.

Results

Descriptive Results

Table 3 shows the means and standard deviations of the PERMA-Profiler for sample 1 as a function of age and gender. The t test for independent samples indicated that there were no statistically significant differences in well-being by gender [$t(23,440) = 1.67$; $p = .57$]. On the other hand, analysis of variance did indicate significant differences in well-being by age group [$F(3, 23,435) = 145.68$, $p < .001$]. The post hoc Bonferroni analysis indicated significant differences among all groups, indicating higher levels

Table 3 Descriptive data of the PERMA-Profiler total score by age and gender (sample 1)

Age	Male			Female			Total		
	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>	<i>N</i>	<i>M</i>	<i>SD</i>
13–17	4769	8.65	1.12	5820	8.60	1.13	10,616	8.63	1.13
18–24	3402	8.77	1.09	3544	8.83	1.06	6946	8.80	1.07
25–34	1923	8.91	0.84	1711	8.94	0.83	3634	8.93	0.84
35–68	1311	9.04	0.79	828	9.05	0.72	2139	9.04	0.76
Total	11,432	8.77	1.04	11,903	8.75	1.06	23,335	8.76	1.05

Note. *SD*=Standard Deviation

of well-being for the older age groups. Table 4 shows the means and standard deviations of the PERMA-Profiler items.

Factor Analysis

ESEM was conducted to explore and verify the factorial validity of the PERMA. Different factor structures were tested: the original structure of five factors (Butler & Kern, 2016), the 1-factor, 2-factor and 3-factor structures that have arisen in Spanish-speaking countries (Hernández-Suárez et al., 2018; Lima et al., 2017)¹. In addition to verifying the model fit using sample 1 (i.e., students), the fit of the models was tested using a different sample composed of professors and employees of the university (sample 2).

The goodness-of-fit indices are presented in Table 5. All models presented an acceptable fit; however, the 5-factor model yielded better indicators for both sample 1 and sample 2. Moreover, the Bayes information criterion (BIC) for the 5-factor model was slightly smaller, indicating a better model fit. Factor loadings are presented in Table 6. All factor loading in the CFA results were significant ($p < .001$) for both samples with values ranging from 0.46 to 0.86, thus meeting the values recommended by Brown (2015). Factor loadings in the ESEM results are meaningful when they are higher than 0.32 (Worthington & Whittaker, 2006). Factor correlations were < 0.85 , as recommended by Brown (2015) (see Fig. 1).

Reliability Analysis

Table 7 shows the reliability coefficients for the subscales for sample 1 and 2. Cronbach's alpha coefficients (α) greater than 0.70 are acceptable values. The 15-item scale had a reliability of $\alpha = 0.94$ (McDonald's Omega = 0.93) for sample 1, and $\alpha = 0.92$ (McDonald's Omega = 0.92) for sample 2, and the total PERMA-Profiler scale had a reliability of $\alpha = 0.90$ (McDonald's Omega = 0.89) for sample 1, and $\alpha = 0.91$ (McDonald's Omega = 0.91) for sample 2. The engagement dimension showed the lowest reliability value ($\alpha = 0.69$ and 0.67, respectively). Moreover, Composite Reli-

¹ Recent evidence supports a higher-order model of well-being whereby the five PERMA dimensions represent first-order factors that, in turn, load on a single general factor (Bartholomaeus et al., 2020). Based on this literature, a second-order factor structure was tested using sample 1. Confirmatory factor analysis revealed a better global model fit for the original structure of five factors than the second-order factor model [$\chi^2(75) = 8458.19$; $p < .001$; $RMSEA(p) = 0.10$ (< 0.001); $CFI = 0.93$; $TLI = 0.89$; $BIC = 526,451$].

Table 4 Means and standard deviations for PERMA-Profiler items (sample 1)

Item	M	SD
M1. In general, to what extent do you lead a purposeful and meaningful life? / En general, ¿hasta qué punto llevas una vida con propósito y sentido?	8.84	1.34
A1. How much of the time do you feel you are making progress towards accomplishing your goals? / ¿Cuánto tiempo sientes que estás avanzando hacia el logro de tus metas?	8.55	1.44
E1. How often do you become absorbed in what you are doing? / ¿Con qué frecuencia estás absorto o completamente “metido” en lo que haces?	8.67	1.31
H1. In general, how would you say your health is? /En general, ¿cómo dirías que está tu salud?	8.66	1.42
P1. In general, how often do you feel joyful? / En general, ¿con qué frecuencia te sientes alegre?	8.72	1.38
R1. Towhat extent do you receive help and support from others when you need it? / ¿Hasta qué punto recibes ayuda y apoyo de otras personas cuando lo necesitas?	8.60	1.67
N1. In general, how often do you feel anxious? / En general, ¿con qué frecuencia te sientes ansioso?	6.62	2.82
A2. How often do you achieve the important goals you have set for yourself? / ¿Con qué frecuencia logras metas importantes que tú mismo te has puesto?	8.50	1.41
M2. In general, to what extent do you feel that what you do in your life is valuable and worthwhile? / En general, ¿hasta qué punto sientes que lo que haces en tu vida es valioso y vale la pena?	8.88	1.48
P2. In general, how often do you feel positive? / En general, ¿con qué frecuencia te sientes positivo?	8.69	1.46
E2. In general, to what extent do you feel excited and interested in things? / En general, ¿hasta qué punto te sientes entusiasmado e interesado en las cosas?	8.80	1.31
Lon. How lonely do you feel in your daily life? / ¿Hasta qué punto te sientes solo te sientes en tu vida diaria?	5.15	3.53
H2. How satisfied are you with your current physical health? / ¿Qué tan satisfecho estás con tu salud física actualmente?	7.99	2.00
N2. In general, how often do you feel angry? / En general, ¿con qué frecuencia te sientes enojado?	5.27	2.88
R2. To what extent do you feel loved? / ¿Hasta qué punto te sientes querido?	8.84	1.54
A3. How often are you able to handle your responsibilities? / ¿Con qué frecuencia eres capaz de manejar tus responsabilidades?	8.88	1.33
M3. To what extent do you generally feel you have a sense of direction in your life? / Generalmente, ¿hasta qué punto tienes un sentido de dirección en tu vida?	8.74	1.42
H3. Compared to others of your same age and sex, how is your health? / Comparada con la de otras personas de tu misma edad y sexo, ¿cómo está tu salud?	8.59	1.64
R3. How satisfied are you with your personal relationships? / ¿Qué tan satisfecho estás con tus relaciones personales?	8.71	1.52
N3. In general, how often do you feel sad? / En general, ¿con qué frecuencia te sientes triste?	4.48	3.05
E3. How often do you lose track of time while doing something you enjoy? / ¿Con qué frecuencia se te pasa el tiempo muy rápido cuando estás haciendo algo que disfrutas?	9.16	1.29
P3. In general, to what extent do you feel contented? / En general, ¿hasta qué punto te sientes contento?	8.84	1.30
Hap. Taking all things together,how happy would you say you are? / Tomando todo en consideración, ¿qué tan feliz dirías que eres?	8.79	1.34

Note. M=Mean; SD=Standard Deviation

Table 5 Model fit indices of the CFA and ESEM (sample 1 and sample 2)

Sample	CFA						ESEM								
	χ^2	df	RMSEA	SRMR	CFI	TLI	BIC	χ^2	df	RMSEA	SRMR	CFI	TLI	BIC	
Sample 1	One factor	27651.97***	90	0.11	0.05	0.88	0.86	519,211	27652.40***	90	0.11	0.05	0.88	0.86	1,045,116
	Two factors	3021.53***	89	0.06	0.04	0.93	0.92	517,322	10194.76***	76	0.07	0.03	0.96	0.94	1,027,800
	Three factors	2557.55***	87	0.06	0.03	0.93	0.91	516,771	6616.97***	63	0.07	0.02	0.97	0.95	1,024,353
	Five factors	2382.91***	80	0.05	0.03	0.95	0.93	515,393	2412.38***	40	0.05	0.01	0.99	0.97	1,020,380
Sample 2	One factor	3168.22***	90	0.11	0.05	0.89	0.87	119,681	3168.96***	90	0.11	0.05	0.89	0.87	119,681
	Two factors	1022.49***	89	0.09	0.04	0.93	0.92	118,499	1689.24***	76	0.09	0.09	0.94	0.92	118,312
	Three factors	957.50***	87	0.08	0.03	0.95	0.92	117,932	720.52***	63	0.06	0.02	0.98	0.96	117,447
	Five factors	630.49***	80	0.05	0.03	0.96	0.95	117,678	274.00***	40	0.05	0.02	0.99	0.98	117,182

Note: *** $p < .001$; df = degrees of freedom; RMSEA = Root Mean Square Error Approximation; CFI = Confidence Interval; SRMR = Standard Root Mean Square Residual; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; BIC = Bayes Information Criterion.

ability (CR) coefficient was examined (Table 8). All CR values were higher than the desirable critical value of 0.70 (Hair et al., 2010).

Validity Analysis

Firstly, convergent and discriminant validity between dimensions were assessed using the Average Variance Extracted (AVE) and the Maximum Shared Variance (Table 8). All AVE values were higher than the critical value 0.50 (Hair et al., 2010), except for engagement. This result indicate that the engagement factor has convergent validity issues ($AVE < 0.05$), which means that the three items that compose this factor do not correlate well with each other within the engagement factor.

Factors whose shared variance are lower than their AVE are characterized by adequate discriminant validity (Hair et al. 2010). Also, all AVE values were higher than the shared variance of the dimensions, except for positivity-engagement, positivity-relations, meaning - achievement. These results indicate poor discriminant validity between these dimensions, since a portion of each factor's variance is better explained by items that mainly load on another factor.

To further evaluate the convergent and discriminant validity of the PERMA Profiler, the possible correlations between the PERMA-Profiler dimensions and other measures (i.e., PANAS, SWLS, PHI, GMS and SF-12) were examined for sample 1. As levels of skewness and kurtosis were high, spearman correlations were performed. Since there were significant differences in the well-being by age, age was included as a covariate in the analysis. The results are shown in Table 9.

First, the main factors of PERMA were strongly correlated with the PHI, SWLS and PANAS-PA, and slightly correlated with SF-Physical. Regarding the secondary components, NE showed a strong and positive correlation with PANAS-NA and a moderate correlation with fixed mindset. The health subscale was highly correlated with the SF-physical and moderately correlated with PANAS-PA, the PHI and the SWLS. In addition, the total PERMA-Profiler score was strongly correlated with PANAS-PA, the SWLS and the PHI and slightly correlated with SF-Physical and growth mindset.

Negative correlations were taken into account to clarify the discriminant validity between variables. The total PERMA-Profiler score and its principal components were slightly negatively correlated with NE, loneliness, PANAS-NA and fixed mindset.

Regarding the relationship between well-being and academic performance, significant correlations ($p < .01$) were observed, although of moderate size, between all the dimensions of the PERMA-Profiler and academic performance.

Measurement Invariance

In order to test the Five-Factor Model for measurement invariance, gender and age groups were taken into account (see Table 10). Regarding gender, two subgroups (i.e., male and female) were considered. The results demonstrate that the CFI differences between configural, metric scalar and strict invariance across gender were less than 0.01 indicating that factor structure, factor loadings, items intercepts, and residual

Table 6 Factor loadings in the CFA and ESEM results (sample 1)

	Item	SF (CFA)	P	E	R	M	A
P	P1	0.85	0.63	0.18	0.12	0.06	0.03
	P2	0.85	0.25	0.70	0.04	0.02	0.01
	P3	0.86	0.47	0.19	0.26	0.09	0.11
E	E1	0.69	0.24	0.01	0.05	0.08	0.44
	E2	0.83	0.17	0.50	0.09	0.09	0.22
	E3	0.47	0.16	0.04	0.01	0.19	0.35
R	R1	0.66	0.10	0.09	0.33	0.08	0.06
	R2	0.78	0.13	0.05	0.72	0.01	0.08
	R3	0.77	0.19	0.09	0.59	0.11	0.01
M	M1	0.81	0.11	0.05	0.07	0.71	0.09
	M2	0.83	0.01	0.38	0.19	0.24	0.23
	M3	0.84	0.02	0.17	0.16	0.46	0.28
A	A1	0.82	0.25	0.14	0.01	0.49	0.17
	A2	0.78	0.07	0.21	0.01	0.23	0.40
	A3	0.68	0.03	0.09	0.19	0.16	0.39

Note. SF=Specific factor; P=Positive emotions; E=Engagement; R=Relationships; M=Meaning; A=Achievement

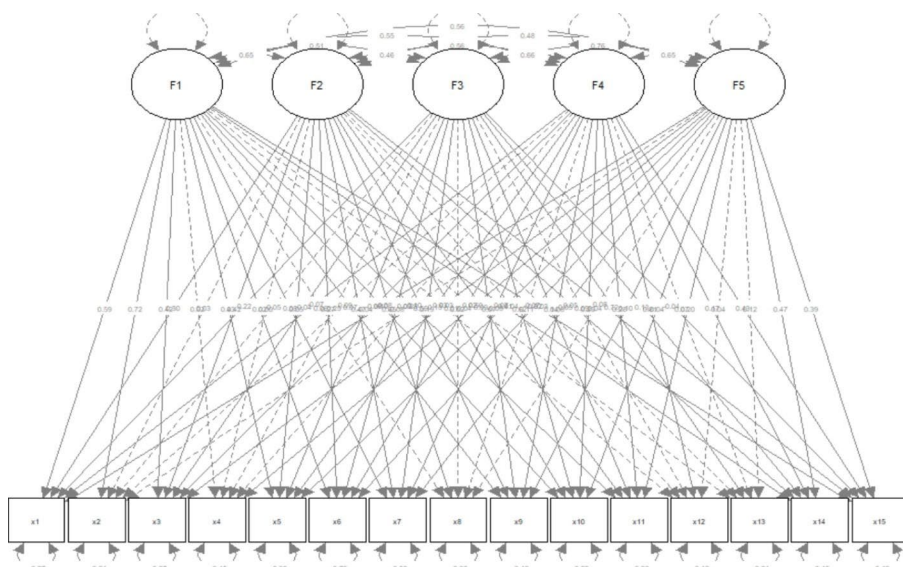


Fig. 1 Schematic representation of ESEM model: five-factor model (sample 1). (Note. F1=Positive emotions; F2=Engagement; F3=Positive Relations; F4=Meaning; F5=Achievement.)

variances were equivalent across gender. Regarding age, two subgroups (under 18 vs. 18 or more) were considered. Results showed that criteria for configural, metric and scalar measurement invariance were met. There was a non-significant decrease in model fit. Thus, the factor structure, loadings and item intercepts were equivalent across groups. However, the results showed that criteria for strict measurement

Table 7 Reliability PERMA-Profiler (sample 1 and 2)

Factors	Cronbach' alpha	
	Sample 1	Sample 2
Positive emotions (P)	0.88	0.90
Engagement (E)	0.69	0.65
Relationships (R)	0.77	0.75
Meaning (M)	0.87	0.88
Accomplishment (A)	0.80	0.76
Total PERMA-15	0.94	0.92
Negative emotions (NE)	0.77	0.76
Health (H)	0.86	0.87
Total PERMA-23	0.90	0.91

Table 8 Average Variance Extracted (AVE), the Composite Reliability (CR), and the shared variances of the dimensions (Sample 1)

Dimension	AVE	CR	Shared variance				
			P	E	R	M	A
P	0.73	0.89	-				
E	0.46	0.71	0.49	-			
R	0.55	0.78	0.55	0.37	-		
M	0.68	0.87	0.55	0.53	0.45	-	
A	0.58	0.81	0.44	0.44	0.47	0.67	-

invariance (i.e., equal residual variances) were not met. Although changes in the RMSEA were ≤ 0.015 , ΔCFI was 0.029. Thus, residual errors were not equivalent across age groups.

Discussion and Conclusions

The main purpose of the present study was to evaluate the validity of the PERMA theory of well-being by developing and testing a translated and culturally adapted version of the PERMA-Profiler in a large Mexican student sample. For this, the psychometric properties of the adaptation of the questionnaire to Spanish were estimated, the reliability and validity of the questionnaire were tested, and the most appropriate factor structure for this population was confirmed.

First, in relation to the descriptive results, although there was no difference in well-being by gender, differences by age were found (i.e., older age groups showed higher well-being). Although many studies found that life satisfaction showed a U-shaped curve over the life span, with its low point around 50 years of age (Blanchflower & Oswald, 2008), this hypothesis has not yet been tested using other integrative well-being measures such as PERMA. Moreover, mean scores for each of the 15 items were higher than those found in other Latin American countries (such as Ecuador, Chile and Venezuela). The average scores obtained for each factor were much higher than those found in the original study and in the other PERMA-Profiler validations (i.e., Japan, India, Germany, and Australia). These higher scores in well-being in Mexico could be due, in part, to the so-called ‘Latin American paradox’, territories

Table 9 Descriptive statistics and bivariate correlations between the different instruments (sample 1)

	N	M (SD)	Ske	Kurt	P	E	R	M	A	NE	H	Loneliness	Happiness	Total
P	23,723	8.75 (1.24)	-2.15	7.47	1									
E	23,723	8.87 (1.02)	-2.03	7.86	0.66**	1								
R	23,723	8.72 (1.30)	-1.97	5.90	0.70**	0.60**	1							
M	23,723	8.82 (1.25)	-2.28	8.47	0.69**	0.70**	0.65**	1						
A	23,723	8.64 (1.17)	-1.97	7.01	0.63**	0.70**	0.60**	0.80**	1					
NE	23,723	5.46 (2.42)	-0.09	-0.72	-0.22**	-0.11**	-0.16**	-0.18**	-0.10**	1				
H	23,723	8.41 (1.51)	-1.72	4.30	0.55**	0.47**	0.52**	0.51**	0.51**	-0.05**	1			
Loneliness	23,723	5.15 (3.53)	-0.15	-1.46	-0.11**	-0.03**	-0.14**	-0.11**	-0.02**	0.60**	-0.04**	1		
Happiness	23,723	8.79 (1.34)	-2.15	7.70	0.78**	0.58**	0.67**	0.64**	0.57**	-0.20**	0.52**	-0.11**	1	
Total	23,723	8.76 (1.05)	-2.09	7.86	0.86**	0.83**	0.83**	0.88**	0.85**	-0.18**	0.60**	-0.10**	0.78**	1
Fixed mindset	4,817	23.79 (11.60)	0.54	-0.78	0.01	-0.04*	-0.02	-0.03	-0.04*	0.34*	0.06*	0.32**	0.03	-0.03*
Growth Mindset	4,817	39.83 (7.08)	-1.60	4.03	0.33**	0.27**	0.27**	0.32**	0.31**	-0.04*	0.20**	-0.02	0.27**	0.35**
PANAS-PA	4,625	37.83 (8.18)	-0.64	0.10	0.55**	0.55**	0.50**	0.60**	0.57**	-0.24**	0.41**	-0.15**	0.51**	0.64**
PANAS-NA	4,625	18.07 (8.26)	1.54	2.51	-0.18**	-0.15**	-0.25**	-0.24**	-0.22**	0.51**	-0.15**	0.36**	-0.25**	-0.28**
SWLS	4,787	27.84 (6.58)	-1.45	2.00	0.59**	0.52**	0.57**	0.60**	0.56**	-0.13**	0.46**	-0.07**	0.61**	0.67**
PHI	4,692	8.44 (1.12)	-2.15	8.08	0.69**	0.59**	0.63**	0.67**	0.60**	-0.45**	0.46**	-0.34**	0.65**	0.75**
SF-P	4,802	16.97 (2.46)	-0.93	0.51	0.34**	0.28**	0.32**	0.35**	0.32**	-0.29**	0.53**	-0.20**	0.33**	0.37**
SF-M	4,802	16.97 (1.91)	-0.41	1.22	0.01	0.01	0.06**	0.04*	0.03*	-0.06**	0.01	-0.04**	0.02	0.04**
Academic performance	14,629	87.85 (5.90)	-0.43	0.47	0.03**	0.10**	0.07**	0.15**	0.20**	-0.20**	-0.01	-0.18**	0.03*	0.14**

Note: ** $p < .01$; * $p < .05$; Ske=Skewness, Kurt=Kurtosis; Note: P=Positive emotions, E=Engagement, R=Relationships, M=Meaning, A=Accomplishment, NE=Negative emotions, H=Health, PT=Total PERMA-Profiler, PANAS-PA=Positive items of PANAS, PANAS-NA=Negative items of PANAS, SWLS=Satisfaction with Life Scale, PHI=Pemberton Happiness Inventory, SF-P=Physical Health Scale, SF-M=Mental Health Scale, SD=Standard Deviation

in which a much higher well-being is evident than would be expected due to their socioeconomic status (Macchia & Plagnol, 2019). The presence of protective factors commonly associated with well-being, such as social and cultural relationships and religiosity, could explain this paradox (Reyes, 2017). However, it should be noted that these higher well-being scores may also be due to the sample characteristics, since it was drawn from students and employees in private schools with higher socioeconomic status.

Regarding the factorial structure of the PERMA-Profil, the original 5-factor model proposed by Butler and Kern (2016) yielded better indicators, with values within the ranges of scores accepted in the psychometric literature (Brown, 2015). These results confirm the original structure, coinciding with other validations in which CFA is used, such as in Chile, Venezuela, Greece, Indonesia, India, Japan, Turkey, Germany and Italy. Moreover, results support that the five-factor model is acceptable for both students and employees.

Focusing on reliability, the analyses indicated acceptable internal consistency for the 15 items of the PERMA-Profil, similar to the original version (Butler & Kern, 2016) and to validations in other cultural contexts. This result supports the internal consistency of the Mexican translation.

Regarding the levels of consistency for the different dimensions of the PERMA-Profil, the results were theoretically adequate for all dimensions, except for engagement (E). Despite having modified the translation of this dimension after the first preliminary study, the factor loading was still slightly lower than theoretically expected. This low reliability in the dimension of engagement is also found in some samples of the original study and in other validations (e.g., Pezirkianidis et al., 2021). Several studies indicate that these low levels of reliability could be due to the composition of the dimension itself, which includes cognitive, psychological and behavioral aspects (Lambert D'raven, & Pasha-Zaidi, 2016), and could be causing an internal fragmentation of the dimension. It is also possible that low levels of reliability are related to the inclusion of very different components in the same dimension (i.e., commitment, absorption, and dedication). Following this line, it is worth mentioning that AVE for engagement was slightly lower than 0.5. However, Fornell and Larcker (1981) suggested that, if AVE is lower than 0.5, but CR is higher than 0.6, the convergent validity of the construct is still adequate.

Regarding validity, there was a significant correlation among the main factors of the PERMA-Profil, values higher than those reported in the original study, reaffirming the high correlation among the different dimensions of well-being. In any case, correlations among factors were lower than 0.85, indicating acceptable discriminant validity between dimensions (Brown, 2015). Positivity-engagement, positivity-relations, meaning-achievement showed poor discriminant validity. Only the Greek validation analyzed the shared variance, finding similar discriminant validity issues (Pezirkianidis et al., 2021). High cross-factor loadings in the five-factor structure may be taken into account or reworded in future analyses. For instance, discriminant validity improves when P2 ('In general, how often do you feel positive?') or A1 ('In general, how often do you feel positive?') are not included in the discriminant validity analysis.

Table 10 Model comparisons for measurement invariance of the Five-Factor Model regarding gender and age groups

Model	Df	Δ CFI	Δ TLI	Δ RMSEA	Δ SRMR
Gender	10	0.000	0.003	-0.002	0.001
Metric					
-Configural					
Scalar	10	0.002	0.001	-0.001	0.001
- Metric					
Strict	15	0.000	0.004	-0.003	0.000
- Scalar					
Age groups					
Metric	40	0.001	0.004	-0.003	0.007
-Configural					
Scalar	40	0.005	0.001	0.000	0.003
- Metric					
Strict	60	0.029	0.021	0.012	0.012
- Scalar					

Note: df=degrees of freedom;
 RMSEA=Root Mean Square Error Approximation;
 SRMR=Standard Root Mean Square Residual;
 CFI=Comparative Fit Index;
 TLI=Tucker-Lewis Index

On the other hand, the Latin American validations reported lower correlations between the dimensions of well-being and distress of the PERMA-Profiler than those of the original study, highlighting the need to evaluate them both independently in the Latin American context.

The results from this study show, for the first time, the relationship of the PERMA-Profiler with other relevant scales of well-being in the Spanish-speaking population. A high correlation was found between the total PERMA-Profiler score and the PHI. This measure of well-being, which includes hedonic and eudaimonic components, has high indices of reliability and validity. This strong correlation indicates that these two instruments measure very similar aspects, denoting high content validity.

Regarding convergent and discriminant validity between well-being variables, the high correlation with the SWLS is notable, implying a strong relationship with subjective well-being. However, the agreement between the 2 measures is not complete, suggesting that PERMA allows for a broader view than subjective well-being (Seligman, 2018). The PERMA model has influenced the design of multiple interventions in various contexts; therefore, having a valid and reliable multidimensional measure that fits this theoretical model can make a significant contribution.

There were strong correlations between positivity and PANAS-PA, between the negative emotions subscale and PANAS-NA, and between health and the SF-12, supporting the convergent validity of the subscales. Finally, while there was a positive correlation between the PERMA-Profiler and a growth mindset, there was no correlation with a fixed mindset, indicating the discriminant validity of the measure.

Focusing on academic performance, significant and positive correlations were observed, although slight, between this and all dimensions of the PERMA-Profiler. Moreover, academic achievement was negatively related to negative emotions. These significant correlations with academic performance coincide with the results reported for U.S. veterans, the only validation study of the PERMA-Profiler that analyzed the possible correlation (Umucu et al., 2020). This result is also consistent with what was found in a meta-analysis carried out by Bückner et al. (2018), who found a correlation with an average strength of $r = .16$ (varying between 0.11 and 0.22). Previous research has already shown that, while negative emotions negatively influence self-regulated learning, positive emotions are associated with better self-regulated learning, greater

motivation and better grades (Mega et al., 2014). Well-being favors persistence in and commitment to academic tasks and helps students use more effective cognitive processing strategies (Tuominen-Soini et al., 2008). However, it is worth-mentioning that this relationship between well-being and academic performance can be bidirectional, where academic success could also lead to greater subjective well-being (Neubauer et al., 2018).

Regarding measurement invariance, the multi-group CFAs revealed strict measurement invariance of the Five-Factor Model for gender, indicating that the scores among men and women can be compared and interpreted meaningfully. On the other hand, the scale partially met criteria for measurement invariance regarding age. Thus, factor structure, factor loadings and indicator means can be safely compared between age groups. However, indicator residuals comparisons between age groups must be made cautiously. Despite this limitation, these are, to our knowledge, the first findings which explore measurement invariance for the PERMA-Profilier considering gender and age in Spanish-speaking nationalities. By investigating the scale's measurement invariance, this study paves the way for further research on developmental differences in well-being.

There are several limitations that must be taken into account when interpreting the results. The first limitation relates to the sample of participants because the adaptation was carried out in the educational context. Although the age range was wide and the model was also confirmed in a sample with a different profession and age profile (teachers and administrative staff), it is possible that individuals with a lower level of education or lower socioeconomic level are not represented by this sample. In the future, it will be necessary to perform validation studies with samples of other ages, socioeconomic levels, etc., to expand the applicability of this scale in different contexts. Second, this is a cross-sectional study. For this reason, it is not possible to establish causality or directionality in the relationships with other well-being variables (e.g., academic performance). Therefore, longitudinal studies would be beneficial. Third, the reliability of the engagement factor was low. Although these data have been found in most validation studies and even in some samples of the original study, additional interviews should be conducted to evaluate the understanding of the items that compose this dimension, in addition to an investigation of cultural differences with respect to engagement.

Despite the limitations, this study allowed the validation of the Spanish version of one of the most commonly used tools in well-being research. Many interventions in the clinical, educational and work environments have been designed from the perspective of the PERMA model. Therefore, the adaptation and validation of the PERMA-Profilier to the Mexican context allows for a multidimensional tool of well-being that will facilitate the evaluation of well-being programs in the Spanish-speaking population, a tool that may be useful as an indicator of changes in positive functioning. Despite validation in other Latin American contexts, this study allowed the examination of new psychometric properties of the questionnaire (i.e., validity, measurement invariance) through a larger sample size and with a greater age range. This study confirms that the five-factor model is acceptable for different gender, ages and populations. In addition, this study incorporated in its evaluation protocol other measurement tools with a high degree of reliability already validated in Spanish, an

aspect that was not taken into account in any of the Latin American studies. Considering the existence of contradictory results regarding the possible relationship between well-being and academic performance, this study allowed to expand the available evidence in a different cultural context.

The promotion of well-being is increasingly being sought in various contexts (i.e., educational, social, work). Measuring well-being in the university context helps address the needs of its constituents (Oades et al., 2011). Therefore, having innovative tools in an educational context that are reliable and easy to use for the Spanish-speaking population is essential to continue advancing the design of new interventions. In the future, it will be necessary to continue validating multi-component programs for the promotion of different dimensions of well-being in educational institutions and in society (Chaves & Kern, 2017).

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Declarations

Conflict of Interest/Ethical Statement: The manuscript has been written following the Guidelines for authors and has not been submitted elsewhere for publication. None of the authors who sign this paper has any conflict of interest in the conduct and reporting of our research.

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