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Articles

Structural validity and measurement invariance of the Brief Positive and Negative Affect Scale in emerging adulthood across countries and between women and men

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Abstract

Introduction: Emerging adulthood (ages 18–29) is a key period of emotional and social development, and cross-cultural research is essential to understanding how these processes manifest in diverse Latin American contexts. Given the need for brief, culturally valid tools to assess affect during this stage, this study focuses on the validation of the 10-item Positive and Negative Affect Scale in emerging adults from Chile and Ecuador and evaluate its measurement invariance across country and sex groups.

Methods: A psychometric cross-sectional design was used to assess a sample of 1693 emerging adults (61.7% women) aged 18-29 years ($M = 21.94$, $SD = 2.81$). The sample included 983 participants from Chile ($M = 22.52$, $SD = 2.57$) and 710 from Ecuador ($M = 21.13$, $SD = 2.94$).

Results: The results indicate that the Positive and Negative Affect Scale demonstrates adequate structural validity in both countries and both sexes. Strict invariance was achieved across Chile and Ecuador, as well as by sex, supporting the comparability of scores across groups. Regarding latent means, Chilean participants reported lower levels of both positive and negative affect compared to their Ecuadorian counterparts. Additionally, men reported higher levels of positive affect, whereas women reported higher levels of negative affect.

Conclusions: The findings are consistent with theoretical models of subjective well-being that conceptualize positive and negative affect as related but distinct dimensions. Although the results cannot be directly generalized to clinical or public health settings, they suggest that the Brief Positive and Negative Affect Scale may serve as a brief tool for assessing affect in both research and applied contexts, including initial screening and large-scale assessments. However, the use of non-probabilistic sampling may limit generalizability, and future studies should include more diverse populations and longitudinal designs to further examine the robustness of these findings.

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1. Introduction

Emerging adulthood, typically defined as the period between 18 and 29 years of age, represents a critical developmental stage marked by profound emotional, social, and identity-related transitions (Arnett, 2024). According to Arnett and Mitra (2020), it is characterized by five key features: identity exploration, self-focus, a sense of being in transition, instability, and optimism about future possibilities. These features contribute to a context of heightened variability and change, driven by shifts in interpersonal relationships, educational and occupational pursuits, and increasing autonomy in decision-making (Arnett, 2004). As a result, emerging adulthood represents a particularly sensitive stage for emotional development, where life events and transitions may significantly shape subjective well-being (Arnett, 2000, 2004, 2007). Importantly, this period is also characterized by increased vulnerability to mental health difficulties, underscoring the importance of accurately studying well-being during this stage (Botha et al., 2023).

Subjective well-being refers to individuals' evaluations of their own lives, encompassing both cognitive components, such as life satisfaction, and affective experiences (Diener et al., 2018; Larsen, 2009). The emotional dimension includes positive affect, feelings such as joy and affection, and negative affect, which comprises emotions like worry, stress, and guilt (Batz & Tay, 2018; Diener et al., 1985; Joshi, 2010). These dimensions are commonly assessed using the Positive and Negative Affect Schedule (PANAS; Watson et al., 1988), a widely validated instrument applied across multiple languages, cultural contexts, and life stages (Roemer & Medvedev, 2023). However, despite its widespread use, prior research indicates that the factorial structure of the PANAS may vary across sociocultural contexts and population characteristics, raising questions about its structural stability across diverse samples, including forensic populations (Leue & Beauducel, 2011), clinical samples (Díaz-García et al., 2020), and other populations (Roemer & Medvedev, 2023).

In the present study, we distinguish between the original Positive and Negative Affect Schedule (PANAS; Watson et al., 1988) and its abbreviated adaptation used in this research, the PNA-10 (Yáñez-Yaben et al., 2014). While PANAS refers to the original 20-item instrument, the PNA-10 corresponds to a shortened version designed to assess positive and negative affect more efficiently.

Although the PANAS has proven to be a robust tool, its original 20-item format may be less suitable in studies where reducing assessment time is critical to maintaining participant engagement. This is particularly relevant when working with emerging adults, who often face high demands on their time due to academic, work, and social commitments (Petersen et al., 2018), increasing the risk of fatigue or inattentive responding in longer questionnaires. This

highlights the importance of developing brief versions that retain the psychometric strengths of the original instrument while improving feasibility and accessibility for research with this population. In this sense, the development and validation of short forms is not only a practical consideration but also a methodological necessity to ensure data quality in contemporary research contexts characterized by increased participant burden (Clark & Watson, 2019).

In Latin America, the PANAS has been used in various countries, including Argentina (Flores & Medrano, 2016, 2018), Brazil (Nunes et al., 2019), Chile (Dufey & Fernandez, 2012), Colombia, Ecuador (Moreta-Herrera et al., 2021), Mexico (Robles & Páez, 2003), Peru (Gargurevich & Matos, 2012), and Venezuela (Baptista et al., 2020). However, most of these studies have relied on the original 20-item version. Overall, this body of research remains fragmented and methodologically heterogeneous, as most studies are limited to single-country samples and do not allow for direct cross-cultural comparisons. A few exceptions have proposed shortened versions, such as the 10-item form developed by Flores and Medrano (2018) in a sample of university students from Argentina, and the version tested by Ruiz-Pérez et al. (2021), which included participants from Latin America, North America (e.g., the United States and Canada), Europe, and Asia. However, the latter study relied on small subsamples from each country, limiting the generalizability of its findings. Thus, although initial efforts toward shorter versions exist, their empirical support remains limited and inconclusive, particularly in terms of cross-cultural robustness. Hence, despite the growing interest in shorter forms, their use remains limited, particularly in research focused on emerging adulthood.

Although there is a shortened Spanish version of the PANAS developed by Yáñez-Yaben et al. (PNA-10, 2014), which has shown adequate psychometric properties, its use has primarily been limited to adolescent populations. Tay-Karapas et al. (2024), for instance, reported good reliability and validity in Chilean adolescents. However, this version has not yet been validated in samples of emerging adults, nor has it been tested across diverse contexts such as Chile and Ecuador. This represents a critical gap, as the psychometric performance of affect measures may vary across developmental stages and sociocultural contexts, potentially limiting their validity when applied beyond the populations in which they were originally tested.

In addition to the scarcity of abbreviated versions, there is a lack of studies that examine the cross-cultural validity of affect measures in young adults from different Latin American contexts. This is particularly relevant given the importance of understanding how emotional experiences are shaped by sociocultural environments during early adulthood.

Cross-national comparisons, especially between countries like Ecuador and Chile, which share regional and linguistic similarities but differ in certain cultural dimensions such as individualism, power distance, and uncertainty avoidance (The Culture Factor Group, 2023), offer a valuable

opportunity to assess the stability and adaptability of affective measures. While both countries belong to the broader Latin American context, characterized by collectivist values and expressive emotional norms, their emotional and motivational manifestations can differ significantly (Heine & Raineri, 2009; Ruby et al., 2012). It is important to note that not all collectivisms are expressed similarly: in contrast to the more restrained forms observed in East Asian societies, Latin American collectivism tends to be more emotionally expressive (Krys et al., 2022). Even within Latin America, however, important differences remain. For example, Ecuador has higher levels of collectivism than Chile, which may shape affective expression and self-reported well-being in distinct ways (The Culture Factor Group, 2023). These nuances are particularly relevant during emerging adulthood, a life stage when sociocultural norms can significantly influence emotional experiences. In this context, examining whether brief affective measures, such as the PNA-10, function equivalently across culturally similar yet distinct contexts are essential for advancing cross-cultural research in this field and for informing future assessment and intervention efforts during this developmental stage (Cleveland & Goldstein, 2019).

Additionally, potential sex differences in subjective well-being warrant attention. Cross-sectional studies (Joshi, 2010) and meta-analyses have reported either small effect sizes ($d = -0.03$; Batz-Barbarich et al., 2018) or non-significant differences (Buecker et al., 2023) between men and women in subjective well-being. Overall, the evidence suggests that sex differences in subjective well-being are inconsistent and may vary depending on contextual factors such as socioeconomic status, social support, and cultural norms (Chen et al., 2023; Joshanloo & Jovanović, 2020; Wang, 2025). Despite these generally small or inconsistent differences, gendered socialization patterns appear to influence emotional expression. Women tend to report and express more internalizing emotions, such as sadness and anxiety, whereas men may be more likely to express anger or suppress vulnerable emotions due to prevailing social norms (Chaplin, 2015; Perry, 2020). However, most of the available evidence has been derived from studies conducted in the United States, Canada, and European countries, leaving important gaps in understanding how these patterns manifest in Latin American contexts (Batz-Barbarich et al., 2018; Buecker et al., 2023; Leue & Lange, 2011). Within this broader framework of subjective well-being, affective components, specifically positive and negative dimensions, have received comparatively less attention in terms of sex differences. Meta-analytic evidence indicates that no statistically significant differences have been found between men and women in positive and negative affect (Buecker et al., 2023; Leue & Lange, 2011). However, large-scale cross-national research suggests that women may report higher levels of negative affect and, in some contexts, greater overall emotional intensity, encompassing both positive and negative experiences, than men (Blanchflower & Bryson, 2024). Examining sex-related variations in affective experiences

within Latin American contexts using culturally adapted instruments is therefore essential to better understand the intersection of sex, culture, and well-being during emerging adulthood.

In light of these considerations, the main objective of this study is to validate a brief version of the Positive and Negative Affect Scale (PNA-10) in emerging adults from Ecuador and Chile. The specific objectives are: a) to evaluate the factor structure of the PNA-10 using Confirmatory Factor Analysis (CFA) by country and sex; b) to examine multigroup invariance across countries and sex to determine whether the scale assesses positive and negative affect similarly in both contexts and both sexes; c) to compare mean levels of positive and negative affect between Ecuadorian and Chilean participants; and d) to examine sex differences in positive and negative affect among emerging adults as a whole.

Based on the literature described above, we formulated the following hypotheses:

- 1) The PNA-10 will exhibit a two-factor oblique structure (positive affect and negative affect) across all groups.
- 2) The PNA-10 will demonstrate measurement invariance across countries and sex at the configural, metric, scalar and strict levels.
- 3) Cross-cultural differences in latent mean levels of affect will be observed between Ecuadorian and Chilean participants.
- 4) Sex differences in latent mean levels of affect will be observed between men and women participants.

2. Method

2.1 Design

The instrumental design of this study is a descriptive, quantitative and psychometric cross-sectional (Ato et al., 2013).

2.2 Participants

Participants were selected based on predefined inclusion and exclusion criteria. Inclusion criteria were: (a) being between 18 and 29 years old; (b) residing in Chile or Ecuador; and (c) providing informed consent before to participate in the study. Exclusion criteria included: (a) failure to meet the age criteria. These criteria were applied to ensure data quality and the validity of the analyses.

The total sample of emerging adults consisted of 1693 participants aged 18-29 years ($M = 21.94$; $SD = 2.81$). Of these, 983 emerging adults were from Chile ($M = 22.52$; $SD = 2.57$), of whom 56.9% were women. Regarding gender identity, 96% identified as cisgender (male or female). As for sexual orientation, 70.4% self-identified as heterosexual, 4.6% as gay or lesbian, 20.8% as bisexual, and 4.2% as other. Educational attainment varied: 0.3% had completed only primary

education, 35.3% secondary education, and 57.8% higher education (e.g., technical, undergraduate, or postgraduate).

The Ecuadorian sample included 710 emerging adults ($M = 21.13$; $SD = 2.94$), 68.3% of whom were women. Regarding gender identity, only one participant identified as non-binary and one as "other." In terms of sexual orientation, 90.14% identified as heterosexual, 5.91% as bisexual, 1.40% as gay or lesbian, and 2.53% as other. The Ecuadorian sample is made up of university students in this age group, so all participants are at a higher level of education.

2.3 Measures

Positive and Negative Affect Scale (PNA-10; Yáñez-Yáñez et al., 2014), in its adapted and validated version for Chilean adolescents (Tay-Karapas & Yáñez-Yáñez, 2019). This instrument consists of 10 items distributed on two oblique factors. One factor evaluates positive affect (PA), characterized by emotions and expressions such as joy, pride, enthusiasm, energy and pleasure (e.g. "Have you felt full of energy?"). The other factor assesses negative affect (NA), which reflects the presence of negative emotions such as sadness, disgust, lethargy, anxiety and distress (e.g. "Have you felt very worried?"). The PNA-10 is answered on a 4-point Likert scale (1 = never, 4 = almost always). High scores on the PA scale indicate a predominance of positive emotions, while high scores on the NA scale indicate a predominance of negative emotions.

2.4 Procedure

Data were gathered in Chile and Ecuador during 2024 using non-probability sampling methods, specifically convenience and snowball sampling strategies. Participants were invited to take part through online channels, including social media platforms and institutional networks, and completed the study using self-administered questionnaires delivered in an online format. Although an a-priori power analysis was not conducted, the final sample size ($N = 1693$) is considered adequate for confirmatory factor analysis and multigroup invariance testing, based on simulation studies and methodological recommendations indicating that large samples (e.g., $N > 500$) provide stable parameter estimates and sufficient statistical power for complex structural models (Meade et al., 2008).

The Chilean sample adhered to the ethical principles of the Declaration of Helsinki and was approved by the Ethics Committee of the Universidad Católica del Norte [No. 011/2023]. A cross-sectional design was used, using a non-probabilistic convenience sampling to select participants from different regions of the country, with recruitment through social media and snowball sampling by a team of trained recruiters.

Similarly, the Ecuadorian sample followed ethical standards and was approved by the University Welfare Unit of the Universidad Nacional de Loja.

A cross-sectional design was also used, with non-probabilistic convenience sampling to select participants from the southern region of the country. Recruitment was carried out through an informational email, which explained the objectives of the study and the voluntary nature of participation, and invited those interested to complete an online survey.

Participants were assured of the confidentiality and voluntary nature of their participation and were provided with information on where to seek support if they experienced psychological distress. Informed consent was obtained via an online form and those who consented completed a restricted access survey on secure platforms: SurveyMonkey for Chile and Google Forms for Ecuador, ensuring data protection.

2.5 Data analysis

Descriptive statistics were employed to characterize the sample, and Mardia's test was used to assess multivariate normality (Mardia, 1970). To examine the factor structure, a confirmatory factor analysis (CFA) was conducted using the diagonally weighted least squares (DWLS) method available in R (Rosseel, 2012). The DWLS estimator is ideal when the data do not follow a normal distribution (Baghdarnia et al., 2014). This method is recommended when the assumption of multivariate normality is not met. Three CFA models were run: the first for the Chilean sample, the second for the Ecuadorian sample and the third for the combined sample from both countries. A multigroup factorial invariance analysis was then performed to assess the equivalence of the scale between countries and by assigned sex at birth. Configural, metric, scalar, strict, variance, covariance and latent mean invariance levels were assessed to ensure comparability between groups. Model comparisons across increasing levels of invariance were considered acceptable when the chi-square difference test ($\Delta\chi^2$) was not statistically significant ($p > 0.05$) (Asparouhov & Muthén, 2014) and changes in fit indices met the following criteria: $\Delta CFI > -0.01$ and $\Delta RMSEA \leq 0.015$ (Chen, 2007). If scalar invariance was achieved for the ordinal indicators, latent mean comparisons were conducted. This involved fixing the latent means to zero in the reference group and estimating the K parameters in the comparison group. Statistically significant differences ($p < .05$) in K values would indicated meaningful group differences in the latent constructs of positive and negative affect (Sokolov, 2019). For ease of interpretation, the magnitude of these differences was standardized using an effect size estimate, ΔK , analogous to Cohen's d, calculated as the difference in latent means divided by the joint standard deviation of the latent factors. Finally, internal consistency was assessed by calculating Cronbach's alpha and McDonald's omega coefficients (McDonald, 1999). All analyses were conducted on the full sample of participants using R software version 4.3.2 (R Core Team, 2022).

3. Results

3.1 Descriptive analysis

Table 1 presents the descriptive analyses by country and sex. In terms of univariate normality, slight deviations in skewness and kurtosis were observed, indicating a slight violation of univariate normality. On the other hand, multivariate normality showed a non-normal distribution in all samples, indicating that the data did not follow a normal distribution. The results also showed moderate differences between Chile and Ecuador, with Ecuador scoring higher on both positive and negative affect on most items. In addition, men report higher mean scores for positive affect and women report higher mean scores for negative affect.

Table 1.

Descriptive analysis of the Positive and Negative Affect Scale by country and sex

	Chile (N = 983)				Ecuador (n = 710)				Women (N = 1044)				Men (n = 649)			
	M	SD	S	K	M	SD	S	K	M	SD	S	K	M	SD	S	K
Negative Affect																
PNA1	2.38	.93	.27	-.77	2.35	.87	.43	-.47	2.43	.88	.32	-.63	2.27	.93	.40	-.67
PNA2	2.68	.90	-.10	-.82	2.70	.86	-.02	-.79	2.82	.83	-.13	-.75	2.48	.93	.12	-.84
PNA3	2.30	1.02	.19	-1.1	2.54	.93	.02	-.89	2.51	.96	-.02	-.95	2.22	1.03	.33	-1.05
PNA4	2.27	.96	.28	-.86	2.35	.93	.27	-.76	2.38	.93	.35	-.82	2.18	.95	.40	-.75
PNA8	2.48	.94	-.04	-.91	2.64	.97	-.07	-1.02	2.76	.89	-.16	-.82	2.20	.96	.27	-.96
Total	2.42	.71	-	-	2.52	.72	-	-	2.58	.68	-	-	2.27	.075	-	-
Positive Affect	M	SD	S	K	M	SD	S	K	M	SD	S	K	M	SD	S	K
PNA5	2.23	.83	.25	-.48	2.52	.88	.24	-.72	2.27	.82	.35	-.34	2.48	.90	.11	-.76
PNA6	2.41	.81	.09	-.49	2.53	.88	.11	-.74	2.39	.83	.21	-.49	2.59	.85	-.04	-.64
PNA7	2.43	.81	.08	-.48	2.61	.90	.11	-.88	2.47	.84	.21	-.57	2.57	.87	.00	-.69
PNA9	1.86	.83	.65	-.32	2.39	.90	.27	-.67	2.06	.88	.51	-.47	2.11	.92	.45	-.66
PNA10	2.36	.87	.18	-.63	2.81	.94	-.21	-.97	2.53	.92	.09	-.84	2.58	.94	-.02	-.91
Total	2.26	.65	-	-	2.57	.74	-	-	2.34	.69	-	-	2.46	.73	-	-
Mardia		418.67 *	8.65*			680.34*	23.5*			632.35 *	16.7*			428.64*	11.2*	

Note. *p < .001; M = Median; SD = standard deviation, S = Skew; K = Kurtosis.

3.2 Confirmatory factorial analysis

The analysis involved conducting independent confirmatory factor analyses (CFAs) for the two participant groups to assess factorial validity (see Table 2). These analyses were performed using the DWLS method, which is suitable for handling ordinal items and addressing the lack of multivariate normality (Holtmann et al., 2016).

Table 2 shows the goodness of fit indices for the Chilean, Ecuadorian and total samples. All models show a good fit, with CFI and TLI values close to 1 and low SRMR values, indicating a good agreement between the data and the models. The RMSEA values are low, with confidence intervals suggesting a good fit (Brown, 2015; Byrne, 2008). In terms of internal consistency, Cronbach's alpha (PA = >.85, AN = >.81) and McDonald's omega (PA = >.87, AN = >.84) coefficients indicate high reliability in all samples. The overall results support the validity of the models for all three samples.

Table 2.

Fit indices by country, sex, and total samples

By country	$\chi^2(df)$	CFI	TLI	SRMR	RMSEA (CI ₉₀)	AP		AN	
						<i>a</i>	<i>w</i>	<i>a</i>	<i>w</i>
Chile	268.16(34)*	.986	.982	.067	.084 (.075 - .094)	.85	.87	.81	.84
Ecuador	192.60(34)*	.992	.990	.058	.081 (.070 - .092)	.88	.90	.85	.89
By sex	$\chi^2(df)$	CFI	TLI	SRMR	RMSEA (CI ₉₀)	AP		AN	
						<i>a</i>	<i>w</i>	<i>a</i>	<i>w</i>
Women	303.30(34)*	.986	.982	.065	.087 (.078 - .096)	.87	.88	.81	.85
Men	218.70(34)*	.988	.984	.074	.092 (.081 - .104)	.88	.89	.84	.87
Total sample	489.84(34)*	.987	.983	.067	.089 (.082 - .096)	.87	.89	.83	.86

Note. * $p < .001$; χ^2 = Chi-square; df = Degrees of freedom; CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; SRMR = Standardized Root Mean Square Residual; RMSEA = Root Mean Square Error of Approximation; AP = Positive Affect; AN = Negative Affect; *a* = Cronbach's alpha; *w* = McDonald's omega.

Figure 1 and Figure 2 shows the factor loadings, errors and covariance of the latent factors for the country, sex and total samples. In general, it can be seen that both factor loadings and errors are within the expected parameters, which supports the validity of the scale by country and sex samples. In addition, the covariation of the factors is significant ($p < .01$), indicating that one construct is measured by two different latent variables.

Figure 1.

Factor loadings of the Positive and Negative Affect Scale: Chile (left), Ecuador (center) and total sample (right)

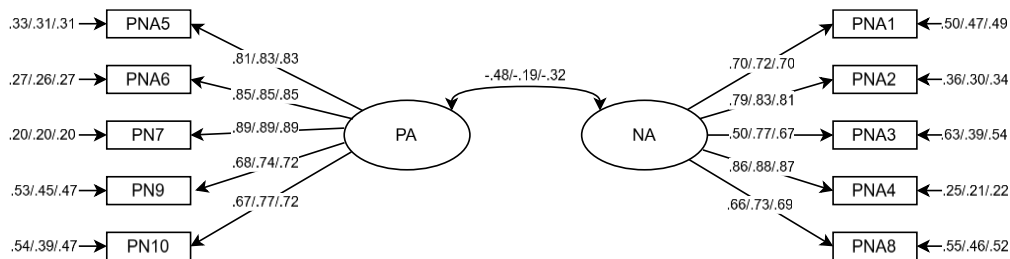
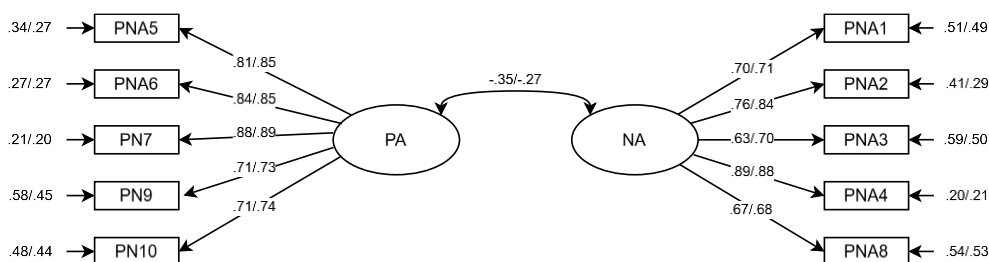


Figure 2.

Factor loadings of the Positive and Negative Affect Scale: women (left), men (right)



3.2 Multi-group factorial invariance and its differences by country and sex assigned at birth

The multigroup factor invariance analysis was conducted to examine measurement invariance across country and sex assigned at birth. Fit indices difference tests were employed to assess various levels of invariance, including configural, metric, scalar, strict, variance, covariance and latent mean invariance (see Table 3).

Results at the country level showed that configural invariance was established, indicating that the factorial structure is equivalent in both groups. Metric invariance was also confirmed, suggesting that the strength of the relationship between items and their corresponding factors was consistent across countries. Scalar invariance, which evaluates the equality of item thresholds in categorical data, was also supported, indicating that the response categories functioned similarly across groups. This allows for valid comparisons of latent means. The model also supported strict invariance, suggesting that the residual variances of the items were equal between groups. Subsequent restrictions on latent variances, covariances and latent means produced changes in fit indices within acceptable parameters ($\Delta CFI < .01$; $\Delta RMSEA < .015$). Overall, these findings indicate that full measurement invariance was achieved across countries, including equivalence in the factorial structure, loadings, thresholds, residuals, latent variances, covariances, and means. Results by sex assigned at birth supported configural, metric, scalar,

strict, and latent variance and covariance invariance, indicating that the measurement model operates equivalently across women and men in terms of factor structure, factor loadings, item thresholds, residuals, and latent variances/covariances. However, latent mean invariance was not supported ($\Delta\text{CFI} = -.010$; $\Delta\text{RMSEA} = .021$), suggesting significant differences in the average levels of the latent constructs between sexes.

Table 3.

Multigroup factor invariance analysis by country and sex assigned at birth

Country	$\chi^2(\text{gl})$	CFI	TLI	RMSEA (CI ⁹⁰)	$\Delta\chi^2(\Delta\text{gl})$	ΔCFI <.01	ΔRMSEA <.015
Configural	460.76(68)*	.989	.986	.083 (.076 -.090)			
Metric	499.56(76)*	.989	.986	.081 (.075 -.088)	38.79(8)**	.000	-.002
Scalar	678.74(94)*	.984	.985	.086 (.080 -.092)	179.18(18)**	-.005	.005
Strict	767.53(104)*	.982	.985	.087 (.081 -.093)	88.79(10)**	-.002	.001
Variiances	858.25(106)*	.980	.983	.092 (.086 -.098)	90.71(2)**	-.002	.005
Covariiances	1098.08(107)*	.973	.978	.105 (.099 -.111)	239.84(1)**	-.007	.013
Means	1170.66(106)*	.971	.976	.109 (.104 -.115)	72.58(1)**	-.002	.004
Sex assigned at birth	$\chi^2(\text{gl})$	CFI	TLI	RMSEA (CI ⁹⁰)	SB $\Delta\chi^2(\Delta\text{gl})$	ΔCFI <.01	ΔRMSEA <.015
Configural	522.01(68)*	.987	.983	.089 (.082 -.096)			
Metric	532.22(76)*	.987	.985	.084 (.078 -.091)	10.20(8)	.000	-.005
Scalar	640.37(94)*	.984	.985	.083 (.077 -.089)	108.15(8)**	-.003	-.001
Strict	661.63(104)*	.984	.986	.080 (.074 -.086)	21.25(10)*	.000	-.003
Variiances	858.25(106)*	.982	.985	.083 (.078 -.089)	63.24(2)**	-.002	.003
Covariiances	737.07(107)*	.982	.985	.084 (.078 -.089)	12.19 (1)**	.000	.001
Means	708.002(99)*	.972	.976	.105 (.099 -.110)	348.41(1)**	-.010	.021

Note. * $p < .05$; ** $p < .001$; SB χ^2 = Chi-square; df = degrees of freedom; CFI = comparative fit index; RMSEA = root mean square error of approximation; $\Delta\chi^2$ = change in chi-square difference; Δgl = change in degrees of freedom; ΔCFI = change in Comparative fit index; ΔRMSEA = change in Root mean error of approximation.

3.3 Country and sex differences

Scalar invariance was established across countries, allowing for latent mean comparisons. Participants from Chile reported significantly lower levels of both positive ($K = -0.648, p < .001, \Delta K = .23$) and negative affect ($K = -0.160, p < .001, \Delta K = .07$) compared to participants from Ecuador. When comparing groups by sex assigned at birth, latent mean invariance was not supported ($\Delta CFI = -0.010; \Delta RMSEA = 0.021$), suggesting potential bias in comparing latent means. Nonetheless, exploratory comparisons showed that men scored significantly higher on positive affect ($K = 0.267, p < .001; \Delta K = .09$), while women scored significantly higher on negative affect ($K = -0.518, p < .001; \Delta K = .24$). Differences in latent means of positive and negative affect between countries and between sexes were statistically significant, but small in magnitude, suggesting modest effects in practical terms.

4. Discussion

The main objective of this study was to validate a brief version of the Positive and Negative Affect Scale (PNA-10) in emerging adults from Chile and Ecuador, examining its equivalence across country and sex assigned at birth. In terms of its factorial structure, results showed that the two-factor oblique model (positive affect and negative affect) adequately fit the data in all samples, supporting the structural validity of the scale in these contexts. Our findings are consistent with previous research that has also confirmed the two-dimensional structure of the scale (Arancibia, 2019; Flores-Kanter et al., 2021; García & Arias, 2019; Moreta-Herrera et al., 2021; Tay-Karapas & Yáñez-Yáñez, 2019; Vera-Villaruel et al., 2019; Yáñez-Yáñez et al., 2014). In this regard, the current study contributes to the literature by providing evidence of the structural validity of a brief affect measure in emerging adults from Latin America, a population that remains underrepresented in psychometric research.

In relation to the multigroup invariance of the PNA-10, this was assessed to determine whether the scale measures the same constructs across the cultural contexts of Chile and Ecuador, as well as across sexes. The results supported configural, metric, scalar, and strict invariance by country, indicating that the factor structure and item functioning of the PNA-10 were equivalent in both national samples. Achieving metric invariance allows for meaningful comparisons of relationships between positive and negative affect and other variables across countries, while scalar invariance further supports the validity of comparing latent mean levels. This finding is consistent with the study by Moreta-Herrera et al. (2021), who found strict invariance of the 20-item PANAS in Colombian and Ecuadorian university students. Similarly, the study by Ruiz-Pérez et al. (2021), conducted with participants from several Latin American countries, reported good psychometric results for a reduced version of the PANAS. Unlike those studies, however,

the present research focused specifically on emerging adults, employed a validated 10-item version, and demonstrated full invariance, thus strengthening the case for cross-national comparability of affective measures in Latin America. These results contribute to the growing effort to develop brief, psychometrically sound tools that are appropriate for use in diverse sociocultural contexts.

The results of the latent means analysis revealed that participants from Ecuador reported slightly higher scores than those from Chile in both affectivity dimensions. These findings indicate that Ecuadorian emerging adults experience and report higher levels of both positive and negative affect compared to their Chilean counterparts. This pattern underscores the role of sociocultural context in shaping affective experiences, highlighting the importance of using culturally validated instruments when comparing emotional well-being across countries. The observed pattern aligns with previous research showing that positive affect and negative affect vary across cultural settings (Quirin et al., 2018). For instance, Latin American cultures are often characterized by a strong orientation toward positive emotional expression (Sirgy, 2021), which may partly explain the elevated PA levels in Ecuador (Larco et al., 2024). In addition, Ecuador's stable collectivist values may foster higher emotional intensity through strong community networks and interpersonal closeness (Helliwell et al., 2024; The Culture Factor Group, 2023). However, persistent socioeconomic inequalities may contribute to heightened negative affect as well, reflecting emotional ambivalence within the population.

In contrast, Chile exhibits a relatively more individualistic cultural profile compared to Ecuador (The Culture Factor Group, 2023). While this shift has been associated with increases in positive affect linked to personal achievement and autonomy (Minkov, 2018), it may also result in lower emotional expressiveness overall, due to increased stress, economic pressure, and weakened community ties. Recent regional surveys have consistently demonstrated that levels of subjective well-being in Chile are comparatively lower than those observed in other Latin American countries. In 2018, 67.4% of Chileans reported being satisfied with their lives, compared to 72.2% of Ecuadorians, placing Chile in 13th position and Ecuador in 10th within the regional ranking (Rojas & Charles-Leija, 2022). These cross-national differences highlight the relevance of sociocultural dynamics in shaping how young people experience and report their emotions. However, this remains a tentative explanation that requires further investigation in future studies. Specifically, future studies could explore the sociocultural mechanisms underlying these affective variations, such as the role of collectivism, individualism, socioeconomic conditions, and social support systems in shaping emotional expression and well-being. Such inquiries would deepen our understanding of how context influences the affective lives of emerging adults in culturally diverse settings.

Regarding sex-based comparisons, the results indicate that the PNA-10 functions similarly for men and women, meaning that the scale measures the same underlying constructs in both groups (Parra-Gaete et al., 2025). This equivalence allows for meaningful comparisons in the levels of positive and negative affect across sexes. Although the scale measures the same constructs across sexes, the findings suggest that positive and negative affect are experienced differently by men and women: men generally reported higher levels of positive affect, while women reported higher levels of negative affect. These findings are consistent with previous studies suggesting that men tend to experience higher levels of subjective well-being than women, with low effect sizes (Haring et al., 1984; Pinqart & Sorensen, 2001). More recent cross-sectional studies (Joshi, 2010) and meta-analyses have reported no significant differences between men and women in positive and negative affect (Buecker et al., 2023; Leue & Lange, 2011), highlighting the inconsistency of these findings. In contrast, meta-analytic evidence on life satisfaction component of the subjective well-being has shown slightly higher levels among men, although the effect size is very small ($d = -0.03$; Batz-Barbarich et al., 2018), consistent with the magnitude observed in the present study. Similarly, cross-national evidence has reported small differences in subjective well-being, with women showing slightly lower levels than men ($d = -0.07$; Chen et al., 2023), although not all studies report effect sizes (Joshi & Jovanović, 2020; Wang, 2025). Despite the variability in findings, large-scale cross-national research based on multiple indicators of subjective well-being has shown that women tend to report both higher levels of negative affect and, in some contexts, greater emotional intensity overall, including both positive and negative experiences (Blanchflower & Bryson, 2024). These findings highlight the importance of taking sex into account when analyzing the emotional dimensions of subjective well-being, as the observed differences may reflect socio-cultural influences that shape emotional expression differently between the sexes.

This study offers several important contributions to the understanding of subjective well-being through its affective component. First, the validation of the PNA-10 offers a brief, reliable, and culturally sensitive tool that can be used in academic, clinical, and public health settings to monitor emotional well-being among emerging adults. Its brevity makes it especially suited for large-scale surveys or repeated assessments where participant burden must be minimized. Furthermore, establishing cross-cultural validity is crucial for enabling meaningful comparisons across Latin American countries, contributing to a more nuanced understanding of affective well-being in the region. Second, the study highlights meaningful differences in emotional experiences across countries and sexes, with evidence of scalar invariance supporting valid interpretation of these group differences. At the same time, the observed differences in affect levels between countries open important avenues for future research.

The present study has several limitations that should be taken into account in future research. First, although the sample included participants from both countries, the use of non-probabilistic convenience sampling may limit the generalizability of the findings and introduce potential bias. In this regard, future studies should include more diverse and representative samples, such as clinical populations or people at different stages of life, to strengthen the external validity of the results.

Beyond the limitations of the present study, several avenues for future research emerge. First, longitudinal designs are needed to examine the temporal stability of the PNA-10 and to better understand how affective experiences evolve throughout emerging adulthood. Second, future studies could extend the validation of this instrument to clinical populations and to individuals at different life stages, in order to evaluate its applicability across a broader range of contexts. Third, further research should explore the role of sociocultural variables, such as socioeconomic status, social support, and cultural values, in shaping affective experiences and their measurement. Finally, expanding cross-cultural comparisons to include additional Latin American countries would contribute to a more comprehensive understanding of the generalizability and cultural sensitivity of brief affect measures. Despite these limitations, the results suggest that the scores obtained from the PNA-10 provide a reliable and valid measure of positive and negative affect in emerging adults in Chile and Ecuador.

Ethical approval

Ethical approval was obtained from the Ethics Committee of the Universidad Católica del Norte, Chile (official document number: 011/2023).

Informed Consent Statement

Informed consent was obtained from all subjects involved in the study.

Data Availability Statement

The datasets used during the current study are available from the corresponding author on reasonable request.

Conflict of interest statement

The authors declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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Authors' Contribution

OV-B: Conceptualization, Methodology, Software, Validation, Formal analysis, Investigation, Resources, Data curation, Writing – original draft, Writing – review & editing, Visualization, Project administration; MG-G: Conceptualization, Investigation, Writing – original draft, Writing – review & editing, Supervision, Funding acquisition; FC-B, NM-S, RM-H and KT-K: Conceptualization, Writing – original draft, Writing – review & editing and Visualization.

AI Disclosure Statement

The authors declare that no artificial intelligence (AI) tools, including generative AI systems, were used in the conception, design, analysis, interpretation of data, drafting, or writing of this manuscript. All intellectual content, scientific reasoning, and manuscript preparation were carried out solely by the authors.

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