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Original

Is a Global Measure of Anger Proneness Truly Comparable in Latin America? An Analysis of the Measurement Invariance of García's Anger Proneness Scale (APS-G) in Six Latin American Countries

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A B S T R A C T

Anger is a negative emotion often associated with mental or psychological distress. This study examines anger proneness from a psychometric perspective, aiming to gather evidence on the internal structure and measurement invariance of the García's Anger Proneness Scale (APS-G) in a sample of 2,513 individuals from six Latin American countries (El Salvador, Paraguay, Chile, Colombia, Bolivia, and Peru). First, structural equation modeling (SEM) was used to assess the internal structure of the latent construct of anger proneness. Second, measurement invariance across countries was evaluated using traditional multigroup confirmatory factor analysis (MGCFA) and the alignment method (CFA-MIAL). Results showed that the fit indices of the APS-G unidimensional model were adequate in all participating countries. According to the MGCFA, measurement equivalence was supported at the configural and metric levels across the six countries; however, scalar invariance thresholds were not met. Using the CFA-MIAL method, approximate invariance of the APS-G was observed among the six countries. Cross-national comparisons of anger proneness scores revealed generally negligible differences. In conclusion, the APS-G demonstrates approximate invariance across different countries and is therefore suitable for use in cross-national studies on mental health in Latin American contexts.

Palabras clave:
Alineamiento
Invarianza de la medición
Latinoamérica
Propensión a la ira

¿Es una medida global de propensión a la ira verdaderamente comparable en América Latina? Un análisis de la invariancia de la medición de la Escala de Propensión a la Ira de García (APS-G) en seis países latinoamericanos

R E S U M E N

La ira es una emoción negativa considerada como un indicador de salud mental. El presente estudio investiga la propensión a la ira desde un enfoque psicométrico para obtener evidencia de la estructura interna e inva-

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rianza de la medición de la García's Anger Proneness Scale (APS-G) en 2513 personas de seis países latinoamericanos (El Salvador, Paraguay, Chile, Colombia, Bolivia y Perú). En primer lugar, se utilizó la metodología de modelos de ecuaciones estructurales (SEM) para identificar las propiedades de la estructura interna del constructo latente propensión en la ira; en segundo lugar, se examinó la invariancia de la medición según el país con el análisis factorial confirmatorio multigrupo tradicional (MGCFA) y método de alineamiento (CFA-MIAL). Los resultados indicaron que los índices de ajuste del modelo unidimensional de la APS-G son adecuados en todos los países participantes. De acuerdo con el MGCFA existe una equivalencia de medida para los seis países a nivel configural y métrico; sin embargo, a nivel de invarianza escalar, los valores superan los puntos de corte. Según el método CFA-MIAL existe una invarianza aproximada de la APS-G entre los seis países. La comparación de los puntajes de la propensión a la ira entre países indica que, en general, las diferencias son irrelevantes. En conclusión, la APS-G presenta invarianza aproximada entre diferentes países, por lo que puede aplicarse en estudios transnacionales sobre la salud mental en países latinoamericanos.

Introduction

Anger is considered a negative emotion that, alongside symptoms of depression and anxiety, is often associated to mental health distress (García-Cadena et al., 2018). However, it is essential to distinguish between state anger—defined as a brief and situational expression of varying intensity, triggered by real or perceived harm and capable of obstructing goal achievement—and trait anger, considered as a relatively enduring personality characteristic also known as anger proneness (Spielberger & Reheiser, 2010). While anger is often seen as negative, it can be adaptive when properly regulated, as it may promote personal safety and goal attainment (Moeller & Bech, 2019). However, when anger occurs frequently, with high intensity, and leads to excessive aggressive behaviors, it may be considered a clinically relevant issue (Novaco & Taylor, 2016). Thus, the core problem lies not in anger itself, but in its dysregulation, which can have significant consequences for human behaviors and mental health (Moeller & Bech, 2019).

Numerous studies have explored the associations between anger and various mental and behavioral disorders, including depression and anxiety (Alagöz et al., 2025; Goulart et al., 2021; Lindert et al., 2021), alcohol misuse (Kim et al., 2021; Miloslavich et al., 2023), and alcohol-related aggression (Grom et al., 2021; Jones et al., 2022), as well as drug dependence (Laitano et al., 2021). Anger has also been associated with risky driving and cycling behaviors that threaten traffic safety and personal well-being (Deffenbacher et al., 2016; Nesbit et al., 2007; O'Hern et al., 2019; Stephens et al., 2024). Furthermore, anger is a characterizing symptom in various mental disorders, such as post-traumatic stress disorder, psychotic disorders, bipolar disorder, and borderline personality disorder (Fernandez & Johnson, 2016; Novaco, 2010; Novaco & Whittington, 2013; Oliva et al., 2023). Despite its relevance, the international scientific interest and research evidence have been decreasing over the last decade (Umbra & Fasbender, 2025). A deeper understanding and measurement of this emotion is of interest as well as it is mandatory to prioritize research evidence on anger, given its association with the onset and persistence of mental disorders and its impact on individual functioning (Cankardaş & Şalcıoğlu, 2021).

Currently, a set of validated, self-report instruments are employed for assessing anger, such as the widely used State-Trait Anger Scale (Spielberger, 1983) and the State-Trait Anger Expression Inventory (Spielberger, 1991). Other employed tools include the Novaco Anger Scale and Provocation Inventory (Novaco, 2003), the Anger Self-Report (Reynolds et al., 1994), the Angry Aggression Scale (Bjørnebekk & Howard, 2012), the Dimensions of Anger Reactions (Forbes et al., 2014), and the Anger Regulation and Expression Scale (DiGiuseppe & Tafrate, 2011). An updated list of self-report measures of anger used globally is available in the review provided by Umbra and Fasbender (2025). Many of these instruments assess anger as a trait, a state, or both; however, some are quite lengthy, such as the Anger Regulation and Expression Scale with 76 items (DiGiuseppe & Tafrate, 2011) or the Reaction Inventory with 40 items (Evans & Stangeland, 1971). Also, in terms of theoretical models underpinning these tools, a significant variety of constructs exists. For instance, instruments like the State-Trait Anger Scale (Spielberger et al., 1983), State-Trait Anger Expression Inventory (Spielberger, 1991), and Novaco Anger Scale and Provocation Inventory lack a clearly defined theoretical basis (Umbra & Fasbender, 2025). Others, such as the Facets of Emotional Experiences in Everyday Life Scale (Chung et al., 2022), are based on the circumplex and differential emotions models, while yet others draw from the cognitive-motivational-emotive system model (Umbra & Fasbender, 2025). Cognitive models emphasize perceived unpleasantness and the sources of frustration (Wilkowski & Robinson, 2010), whereas metacognitive models define anger as the outcome of maladaptive cognitive regulatory strategies that perpetuate emotional dysregulation (Caselli et al., 2017). Nevertheless, both cognitive and metacognitive models have been criticized for failing to capture the full complexity of anger, particularly by omitting essential physiological and behavioral components (Cox & Harrison, 2008; Martin et al., 2000). In contrast, behavioral models explain anger as a function of its contingencies (Harmon-Jones, 2003).

Despite the range of explanatory models, Umbra and Fasbender (2025) reported that of the 18 self-report measures for anger available globally, 12 lack a theoretical foundation. In this context, a brief measure of anger proneness was recently developed in Latin America based on an inter-behavioral perspective: the García's Anger Proneness Scale (APS-G; García-Cadena et al., 2018). According to the inter-behavioral model (Kantor, 1959, 1969; Ribes-Iñesta, 2009), individuals experience anger proneness in specific situations—such as when events do not unfold as expected or when they are contradicted (García-Cadena et al., 2018). These episodes of anger are generated by environmental conditions related to the individual reactive history. The appropriate linkage between stimulus and response functions within a given setting enables fluid interaction between person and environment (Kantor, 1959, 1969; Ribes-Iñesta, 2007).

The APS-G is a reliable and valid tool for assessing anger proneness, developed for use in research and screening within Spanish-speaking populations (García-Cadena et al., 2018). Unlike many existing instruments, the APS-G is brief and easy to administer, making it suitable for both clinical and large-scale research contexts. In recent years, brief instruments have become increasingly common for measuring psychological constructs in both clinical and non-clinical settings (Kruyen et al., 2013). Short measures reduce assessment time and associated costs (Kemper et al., 2019), increase participation rates (Edwards et al., 2004), and help prevent fatigue or other adverse reactions that could compromise data quality (Credé et al., 2012). The brevity of the APS-G also facilitates its use in large

observational studies. These strengths have led to the growing use of this instrument across Latin American populations, including older adults (Caycho-Rodríguez et al., 2021), university students (Caycho-Rodríguez et al., 2019), and the general population (García-Cadena et al., 2018). Moreover, the APS-G has been used in relational models involving variables such as optimism, life satisfaction, anxiety, depression, mindfulness, and patience across several Latin American countries (Caycho-Rodríguez et al., 2019; Garcia-Cadena et al., 2021; García-Cadena et al., 2024).

Unlike the instruments discussed by Umbra and Fasbender (2025), it is worth noting that the APS-G was originally developed in Spanish, facilitating its use and adaptation across more than 20 Spanish-speaking countries in North, Central, and South America, and the Caribbean (Moscoso & Spielberger, 2011). Currently, nearly 591 million people speak Spanish as a first, second, or foreign language. Spanish is also the second most spoken language in terms of native speakers (over 499 million) and ranks third globally in international presence after English and French (Lengua Viva, 2024). Despite the socio-cultural diversity among Hispanic populations, it is relevant the adoption of a measure that allows for unbiased cross-country comparisons of anger proneness. Although there is biological universality in the expression and recognition of anger (Ekman, 1999), cultural contexts can modulate its expression, leading to intercultural variation in how anger manifests (Matsumoto et al., 2010). Thus, in addition to biological factors, sociocultural environments either promote or suppress the experience of anger through norms and values (Ramírez et al., 2001). Each cultural and social context provides a normative framework that defines acceptable behaviors and enables individuals to learn and apply such norms to make contextually appropriate decisions when faced with anger-provoking situations. These culturally appropriate responses are aimed at maintaining social order (Matsumoto & Yoo, 2006). For example, in the United States, the appropriate experience and expression of anger is seen as a marker of healthy and mature self-expression, while its suppression may be viewed as harmful (Shweder et al., 2008). In contrast, in Japan, expressing anger is seen as a threat to interpersonal harmony, and socialization practices aim to avoid confrontational interactions (Boiger et al., 2013; Trommsdorff & Kornadt, 2003). This highlights the significant cultural variability in the social acceptability of anger expression, which tends to be more tolerated in individualistic than in collectivistic societies (Niedenthal et al., 2006).

Some cross-cultural studies examining variability in anger components have included Spanish-speaking Latin American countries. Scherer and Wallbott (1994) explored 37 countries, including Chile, Costa Rica, El Salvador, Guatemala, Honduras, Mexico, and Venezuela, and reported greater intercultural differences in verbal expression of anger compared to non-verbal expression and physiological responses. Matsumoto et al. (2007), across 36 countries, reported that the country of origin accounted for 2- 7% of variance in anger components, with higher percentages for verbal expression and lower for physiological expression. Another study involving university students from 25 countries—including Argentina, Bolivia, Chile, Colombia, El Salvador, and Peru—reported that verbal and cognitive reactions to anger exhibited greater cross-cultural variability, while self-control mechanisms showed the least variability (Alonso-Arbiol et al., 2011). However, very few studies have investigated whether the components of anger vary in the same way across different Latin American countries using self-report instruments.

The comparison of mean scores obtained from a self-report scale is usually valid only if there is evidence that the scale assesses the same construct—anger proneness, in this case—in a comparable manner across all groups or countries. Measurement invariance (MI) denotes the extent to which a given measure operates equivalently across different populations or contexts (Meredith, 1993; Leitgöb et al., 2023). Evaluating MI includes comparing a hypothesized measurement model—which describes the theoretical relationship between scale items and the underlying construct—across two or more groups. One of the most widely used methods for assessing MI is the multigroup confirmatory factor analysis (MGCFA), which determines whether the factor structure of a measure is consistent across groups (Jöreskog et al., 2000). MGCFA typically tests four hierarchical levels of invariance: configural, metric, scalar, and strict invariance (Vandenberg & Lance, 2000). Configural invariance allows free estimation of parameters across groups and indicates a generally similar model structure. Metric invariance assumes equal factor loadings across groups, allowing comparison of unstandardized regression coefficients and/or covariances. Scalar invariance adds the constraint of equal item intercepts, permitting comparison of latent means and variances across groups. However, achieving scalar invariance is considered unrealistic, especially when many groups are involved (Boer et al., 2018; Fischer & Karl, 2019).

Despite its popularity, MGCFA has been criticized for its rigidity in studies involving numerous groups (Immekus, 2021; Rutkowski & Svetina, 2014). Scalar invariance is also rarely achieved when comparing many groups (Cieciuch et al., 2019; Davidov et al., 2014; Marsh et al., 2018). Fit indices such as CFI and RMSEA may not perform well in such comparisons, leading to model adjustments that increase the risk of model misspecification (Asparouhov & Muthén, 2014). Moreover, conventional cut-off values for assessing invariance (e.g., $\Delta CFI \leq .01$) may be overly stringent when the number of groups is large (Kim et al., 2017; Rutkowski & Svetina, 2014). To address these limitations, the alignment method was developed (Asparouhov & Muthén, 2014, 2023). This method estimates group-specific factor means and variances without requiring exact MI, tolerating small discrepancies (Cintron et al., 2023; Fischer & Karl, 2019). Alignment is thus a more realistic approach for evaluating MI in cross-national studies (Muthén & Asparouhov, 2012). The alignment method (CFA-MIAL) assumes that a configurally appropriate model with minimal differences in factor loadings and intercepts is sufficient for comparing latent means across groups (Luong & Flake, 2023). Specifically, CFA-MIAL identifies a configural model with minimal non-invariance and optimizes it using a loss function to reduce non-invariance in factor means and variances across groups (Asparouhov & Muthén, 2014). Invariance is then evaluated using the R^2 index, with values closer to 1 indicating higher invariance (Asparouhov & Muthén, 2014). A non-invariance rate below 25% is generally considered acceptable for reliable comparisons of factor means and variances (Flake & McCoach, 2018; Muthén & Asparouhov, 2014).

Establishing MI is crucial in the transnational adaptation of self-report measures, as it provides evidence for construct validity (Hambleton & Lee, 2013). It also clarifies whether observed group differences are real or merely reflect measurement bias (Boer et al., 2018). Lack of MI is one of the most serious sources of error in adapting emotional measures across countries and may lead to invalid conclusions about the magnitude of construct differences (Moscoso & Spielberger, 2011).

In this context, the aim of our study was to examine the factor structure of the APS-G and provide evidence of its MI across samples from six Spanish-speaking Latin American countries. The hypothesis was that the meaning and structure of the APS-G would be similar across all countries assessed. This would support the scale validity and enhance its future applicability in multilevel and multicultural studies. Emphasizing MI allows to compare the construct of anger proneness and test its consistent meaning across national contexts .

Methods

Participants and Procedure

A total of 2,513 individuals from six Latin American countries (El Salvador, Paraguay, Chile, Colombia, Bolivia, and Peru) were included in the study. In each country, participants completed the APS-G, which was part of a larger research project titled *"Cross-cultural measurement of patience and associated factors."* This project was approved by the Chair of Medical Psychology of the Faculty of Medical Sciences at the National University of Asunción, under Resolution No. 0708-00-2022 of the Faculty's Board of Directors (ethical approval No. 001-007-2024). The study was conducted in accordance with the principles of the Declaration of Helsinki.

Data collection was carried out using an online survey created via Google Forms. Participants were invited to respond through social media and personal e-mail from July 31 to September 6, 2024. All participants were selected through non-probabilistic snowball sampling, which involved asking respondents to forward the survey to family members, friends, or other contacts who met the following inclusion criteria (Hernández-Ávila & Escobar, 2019): (a) over 18 years old; (b) being able to complete online surveys; and (c) providing informed consent. All participants responded voluntarily, provided an informed consent, and received no monetary compensation. Data were alphanumerically coded to ensure anonymity.

Of the participants, 63.9% were women, 35.2% men, and 0.80% preferred not to say or be identified as another gender. The average age was 31.9 years old (standard deviation [SD] = 11.60). Across all countries, most participants were single (ranging from 47.2% to 76.9%) or married (ranging from 11.2% to 31.9%). Most participants also reported having permanent employment (33.2% to 83.6%). Additionally, the majority had completed or partially completed university education, lived in urban areas, and did not report having a chronic illness. Sociodemographic characteristics by country are presented in Table 1.

Table 1.
Sociodemographic Characteristics of Participants from Six Latin American Countries

	El Salvador (*n* = 510)		Paraguay (*n* = 540)		Chile (*n* = 379)		Colombia (*n* = 363)		Bolivia (*n* =369)		Peru (*n* = 352)	
	n	%	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Age (M±SD)	30.89	10.50	30.54	10.05	41.35	10.63	27.72	12.66	33.55	11.27	28.48	9.71
Gender												
Female	282	55.29	388	71.85	239	63.06	221	60.88	248	67.21	230	65.34
Male	225	44.12	147	27.22	139	36.68	135	37.19	120	32.52	119	33.81
Other	2	0.39	0	0.00	1	0.26	1	0.28	0	0.00	2	0.57
Prefer not to say	1	0.20	5	0.93	0	0.00	6	1.65	1	0.27	1	0.28
Marital Status												
Single	344	67.45	359	66.48	179	47.23	274	75.48	205	55.56	271	76.99
Married	112	21.96	105	19.44	116	30.61	41	11.29	118	31.98	48	13.64
Widowed	5	0.98	0	0.00	3	0.79	5	1.38	1	0.27	3	0.85
Divorced	5	0.98	20	3.70	31	8.18	10	2.75	19	5.15	3	0.85
Cohabiting	28	5.49	46	8.52	45	11.87	20	5.51	22	5.96	21	5.97
Other	16	3.14	10	1.85	5	1.32	13	3.58	4	1.08	6	1.70
Employment												
Unemployed	116	22.75	94	17.41	36	9.50	145	39.94	91	24.66	124	35.23
Retired	16	3.14	8	1.48	0	0.00	12	3.31	5	1.36	5	1.42
Permanent job	309	60.59	355	65.74	317	83.64	121	33.33	193	52.30	117	33.24
Temporary job	69	13.53	83	15.37	26	6.86	85	23.42	80	21.68	106	30.11
Education												
Completed primary education	14	2.75	2	0.37	1	0.26	3	0.83	0	0.00	1	0.28
Incomplete primary education	6	1.18	0	0.00	0	0.00	2	0.55	0	0.00	0	0.00
Completed secondary education	90	17.65	51	9.44	9	2.37	88	24.24	37	10.03	41	11.65
Incomplete secondary education	30	5.88	10	1.85	1	0.26	15	4.13	8	2.17	7	1.99
Completed technical studies	46	9.02	11	2.04	28	7.39	43	11.85	53	14.36	21	5.97
Incomplete technical studies	4	0.78	1	0.19	4	1.06	2	0.55	11	2.98	8	2.27
Completed university education	146	28.63	290	53.70	318	83.91	96	26.45	184	49.86	161	45.74
Incomplete university education	174	34.12	175	32.41	18	4.75	114	31.40	76	20.60	113	32.10
Area of Residence												
Urban	381	74.71	501	92.78	351	92.61	349	96.14	329	89.16	302	85.80
Rural	129	25.29	39	7.22	28	7.39	14	3.86	40	10.84	50	14.20
Chronic Illness												
Yes	64	12.55	75	13.89	103	27.18	40	11.02	48	13.01	29	8.24
No	446	87.45	465	86.11	276	72.82	323	88.98	321	86.99	323	91.76

Instruments

Sociodemographic Survey. A sociodemographic questionnaire was specifically developed for this study to collect information on country of residence, age, sex, marital status, type of employment, socioeconomic level, area of residence, and the presence of chronic illness.

García's Anger Proneness Scale (APS-G)(García-Cadena et al., 2018). The APS-G consists of four items that assess anger proneness. Participants respond using a six-point Likert scale ranging from "Definitely not = 0" to "Definitely yes = 5." The sum of the item scores yields a total score ranging from 0 to 20, with higher scores indicating greater anger proneness. The APS-G was originally developed in Mexican Spanish and showed adequate reliability, construct validity, convergent and discriminant validity, and gender invariance (García-Cadena et al., 2018).

Data Analysis

First, descriptive statistics were calculated for each item, including the mean, standard deviation, skewness, and kurtosis for each country separately. Values of skewness and kurtosis exceeding ±1.5 were considered indicative of non-normality (Pérez & Medrano, 2010). Confirmatory factor analyses (CFA) were then conducted independently for each country, testing a one-factor structure for the four items. Model fit was evaluated using the Comparative Fit Index (CFI > .95), Tucker-Lewis Index (TLI > .95), Root Mean Square Error of Approximation (RMSEA < .08), and Standardized Root Mean Square Residual (SRMR < .08), based on Hu & Bentler (1999). Robust versions of CFI, TLI, and RMSEA were used because the estimation method applied was Robust Maximum Likelihood (MLR; Brosseau-Liard & Savalei, 2014). Although WLSMV is recommended for ordinal items (Li, 2016), MLR yields similar results with scales having more than five response options (Rhemtulla et al., 2012) and is more appropriate for invariance testing, since WLSMV tends to increase Type I and II errors when ΔCFI is used as the criterion for detecting non-invariance (Sass et al., 2014). Furthermore, given the small number of items and unidimensional structure, SRMR was prioritized as the primary fit index because it performs better with models that have low degrees of freedom, whereas RMSEA tends to favor models with higher degrees of freedom (Kenny et al., 2014).

Since model fit indices were adequate, measurement invariance by country and gender was tested using both traditional multigroup confirmatory factor analysis (MGCFA) and the alignment method (CFA-MIAL; Muthén & Asparouhov, 2012, 2014). The alignment method allows for slight parameter differences across groups, which is a more realistic approach in cross-cultural studies (Fischer & Karl, 2019; Lomazzi, 2018), especially given that strict invariance is rarely achieved and may result in plausible models being rejected (Davidov et al., 2014; Lomazzi, 2018). Additionally, CFA-MIAL can be used to compare latent means even in the absence of scalar invariance. However, if scalar invariance is supported by MGCFA, the use of CFA-MIAL becomes unnecessary (Marsh et al., 2018).

To test invariance using MGCFA, the criteria were ΔCFI > .01, ΔRMSEA > .015, and ΔSRMR > .005 (Cheung & Rensvold, 2002). Configural invariance was first assessed through an unconstrained multigroup CFA (Brown, 2015), followed by tests for metric and scalar invariance by constraining factor loadings and intercepts, respectively. CFA-MIAL followed the recommendations of Robitzsch (2020), with factor loadings estimated at $\lambda = .40$ and intercepts at $v = .20$, using an alignment estimation power of .25 for both parameters (Fischer & Karl, 2019). Measurement invariance was evaluated using the R^2 index, where values closer to 1 indicate higher invariance (Asparouhov & Muthén, 2014). A threshold of more than 25% non-invariant parameters was considered indicative of poor invariance.

To analyze between-group differences by country, ANOVA and post hoc tests with effect sizes were conducted and illustrated with boxplots. For gender comparisons, Student's t-test was used along with Cohen's d as a measure of effect size.

Finally, internal consistency was assessed as an indicator of reliability, using the omega coefficient, with expected values above .700 (Ventura-León & Caycho-Rodríguez, 2017).

All analyses were conducted using R statistical software and the lavaan, semTools, and sirt packages.

Results

Table 2 presents the descriptive statistics for each APS-G item by country. All items showed positive skewness, indicating a tendency toward lower scores, except for item 3. In fact, item 3 (*"It makes me angry when things don't go the way I want"*) showed the highest average in all countries. Skewness and kurtosis values remained within the ±1.5 range, suggesting univariate normality.

Table 2.
Descriptive Statistics for Each APS-G Item by Country

	Statistics	Item1	Item2	Item3	Item4
El Salvador	*M*	2.46	1.86	2.81	2.46
	SD	1.42	1.26	1.42	1.46
	Asimetria	0.11	0.65	-0.23	0.21
	Curtosis	-1.11	-0.35	-1.07	-1.18
Paraguay	*M*	2.31	1.91	2.93	2.18
	SD	1.37	1.24	1.31	1.36
	Asimetria	0.17	0.48	-0.31	0.28
	Curtosis	-1.12	-0.68	-0.78	-0.95
Chile	*M*	2.10	1.70	2.60	1.66
	SD	1.27	1.16	1.31	1.30
	Asimetria	0.17	0.60	-0.03	0.73
	Curtosis	-0.85	-0.16	-0.90	-0.14
Colombia	*M*	2.58	1.87	2.98	2.42
	SD	1.50	1.25	1.37	1.50
	Asimetria	0.01	0.61	-0.32	0.11
	Curtosis	-1.13	-0.31	-0.77	-1.14
Bolivia	*M*	2.41	2.01	3.13	2.30
	SD	1.31	1.18	1.32	1.41
	Asimetria	0.08	0.43	-0.49	0.18
	Curtosis	-1.00	-0.63	-0.68	-1.13
Peru	*M*	2.22	1.89	2.88	1.94
	SD	1.24	1.17	1.25	1.30
	Asimetria	0.15	0.50	-0.33	0.40
	Curtosis	-0.69	-0.49	-0.69	-0.77

Note: M = mean, SD = standard deviation.

Table 3 displays the goodness-of-fit indices for the unidimensional model in each country. The model showed acceptable fit in all participating countries, with Colombia and Peru reporting the highest fit values. Regarding factor loadings, all items showed loadings above .50 in every country, except item 3 in Bolivia, which reported a lower loading of $\lambda = .384$.

As for reliability (see Table 3), all samples reached the recommended threshold for the omega coefficient (> .70). El

Table 3.
Goodness-of-Fit Indices for the Unidimensional Model of the APS-G by Country

	X2	df	p	CFI	TLI	RMSEA	SRMR	Item1	Item2	Item3	Item4	ω
El Salvador	5.676	2	.059	.990	.969	.060	.021	.733	.637	.601	.695	.763
Paraguay	4.688	2	.096	.992	.976	.050	.021	.713	.648	.557	.713	.755
Chile	5.578	2	.061	.984	.953	.069	.026	.708	.607	.574	.738	.753
Colombia	0.103	2	.950	1.000	1.022	.000	.003	.743	.585	.626	.756	.780
Bolivia	8.175	2	.017	.973	.918	.091	.035	.775	.503	.384	.763	.708
Peru	1.866	2	.383	1.000	1.002	.000	.016	.688	.604	.549	.669	.723

Note. ω = Omega coefficient.

Table 4.
Measurement Invariance of the APS-G by Country Based on MGCFA

		X2	df	CFI	RMSEA	SRMR	ΔCFI	ΔRMSEA	ΔSRMR
Country	Configural	25.088	12	0.992	0.051	0.017			
	Metric	46.935	27	0.987	0.042	0.033	-0.005	-0.009	0.016
	Scalar	121.789	42	0.950	0.067	0.050	-0.037	0.025	0.017

Salvador showed the highest reliability value, while Bolivia reported the lowest.

Table 4 summarizes the results of the measurement invariance analysis by country. The findings indicate that the APS-G demonstrates configural and metric invariance across the six countries. However, scalar invariance was not achieved, as the values exceeded recommended thresholds, suggesting that mean comparisons across countries would not be valid.

Due to insufficient support for scalar invariance by country, the CFA-MIAL was conducted. At the structural level, the APS-G demonstrated invariance in factor loadings (R^2 = .993) and intercepts (R^2 = .998), as shown in Table 5. With respect to the percentage of non-invariant parameters by country, all factor loadings were invariant (0%). Only two intercept parameters were identified as non-invariant, representing a globally low rate of 8.33%.

Table 5.
Measurement Invariance of the APS-G by Country Using the Alignment Method

	Items	Countries						R2	%
Factor Loadings	Item1	1	2	3	4	5	6	0.993	0
	Item2	1	2	3	4	5	6		
	Item3	1	2	3	4	5	6		
	Item4	1	2	3	4	5	6		
Intercepts	Item1	1	2	3	4	5	6	0.998	8.33
	Item2	1	2	3	**4**	5	6		
	Item3	1	2	3	4	5	6		
	Item4	1	2	**3**	4	5	6		

Figure 1 illustrates the distribution of total scores by country. Overall, the differences were negligible (F(5) = 11.08, p < .001, ω = .02). However, Bolivia and Colombia showed slightly higher scores compared to the other countries. The largest pairwise differences were found between Bolivia and Chile (d = .47), Colombia and Chile (d = .43), El Salvador and Chile (d = .37), Paraguay and Chile (d = .32), Bolivia and Peru (d = .25), Peru and Chile (d = .23), and Colombia and Peru (d = .23).

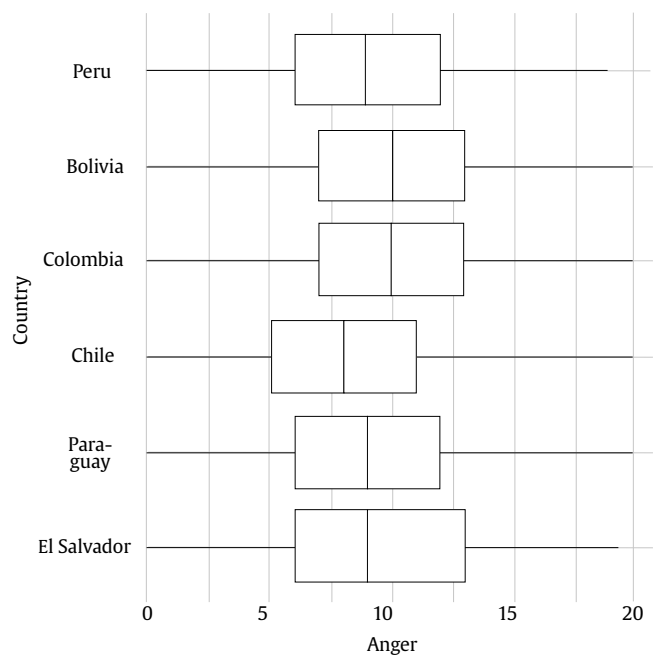

Figure 1.
Comparison of Total APS-G Scores by Country

Discussion

The aim of this study was to examine the factorial structure of the APS-G and provide evidence of its measurement invariance (MI) within samples from six Spanish-speaking Latin American countries. From a methodological standpoint, this is the first study to apply both exact and approximate approaches to assess the MI of the APS-G. The APS-G is a novel instrument developed in Latin America, grounded in an inter-behavioral model, to measure anger proneness. Its brevity and ease of administration make it a promising and useful tool for large-scale surveys and cross-national studies. Therefore, demonstrating its MI across diverse Latin American countries is essential for advancing multicultural research in the region.

Overall, the APS-G exhibited the theoretically expected unidimensional structure in all participating countries. These results are consistent with findings from García-Cadena et al. (2018) and García-Cadena et al. (2024), who also reported uni-dimensionality

across various Latin American contexts. The uni-dimensional model yielded low RMSEA values in most countries, except for Bolivia, where a slightly elevated value was observed. Although high RMSEA values are known to occur in models with few degrees of freedom (Kenny et al., 2015)—as in the APS-G case with only two degrees of freedom—this difference may suggest that the uni-dimensional structure performs differently across samples (Caycho-Rodríguez et al., 2023). Additionally, comparisons with previous studies should be made with caution due to methodological differences. For example, García-Cadena et al. (2018, 2024) employed maximum likelihood estimation, while our study used robust maximum likelihood (MLR). Reliability findings also supported the APS-G as a precise instrument for assessing anger proneness.

Our findings indicate that the transnational MI of the APS-G should be interpreted with caution, and that alternative methods should be considered when evaluating MI across countries. Despite acceptable fit for the unidimensional model in all countries, the MGCFA approach supported only configural and metric invariance. This suggests that the structure of the APS-G is similar and that the latent dimension of anger proneness holds the same meaning across countries, as indicated by equivalent item factor loadings. However, the lack of scalar invariance indicates that intercept equivalence could not be confirmed, limiting the comparability of means. Thus, cross-national comparisons of means cannot be reliably conducted (Steinmetz, 2013; Van de Schoot et al., 2012). This raises the question of whether observed differences in means across countries reflect actual variations in the latent construct of anger proneness or differences in how the construct is measured. Such findings are expected, as achieving scalar invariance in cross-national studies involving many countries is notoriously difficult (Davidov et al., 2014; Rutkowski & Svetina, 2014; Thielmann et al., 2020).

Nevertheless, some scholars argue that scalar non-invariance does not necessarily preclude meaningful comparisons of means (Davidov et al., 2014; Vandenberg & Lance, 2000), and that it may reflect true differences in item-specific variances (McCrae, 2015). In light of this, the CFA-MIAL method was employed (Muthén & Asparouhov, 2012, 2014), which does not require strict parameter equality and is considered a more realistic approach in cross-cultural research (Fischer & Karl, 2019). Accordingly, both methods were applied to analyze the same dataset (Heesen et al., 2019). The CFA-MIAL results indicated approximate MI of the APS-G across the six Latin American countries, thereby allowing for mean comparisons. Factor loadings were invariant across countries, and more than 90% of the item intercepts were approximately invariant. Differences in intercepts likely reflect variations in response thresholds influenced by cultural factors (Vandenberg & Lance, 2000). The CFA-MIAL results showed that non-invariance was highest for items related to anger at any time (item 2) and anger when contradicted (item 4). These results suggest that these two symptoms may manifest to varying degrees across different cultural contexts, independently of general anger proneness. That is, certain cultural characteristics may moderate the expression of anger proneness through reactions such as anger at any time or when being contradicted. Item 2 refers to a situational emotional indicator of anger arising from interpersonal interactions, perceived threats, or evaluations of external stimuli that depend on context (Mill et al., 2018). Item 4 more directly reflects a disposition toward anger. These findings point to interactive effects between momentary emotional experiences and personality traits that may influence the suppression or expression of anger—or both.

After confirming approximate invariance, anger proneness scores were compared across countries. The results showed that differences were generally negligible. Although anger has been found to be susceptible to cultural influences, these findings suggest that symptoms of anger proneness relate similarly across the Latin American countries studied (Alonso-Arbiol et al., 2011). These findings also align with those of Matsumoto et al. (2007), who reported that country-level differences in anger explained only between 2% and 7% of the variance. Hence, the study supports the notion that anger is a widely recognized emotion across cultures. Given the complex nature of anger proneness, it is likely shaped by cultural norms; however, in the countries examined, such norms may not differ substantially. Moreover, emotions like anger proneness may be influenced by *feeling rules*—culturally stable guidelines that dictate how emotions should be accommodated to specific situations—affecting internal experiences of anger (Alonso-Arbiol et al., 2011). Nonetheless, since this study relied on self-reports of anger, it remains essential to determine the extent to which self-reported emotional experiences align with actual anger episodes, for which empirical behavioral observations would be necessary.

Strengths and Limitations

This study shows several notable strengths, including comparable sample sizes across countries, no missing data, and consistently good model fit of the APS-G across national samples. The adherence to a standardized research protocol across countries ensured functional equivalence in data collection (Schnohr et al., 2015), thereby facilitating valid cross-national comparisons and reducing sampling biases during MI testing.

However, some limitations should be acknowledged. First, participants recruitment was conducted online using non-probabilistic sampling, which may introduce selection bias and limit generalizability. Some demographic groups, such as males, unemployed individuals, those from lower socioeconomic backgrounds, and those without higher education, were underrepresented, while women and those with higher education levels were overrepresented. To mitigate this, future research should employ random sampling methods to reduce ambiguity regarding the study's target population and to enhance inferential validity. That said, the absence of random sampling does not invalidate these findings, as the goal was theoretical generalization (Pasek, 2016; Polit & Beck, 2010), namely to determine whether the APS-G produces comparable scores across the six national contexts evaluated. Second, the study focused solely on samples from six Latin American countries. Future research should extend the evaluation of the APS-G'performance and MI to other countries in the region. Third, the study did not include potentially important covariates related to anger proneness, such as depression and anxiety (Alagöz et al., 2025; Goulart et al., 2021; Lindert et al., 2021), which could have enhanced understanding of response patterns. Fourth, the cross-sectional nature of the study precluded test-retest reliability assessment. This limits conclusions about the tool temporal stability, which is especially important given that anger proneness may vary over time (Lindert et al., 2021). Studies based on longitudinal designs are needed to better understand its dynamics. Fifth, the use of a self-report measure introduces the possibility of social desirability bias and common method variance. Future studies should incorporate alternative measures or methodologies to address these issues. Sixth, no gold standard or clinical reference measure for anger was used, such as structured clinical interviews. Therefore, the APS-G sensitivity and specificity for detecting clinically relevant levels of anger proneness remain unknown, and our study does not propose or recommend diagnostic cut-offs. Seventh, no additional measures related to anger proneness were included to assess convergent or

discriminant validity. Eighth, as the sample was drawn from the general population, the psychometric properties of the APS-G in clinical populations were not examined. Finally, the study did not explore potential sources of scalar non-invariance identified via MGCFA. Future research should investigate these sources to refine the instrument's application.

Conclusion and Implications

This study suggests that the APS-G demonstrates approximate measurement invariance across different countries and can therefore be used in cross-national mental health research in Latin America. This cross-cultural psychometric analysis of anger proneness provides a tool for examining how individuals from different countries resemble or differ in their experience, expression, and regulation of anger proneness. Researchers interested in examining anger proneness from an inter-behavioral perspective across nations can rely on the APS-G as a valid measure for the Latin American countries evaluated.

Additionally, the APS-G is brief enough to be administered alongside other instruments in large-scale studies, while also being robust enough to function independently. These qualities make it especially valuable in low- and middle-income Latin American countries, where mental health professionals and researchers often work under time constraints and with limited resources. A psychometrically sound and invariant tool such as the APS-G can raise awareness among mental health professionals and researchers about the feasibility of assessing anger proneness in a simple, reliable, and valid way. It may also support the development, implementation, and monitoring of personalized or cross-national treatments aimed at reducing anger proneness and managing related mental health concerns in Latin American settings.

Furthermore, the positively worded items of the APS-G enhance its usability in populations with limited verbal capacity or difficulty processing negatively worded items. Despite these strengths, the findings should not be interpreted as evidence of the cultural universality of the anger proneness model. Measurement invariance evaluates the psychometric equivalence of a specific construct across groups but does not reveal the cultural meanings embedded in psychological constructs. Thus, the APS-G appears to be a psycho-socio-culturally appropriate instrument for Spanish-speaking countries, which share foundational histories, a common language, and, in many cases, similar religious beliefs—factors that enhance its cross-national applicability within this cultural-linguistic context.

References

Alagöz, Y., Cihan, F. G., Kutlu, R., Alagöz, C., Eren, İ., & Ecirli, Ş. (2025). Evaluation of alexithymia, anger and anxiety depression levels in smokers. *Journal of Substance Use, 30*(2), 265-270. https://doi.org/10.1080/14659891.2024.2312375

Alonso-Arbiol, I., van de Vijver, F. J. R., Fernandez, I., Paez, D., Campos, M., & Carrera, P. (2011). Implicit theories about interrelations of anger components in 25 countries. *Emotion, 11*(1), 1–11. https://doi.org/10.1037/a0020295

Asparouhov, T., & Muthén, B. (2014). Multiple-group factor analysis alignment. *Structural Equation Modeling: A Multidisciplinary Journal, 21*(4), 495-508. https://doi.org/10.1080/10705511.2014.919210

Asparouhov, T., & Muthén, B. (2023). Multiple group alignment for exploratory and structural equation models. *Structural Equation Modeling: A Multidisciplinary Journal, 30*(2), 169-191. https://doi.org/10.1080/10705511.2022.2127100

Bjørnebekk, G., & Howard, R. (2012). Validation of a motivation-based typology of angry aggression among antisocial youths in Norway. Behavioral Sciences & the Law, 30(2), 167-180. https://doi.org/10.1002/bsl.2007

Boer, D., Hanke, K., & He, J. (2018). On detecting systematic measurement error in cross-cultural research: A review and critical reflection on equivalence and invariance tests. *Journal of Cross-Cultural Psychology, 49*(5), 713-734. https://doi.org/10.1177/0022022117749042

Boiger, M., Mesquita, B., Uchida, Y., & Feldman Barrett, L. (2013). Condoned or condemned: The situational affordance of anger and shame in the United States and Japan. *Personality and Social Psychology Bulletin, 39*(4), 540-553. https://doi.org/10.1177/0146167213478201

Brosseau-Liard, P. E., Savalei, V., & Li, L. (2012). An investigation of the sample performance of two nonnormality corrections for RMSEA. *Multivariate Behavioral Research, 47*(6), 904–930. https://doi.org/10.1080/00273171.2012.715252

Brown, T. A. (2015). *Confrmatory factor analysis for applied research.* Guilford Publications.

Cankardaş, S., & Şalcıoğlu, E. (2021). Turkish Adaptation Study of the State Anger Scale in a Traumatized Sample. *Psikiyatride Guncel Yaklasimlar, 13*, 375-387. https://doi.org/10.18863/pgy.992195

Caselli, G., Offredi, A., Martino, F., Varalli, D., Ruggiero, G. M., Sassaroli, S., ... & Wells, A. (2017). Metacognitive beliefs and rumination as predictors of anger: A prospective study. *Aggressive behavior, 43*(5), 421-429. https://doi.org/10.1002/ab.21699

Caycho-Rodríguez, T., García Cadena, C. H., Reyes-Bossio, M., Cabrera-Orosco, I., Oblitas Guadalupe, L. A., & Arias Gallego, W. L. (2019). Evidencias psicométricas de una versión breve de la mindful awareness attention scale en estudiantes universitarios. *Revista Argentina de Ciencias del Comportamiento, 11*(3), 19-32.

Caycho-Rodríguez, T., Palomino, M. B., León, J. L. V., & Orosco, I. C. (2021). Evaluación psicométrica de una medida breve de ira en adultos mayores con hipertensión. *Revista española de geriatría y gerontología, 56*(1), 61-62. https://doi.org/10.1016/j.regg.2020.06.001

Caycho-Rodríguez, T., Valencia, P. D., Vilca, L. W., Carbajal-León, C., Vivanco-Vidal, A., Saroli-Araníbar, D., ... & Flores-Mendoza, C. (2023). Cross-cultural validation of the new version of the Coronavirus Anxiety Scale in twelve Latin American countries. *Current Psychology, 42*(34), 30612-30629. https://doi.org/10.1007/s12144-021-02563-0

Cheung, G. W., and Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modeling, 9*(2), 233–255. https://doi.org/10.1207/S15328007SEM0902_5

Chung, J. M., Harari, G. M., & Denissen, J. J. (2022). Investigating the within--person structure and correlates of emotional experiences in everyday life using an emotion family approach. *Journal of Personality and Social Psychology, 122*(6), 1146-1189.

Cieciuch, J., Davidov, E., Schmidt, P., & Algesheimer, R. (2019). How to obtain comparable measures for cross-national comparisons. *Kölner Zeitschrift für Soziologie und Sozialpsychologie, 71*(S1), 157-186. https://doi.org/10.5167/uzh-172539

Cintron, D. W., Matthay, E. C., & McCoach, D. B. (2023). Testing for intersectional measurement invariance with the alignment method: Evaluation of the 8-item patient health questionnaire. *Health Services Research, 58,* 248-261. https://doi.org/10.1111/1475-6773.14189

Cox, D. E., & Harrison, D. W. (2008). Models of anger: contributions from psychophysiology, neuropsychology and the cognitive behavioral perspective. *Brain Structure and Function, 212,* 371-385. https://doi.org/10.1007/s00429-007-0168-7

Credé, M., Harms, P., Niehorster, S., & Gaye-Valentine, A. (2012). An evaluation of the consequences of using short measures of the Big Five personality traits. *Journal of Personality and Social Psychology, 102*(4), 874-888. https://doi.org/10.1037/a0027403

Davidov, E., Meuleman, B., Cieciuch, J., Schmidt, P., & Billiet, J. (2014). Measurement equivalence in cross-national research. *Annual review of sociology, 40*(1), 55-75. https://doi.org/10.1146/annurev-soc-071913-043137

Deffenbacher, J. L., Stephens, A. N., & Sullman, M. J. (2016). Driving anger as a psychological construct: Twenty years of research using the Driving Anger Scale. *Transportation research part F: traffic psychology and behaviour, 42,* 236-247. https://doi.org/10.1016/j.trf.2015.10.021

DiGiuseppe, R., & Tafrate, R. (2011). *Anger Regulation and Expression Scale (ARES).* North Tonawanda, NY: Multi-Health Systems (MHS).

Edwards, P., Roberts, I., Sandercock, P., & Frost, C. (2004). Follow-up by mail in clinical trials: does questionnaire length matter? *Controlled Clinical Trials, 25*(1), 31-52. https://doi.org/10.1016/j.cct.2003.08.013

Ekman, P. (1999). Basic emotions. In T. Dalgleish & T. Power (Eds.), *The handbook of cognition and emotion* (pp. 45-60). Sussex, United Kingdom: John Wiley and Sons, Ltd.

Evans, D. R., & Stangeland, M. (1971). Development of the reaction inventory to measure anger. *Psychological Reports, 29*(2), 412-414. https://doi.org/10.2466/pr0.1971.29.2.412

Fernandez, E., & Johnson, S. L. (2016). Anger in psychological disorders: Prevalence, presentation, etiology and prognostic implications. *Clinical psychology review, 46,* 124-135. https://doi.org/10.1016/j.cpr.2016.04.012

Fischer, R., & Karl, J. A. (2019). A primer to (cross-cultural) multi-group invariance testing possibilities in R. *Frontiers in psychology, 10,* 1507. https://doi.org/10.3389/fpsyg.2019.01507

Flake, J. K., & McCoach, D. B. (2018). An investigation of the alignment method with polytomous indicators under conditions of partial measurement

invariance. *Structural Equation Modeling: A Multidisciplinary Journal, 25*(1), 56-70. https://doi.org/10.1080/10705511.2017.1374187

Forbes, D., Alkemade, N., Mitchell, D., Elhai, J., McHugh, T., Bates, G., et al. (2014). Utility of the Dimensions of Anger Reactions-5 (DAR-5) Scale as a brief anger measure. *Depression and Anxiety, 31,* 166–173. https://doi.org/10.1002/da.22148

García-Cadena, C. H., Daniel-González, L., Caycho-Rodriguez, T., & López, A. T. (2018). Construct validity of a new scale for assessing anger proneness (APS-G). *Salud mental, 41*(5), 229-236. https://doi.org/10.17711/SM.0185-3325.2018.034

Garcia-Cadena, C. H., Lara-Piñales, O. M., Padilla-López, L. A., Martell-Muñoz, J., Alonso-Morales, A. D., Hernández, L. A., & López-Huesca, T. H. (2021). Validación de la Escala Breve de Optimismo Interactivo-G en México antes de la COVID-19. *Avances en Psicología Latinoamericana, 39*(1), 1-14. https://doi.org/10.12804/revistas.urosario.edu.co/apl/a.10504

García-Cadena, C. H., Quiceno Sierra, J. M., Caycho-Rodríguez, T., García Martínez, F. E., & Lara Pinales, Ó. M. (2023). Bienestar psicológico y agresión reactiva en Latinoamérica en tiempos del COVID-19. Suma Psicológica, 30(2), 21-29. https://doi.org/10.14349/sumapsi.2023.v30.n2.3

García-Cadena, C. H., Sierra, J. M. Q., Caycho-Rodríguez, T., & Pinales, O. L. (2024). Psychometric Properties of a New Scale to Measure Patience. *Revista Interamericana de Psicología, 58*(1), e2002-e2002.

Goulart, A. C., Arap, A. M., Bufarah, H. B., Bismarchi, D., Rienzo, M., Syllos, D. H., & Wang, Y. P. (2021). Anxiety, depression, and anger in bruxism: A cross--sectional study among adult attendees of a preventive center. *Psychiatry Research, 299,* 113844. https://doi.org/10.1016/j.psychres.2021.113844

Grom, J. L., Maloney, M. A., Parrott, D. J., & Eckhardt, C. I. (2021). Alcohol, trait anger, and psychological flexibility: A laboratory investigation of intimate partner violence perpetration. *Journal of contextual behavioral science, 19,* 100-107. https://doi.org/10.1016/j.jcbs.2021.01.006

Hambleton, R. K., & Lee, M. K. (2013). Methods for translating and adapting tests to increase cross-language validity. In D.H. Saklofske, C.R. Reynolds, V.L. Schwean (Eds.), *The Oxford handbook of child psychological assessment* (pp. 172-181). New York, NY: Oxford University Press. doi:10.1093/oxfordhb/9780199796304.013.0008

Heesen, R., Bright, L. K., & Zucker, A. (2019). Vindicating methodological triangulation. *Synthese, 196,* 3067-3081. https://doi.org/10.1007/s11229-016-1294-7

Hernández-Ávila, C. E., & Escobar, N. A. C. (2019). Introducción a los tipos de muestreo. Alerta, *Revista científica del Instituto Nacional de Salud, 2*(1), 75-79. https://doi.org/10.5377/alerta.v2i1.7535

Hu, L., & Bentler, P. M. (1999). Cutof criteria for ft indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling, 6*(1), 1–55. https://doi.org/10.1080/10705519909540118

Immekus, J. C. (2021). Multigroup CFA and alignment approaches for testing measurement invariance and factor score estimation: Illustration with the schoolwork-related anxiety survey across countries and gender. *Methodology, 17*(1), 22-38. https://doi.org/10.5964/meth.2281

Jones, R. M., Van Den Bree, M., Zammit, S., & Taylor, P. J. (2022). The relationship between the Big Five personality factors, anger-hostility, and alcohol and violence in men and women: A nationally representative cohort of 15,701 young adults. *Journal of interpersonal violence, 37*(11-12), NP8559-NP8581. https://doi.org/10.1177/0886260520978178

Joreskog, K. G., Sorbom, D., du Toit, S., & du Toit, M. (2000). *LISREL 8: New statistical features.* Chicago: Scientific Software International.

Kantor, J. R. (1959). *Interbehavioral Psychology: A Sample of Scientific Science Construction.* Bloomington: Principia.

Kantor, J. R. (1969). *Principles of Psychology.* Bloomington: Principia

Kemper, C. J., Trapp, S., Kathmann, N., Samuel, D. B., & Ziegler, M. (2019). Short versus long scales in clinical assessment: Exploring the trade-off between resources saved and psychometric quality lost using two measures of obsessive–compulsive symptoms. *Assessment, 26*(5), 767-782. https://doi.org/10.1177/1073191118810057

Kenny, D. A., Kaniskan, B., & McCoach, D. B. (2015). The performance of RMSEA in models with small degrees of freedom. *Sociological methods & research, 44*(3), 486-507. https://doi.org/10.1177/0049124114543236

Kim, E. S., Cao, C., Wang, Y., & Nguyen, D. T. (2017). Measurement invariance testing with many groups: A comparison of five approaches. *Structural Equation Modeling: A Multidisciplinary Journal, 24*(4), 524-544. https://doi.org/10.1080/10705511.2017.1304822

Kim, J. Y., Kim, J., Park, S., & Fear, N. (2021). Workplace victimization and alcohol misuse among junior military personnel: Mediating the role of anger. *Journal of affective disorders, 294,* 638-644. https://doi.org/10.1016/j.jad.2021.07.010

Kruyen, P. M., Emons, W. H., & Sijtsma, K. (2013). On the shortcomings of shortened tests: A literature review. *International Journal of Testing, 13*(3), 223-248. https://doi.org/10.1080/15305058.2012.703734

Laitano, H. V., Ely, A., Sordi, A. O., Schuch, F. B., Pechansky, F., Hartmann, T., ... & Kessler, F. H. (2021). Anger and substance abuse: a systematic review and meta-analysis. *Brazilian Journal of Psychiatry, 44*(1), 103-110. https://doi.org/10.1590/1516-4446-2020-1133

Leitgöb, H., Seddig, D., Asparouhov, T., Behr, D., Davidov, E., De Roover, K., ... & van de Schoot, R. (2023). Measurement invariance in the social sciences: Historical development, methodological challenges, state of the art, and future perspectives. *Social science research, 110,* 102805. https://doi.org/10.1016/j.ssresearch.2022.102805

Lengua Viva (2024). *Datos sobre el español.* https://lenguaviva.org/

Li, C.-H. (2016). Confrmatory factor analysis with ordinal data: Comparing robust maximum likelihood and diagonally weighted least squares. *Behavior Research Methods, 48*(3), 936–949. https://doi. org/10.3758/s13428-015-0619-7

Lindert, J., Paul, K. C., Lachman, M. E., Ritz, B., & Seeman, T. E. (2021). Depression-, anxiety-, and anger and cognitive functions: findings from a longitudinal prospective study. *Frontiers in psychiatry, 12,* 665742. https://doi.org/10.3389/fpsyt.2021.665742

Lomazzi, V. (2018). Using alignment optimization to test the measurement invariance of gender role attitudes in 59 countries. *Methods, data, analyses: a journal for quantitative methods and survey methodology, 12*(1), 77-103. https://doi.org/10.12758/mda.2017.09

Luong, R., & Flake, J. K. (2023). Measurement invariance testing using confirmatory factor analysis and alignment optimization: A tutorial for transparent analysis planning and reporting. *Psychological Methods, 28*(4), 905–924. https://doi.org/10.1037/met0000441

Marsh, H. W., Guo, J., Parker, P. D., Nagengast, B., Asparouhov, T., Muthén, B., & Dicke, T. (2018). What to do when scalar invariance fails: The extended alignment method for multi-group factor analysis comparison of latent means across many groups. *Psychological Methods, 23*(3), 524–545. https://doi.org/10.1037/met0000113

Martin, R., Watson, D., & Wan, C. K. (2000). A three-factor model of trait anger: Dimensions of affect, behavior, and cognition. *Journal of personality, 68*(5), 869-897. https://doi.org/10.1111/1467-6494.00119

Matsumoto, D., & Yoo, S. H. (2006). Toward a new generation of cross-cultural research. *Perspectives on psychological science, 1*(3), 234-250. https://doi.org/10.1111/j.1745-6916.2006.00014.x

Matsumoto, D., Nezlek, J. B., & Koopmann, B. (2007). Evidence for universality in phenomenological emotion response system coherence. *Emotion, 7*(1), 57–67. https://doi.org/10.1037/1528-3542.7.1.57

Matsumoto, D., Yoo, S. H., Chung, J. (2007). The Expression of Anger Across Cultures. In Potegal, M., Stemmler, G., and Spielberger, C. (Eds.). *Handbook of anger* (pp. 125-137). New York: Springer

McCrae, R. R. (2015). A more nuanced view of reliability: Specificity in the trait hierarchy. *Personality and Social Psychology Review, 19*(2), 97–112. https://doi.org/10.1177/1088868314541857

Meredith, W. (1993). Measurement invariance, factor analysis and factorial invariance. *Psychometrika, 58*(4), 525-543. https://doi.org/10.1007/BF02294825

Mill, A., Kööts-Ausmees, L., Allik, J., & Realo, A. (2018). The role of co-occurring emotions and personality traits in anger expression. *Frontiers in psychology, 9,* 123. https://doi.org/10.3389/fpsyg.2018.00123

Miloslavich, K., Leonard, S. J., Wardle, M. C., & Vujanovic, A. A. (2023). Alcohol use severity, anger and drinking motives among firefighters. *Substance Use & Misuse, 58*(5), 601-609. https://doi.org/10.1080/10826084.2023.2177113

Moeller, S. B., & Bech, P. (2019). The Metacognitive Anger Processing (MAP) Scale–validation in a mixed clinical and a forensic in-patient sample. *Behavioural and Cognitive Psychotherapy, 47*(1), 67-80. https://doi.org/10.1017/S1352465818000140

Moscoso, M. S., & Spielberger, C. D. (2011). Medición transcultural de las emociones: la expresion de la ira. *Revista de Psicología (PUCP), 29*(2), 343-360.

Muthén, B., & Asparouhov, T. (2012). Bayesian structural equation modeling: A more flexible representation of substantive theory. *Psychological Methods, 17*(3), 313–335. https://doi.org/10.1037/a0026802

Muthén, B., & Asparouhov, T. (2014). IRT studies of many groups: The alignment method. *Frontiers in psychology, 5,* 978. https://doi.org/10.3389/fpsyg.2014.00978

Nesbit, S. M., Conger, J. C., & Conger, A. J. (2007). A quantitative review of the relationship between anger and aggressive driving. *Aggression and Violent Behavior, 12*(2), 156-176. https://doi.org/10.1016/j.avb.2006.09.003

Niedenthal, P. M., Krauth-Gruber, S., & Ric, F. (2006). *Psychology of emotion: Interpersonal, experiential and cognitive approaches.* New York, NY: Psychology Press.

Novaco, R. W. (2003). *The Novaco anger scale and provocation inventory: NAS-PI.* Los Angeles, CA: Western Psychological Services.

Novaco, R. W. (2010). Anger and psychopathology. In M. Potegal, G. Stemmler, & C. Spielberger (Eds.), *International handbook of anger* (pp. 465-497). https://doi.org/10.1007/978-0-387-89676-2

Novaco, R. W., & Taylor, J. (2016). Anger. In Carr A. and McNulty, M. (Eds.) *The Handbook of Adult Clinical Psychology* (pp. 380-404). Routledge.

Novaco, R. W., & Whittington, R. (2013). Anger regulation for psychotic patients. In E. Fernandez (Ed.), *Treatments for anger in specific populations: Theory, application, and outcome* (pp. 114–137). Oxford University Press. https://doi.org/10.1093/med:psych/9780199914661.003.0007

O'Hern, S., Stephens, A. N., Young, K. L., & Koppel, S. (2019). What makes cyclists angry? The relationships between trait anger, interest in cycling and self-reported comfort levels. *Transportation research part F: traffic psychology and behaviour, 62,* 672-680. https://doi.org/10.1016/j.trf.2019.03.004

Oliva, A., Ferracini, S. M., Amoia, R., Giardinieri, G., Moltrasio, C., Brambilla, P., & Delvecchio, G. (2023). The association between anger rumination and emotional dysregulation in borderline personality disorder: A review. *Journal of affective disorders, 338,* 546-553. https://doi.org/10.1016/j.jad.2023.06.036

Pasek, J. (2016). When will nonprobability surveys mirror probability surveys? Considering types of inference and weighting strategies as criteria for correspondence. *International Journal of Public Opinion Research, 28*(2), 269-291. https://doi.org/10.1093/ijpor/edv016

Pérez, E. R., & Medrano, L. A. (2010). Análisis factorial exploratorio: bases conceptuales y metodológicas. *Revista Argentina de Ciencias del Comportamiento (RACC), 2*(1), 58-66.

Polit, D. F., & Beck, C. T. (2010). Generalization in quantitative and qualitative research: Myths and strategies. *International journal of nursing studies, 47*(11), 1451-1458. https://doi.org/10.1016/j.ijnurstu.2010.06.004

Ramírez, J. M., Fujihara, T., & Goozen, S. V. (2001). Cultural and gender differences in anger and aggression: A comparison between Japanese, Dutch, and Spanish students. *The Journal of Social Psychology, 141*(1), 119-121. https://doi.org/10.1080/00224540109600528

Reynolds, N. S., Walkey, F. H., & Green, D. E. (1994). *The anger self report: A psychometrically sound (30 item) version.* New Zealand Journal of Psychology, 23, 64-64.

Rhemtulla, M., Brosseau-Liard, P. É., & Savalei, V. (2012). When can categorical variables be treated as continuous? A comparison of robust continuous and categorical SEM estimation methods under suboptimal conditions. *Psychological methods, 17*(3), 354.

Ribes-Iñesta, E. (2007). Lenguaje, aprendizaje y conocimiento. *Revista Mexicana de Psicología, 24*(1), 7-14.

Ribes-Iñesta, E. (2009). La personalidad como organización de los estilos interactivos. *Revista Mexicana de Psicología, 26*(2), 145-161.

Robitzsch, A. (2020). *Sirt: Supplementary Item Response Theory Models (R package version 3.9-4).* Available online at: https://cran.r-project.org/package= sirt (accessed July 7, 2021).

Rutkowski, L., & Svetina, D. (2014). Assessing the hypothesis of measurement invariance in the context of large-scale international surveys. *Educational and psychological measurement, 74*(1), 31-57. https://doi.org/10.1177/0013164413498257

Sass, D. A., Schmitt, T. A., & Marsh, H. W. (2014). Evaluating Model Fit With Ordered Categorical Data Within a Measurement Invariance Framework: A Comparison of Estimators. Structural Equation Modeling: A Multidisciplinary Journal, 21(2), 167–180. https://doi.org/10.1080/10705511.2014.882658

Scherer, K. R., & Wallbott, H. G. (1994). Evidence for universality and cultural variation of differential emotion response patterning. *Journal of Personality and Social Psychology, 66*(2), 310–328. https://doi.org/10.1037/0022-3514.66.2.310

Schnohr, C. W., Molcho, M., Rasmussen, M., Samdal, O., de Looze, M., Levin, K., ... & Torsheim, T. (2015). Trend analyses in the health behaviour in school-aged children study: methodological considerations and recommendations. *The European Journal of Public Health, 25*(suppl_2), 7-12. https://doi.org/10.1093/eurpub/ckv010

Shweder, R. A., Haidt, J., Horton, R., & Joseph, C. (2008). The cultural psychology of the emotions: Ancient and renewed. In M. Lewis, J. M. Haviland-Jones, & L. Feldman Barrett (Eds.), *Handbook of emotions* (pp. 409-427). New York: The Guilford Press.

Spielberger, C. D. (1983). Assessment of anger: the state-trait anger expression scale. *Advances in personality assessment,* 3, 112-134.

Spielberger, C. D., & Reheiser, E. C. (2010). The nature and measurement of anger. In Potegal, M., Stemmler, G., Spielberger, C. (Eds.). *International handbook of anger* (pp. 403–412). New York, NY: Springer. https://doi.org/10.1007/978-0-387-89676-2_23

Spielberger, C.D. (1991). *State-Trait Anger Expression Inventory.* Revised Research Edition. Odessa, Florida: Psychological Assessment Resources.

Steinmetz, H. (2013). Analyzing observed composite differences across groups: is partial measurement invariance enough?. *Methodology, 9*(1), 1–12. https://doi.org/10.1027/1614-2241/a000049

Stephens, A. N., Crotty, R., Trawley, S., & Oxley, J. (2024). Multigroup invariance of measure for angry drivers (MAD) scale using a representative sample of drivers in Australia. *Journal of Safety Research, 90,* 208-215. https://doi.org/10.1016/j.jsr.2024.05.014

Thielmann, I., Akrami, N., Babarović, T., Belloch, A., Bergh, R., Chirumbolo, A., ... & Lee, K. (2020). The HEXACO–100 across 16 languages: A large-scale test of measurement invariance. *Journal of personality assessment, 102*(5), 714-726. https://doi.org/10.1080/00223891.2019.1614011

Trommsdorff, G., & Kornadt, H.~1. (2003). Parent~child relations in cross-cultural perspective. In L. Kuczynski (Ed.), *Handbook of dynamics in parent-child relations* (pp. 271-306). Thousand Oaks, CA: Sage

Umbra, R., & Fasbender, U. (2025). How to Capture the Rage? Development and Validation of a State-Trait Anger Scale. *Journal of Personality Assessment, 107*(2), 188-204. https://doi.org/10.1080/00223891.2024.2390990

Van de Schoot, R., Lugtig, P., & Hox, J. (2012). A checklist for testing measurement invariance. *European journal of developmental psychology, 9*(4), 486-492. https://doi.org/10.1080/17405629.2012.686740

Vandenberg, R. J., & Lance, C. E. (2000). A review and synthesis of the measurement invariance literature: Suggestions, practices, and recommendations for organizational research. *Organizational research methods, 3*(1), 4-70. https://doi.org/10.1177/109442810031002

Ventura-León, J. L., & Caycho-Rodríguez, T. (2017). El coeficiente Omega: un método alternativo para la estimación de la confiabilidad. *Revista Latinoamericana de Ciencias Sociales, niñez y juventud, 15*(1), 625-627.

Wilkowski, B. M., & Robinson, M. D. (2010). The anatomy of anger: An integrative cognitive model of trait anger and reactive aggression. *Journal of personality, 78*(1), 9-38. https://doi.org/10.1111/j.1467-6494.2009.00607.x