

Validation study of the Gratitude Questionnaire–Six Item Form in a Venezuelan general population sample of young adults

Estudio de validación del Cuestionario de Gratiitud GQ–6 en una muestra de población general venezolana de adultos jóvenes

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SUMMARY

Introduction: *Gratitude is widely contemplated in philosophy and theology, although its dissemination in psychology and health sciences is scarce. It is defined as the cognitive and affective state of appreciation in a person favored by a benefactor's contributions. The Gratitude Questionnaire–Six Item Form is one of the most used scales for measuring this construct in several sociocultural contexts.* **Objectives:** *The aims were to*

determine the factorial, convergent, and discriminant validity and to identify its reliability and invariance according to gender, age, and residence. **Method:** *Instrumental research was conducted with 350 Venezuelans.* **Results:** *The six-item model exhibited a poor fit, leading to the formulation of five alternative models. The unifactorial structure of six items with correlated residuals showed a good fit, although the average variance extracted was low. Cronbach's Alpha reported an acceptable value, yet McDonald's Omega was relatively below the recommended cut-off. The questionnaire exhibited correlations with external variables and confirmed full and partial scalar invariance.* **Conclusions:** *The properties of the GQ–6 make it suitable for its use in the Venezuelan context; however, its limitations should be reviewed to improve it. It is concluded that the questionnaire can be used to assess gratitude as a protective factor of mental health and as an element to promote well-being and meaningful life.*

Keywords: *GQ-6 psychometric properties, gratitude, mental health, positive psychology.*

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RESUMEN

Introducción: *La gratitud está ampliamente contemplada en filosofía y teología, aunque su difusión en psicología y ciencias de la salud es escasa. Se define como el estado cognitivo y afectivo de aprecio en una persona favorecida por las contribuciones de*

un benefactor. El Gratitude Questionnaire-Six Item Form es una de las escalas más utilizadas para medir este constructo en diversos contextos socioculturales.

Objetivo: *Los objetivos fueron determinar la validez factorial, convergente y discriminante e identificar su confiabilidad e invarianza según género, edad y residencia. Métodos:* *Se realizó una investigación instrumental con 350 venezolanos. Resultados:* *El modelo de seis ítems mostró un ajuste deficiente, lo que condujo a la formulación de cinco modelos alternativos. La estructura unifactorial de seis ítems con residuales correlacionados mostró un buen ajuste, aunque la varianza media extraída fue baja. El alfa de Cronbach registró un valor aceptable, pero el omega de McDonald se situó relativamente por debajo del límite recomendado. El cuestionario mostró correlaciones con variables externas y confirmó invarianza escalar total y parcial. Conclusión:* *Las propiedades del GQ-6 lo hacen adecuado para su uso en el contexto venezolano; sin embargo, sus limitaciones deben ser revisadas para mejorarlo. Se concluye que el cuestionario puede ser utilizado para evaluar la gratitud como factor protector de la salud mental y como elemento para promover el bienestar y la vida significativa.*

Palabras clave: *GQ-6 propiedades psicométricas, gratitud, salud mental, psicología positiva.*

INTRODUCTION

Although gratitude is an ancient concept that philosophers and theologians have considered an elemental virtue for centuries, Judaism, Christianity, Islam, Buddhism, and Hinduism have given importance to this quality, being appreciated as a relevant human attribute and as “the mother of all virtues” (1). The field of psychology has a long way to go in the exploration of gratitude conceptualization and the role of gratitude in the areas of psychological measurement, psychological intervention, and relationship to health and distress variables. Some researchers propose that the gratitude definition would explain this ambiguity since gratitude is not conceptualized as a basic emotion such as anger, sadness, or joy (1). Other authors point out that this attribute has been studied in the social sciences, such as Schwartz, Weiner and Graham, and even Melanie Klein in the psychoanalytic approach, but this interest has not extended to the empirical social disciplines such as psychology, sociology, and anthropology (2).

This study is based on the conceptualization of gratitude proposed by Emmons and McCullough. In this approach, gratitude is defined as an attitude of correspondence toward the provider and the object provided (1). Within the cognitive–emotional theory, writers contend that intentionality is essential to produce gratitude, and actions perceived as disingenuous have the opposite effect (2). This quality belongs to empathic emotions that possess a “central relational theme” the person uses to establish whether what happens to them is favorable. Thus, the central relational theme of gratitude is the recognition of an altruistic action perceived as such when the benefited person empathizes with the benefactor (3,4). These definitions distinguish gratitude as a moral affect, claiming that gratitude stimulates ethical behavior in which people care about others (2). Gratitude is also assumed to be positively related to sympathy, empathy, kindness, trustworthiness, openness, altruism, and modesty; although there are important differences between these concepts, this relationship is explained by the function of promoting prosocial behaviors that are linked to an emotional base that makes the person more predisposed to have a favorable or unfavorable attitude toward a particular response (2).

Based on Emmons and McCullough’s conceptualization of gratitude, the Gratitude Questionnaire–Six Item Form (GQ–6) was created (5). The instrument involved 39 initial items subjected to exploratory factor analysis that identified one dimension explaining 27 % of the overall variance. Only six items were retained in the final scale, a decision based on theory and high factor loadings (5). The factorial validity was endorsed using structural equations. Discriminant validity was set by comparing models in which gratitude was assumed to be distinct from satisfaction, vitality, happiness, optimism, and hope against models in which these constructs were associated (5). The correlations with affectivity, well–being, prosociality, spirituality, and religiosity were estimated. The authors’ research included four studies in which abundant evidence of the instrument’s psychometric quality was obtained (5).

The GQ–6 structure has been examined in Asia, Europe, and Latin America. In 409 students, Sumi found a single dimension through

exploratory and confirmatory factor analyses (6), results replicated in Chile by Carmona–Halathy et al., who obtained a single factor explaining about 66 % of the variance using principal components analysis in 602 participants (7). Hudecek et al. applied a confirmatory factor analysis after administering the GQ–6 to 508 Germans, detecting an appropriate fit by eliminating the sixth item (8). Similar results were reported by Bernabé Valero et al. on 330 Spanish students. These researchers found good psychometric values with an alternative that eliminated the fourth item (9). Previous research in China by Chen et al. with 608 Taiwanese university students coincided with the need to subtract the last item of the scale (10).

Kong et al. validated the unifactorial structure in 1 151 Chinese adults. Nonetheless, it was necessary to correlate the fourth and fifth item residuals to increase the fit (11). Jans–Beken et al. supported the original structure of the questionnaire. Regardless, problems were detected due to the sixth item’s factor loading (12). Caputo also found difficulties with this item after administering the scale to 204 participants, although the confirmatory factor analysis was acceptable (13). Similarly, research conducted by Cabrera–Vélez et al. found problems with the sixth item after applying a confirmatory factor analysis in 1 112 Ecuadorians (14). Langer et al. conducted two studies in Chile. The six–item model was satisfactorily reproduced in an adult group; however, it was necessary to eliminate the sixth item in an adolescent sample to achieve adequate properties (15).

About construct validity, Sumi identified positive correlations with the Satisfaction with Life Scale (SWLS), the Scale of Positive and Negative Experience (SPANE), and the Flourishing Scale (FS–8), but inverse associations with the negative dimensions of the SPANE (6). Similarly, Langer et al. detected associations between the Positive and Negative Affect Schedule (PANAS) and the Subjective Happiness Scale (SHS) (15). The authors also found negative correlations with the Depression, Anxiety, and Stress Scale (DASS–21) and the PANAS’s negative modules. Chen et al. found a positive relationship between the Revised Life Orientation Test (LOT–R) and some dimensions of the Big Five Personality Test (10). Dixit and

Sinha reported direct relations with the Gratitude Adjective Checklist (GAC) and the Oxford Happiness Questionnaire (OHQ) (16).

Cabrera–Vélez et al. employed the PERMA–Profiler to evaluate the association with the GQ–6. Their results matched the theoretically expected, relating directly and inversely to this instrument’s positive and negative emotions (14). Yüksel and Oguz provided evidence supporting this attribute, uncovering positive relationships with the SWLS, LOT–R, and PANAS (17). These outcomes were equivalent to those of Tachon et al., who identified direct correlations with the SWLS, LOT–R, and the problem–focused and social–support strategies subscales of the Revised Ways of Coping Checklist (WCCL–R). These authors also found that GQ–6 scores were inversely related to the French–Canadian version of the Trait–State Anxiety Inventory (STAI) and the French Center for Epidemiological Studies Depression Scale (CES–D) (18).

Another important characteristic of this questionnaire is its reliability. In this regard, Carmona–Halathy et al. found acceptable values through Cronbach’s Alpha coefficient and item–total correlations (7). In Germany, Hudecek et al. encountered appropriate values with the same statistics (8). Sumi examined the temporal stability finding a significant association between the two measurements, optimum alpha coefficients at each point, and elevated corrected item–total correlations (6). Bernabé Valero et al. obtained adequate Cronbach’s Alpha coefficients for the full scale and each item (9). Kong et al. employed the composite reliability index and discovered adequate figures (11), while Balgiu identified a satisfactory Cronbach’s Alpha in a sample of 250 Romanian students (19). All the other consulted references reported acceptable indices (10,12,13,16–18).

Hudecek et al. validated the GQ–6 invariance in samples from Germany and the United Kingdom in a reduced five–item structure (8). This result was consistent with outcomes evidenced by Larger et al., who ratified the equivalence in their five–item proposal when working with Chilean adolescents and adults employing sex as a group variable (15). Gender was also used as a factor by Cabrera–Vélez et al., who confirmed invariance using the comparative fit index and the

root mean square error by approximation (14). Dixit and Sinha ratified the configural invariance between female and male participants, although they faced difficulties when testing for metric invariance (16). Likewise, Kong et al. validated this attribute according to sex, which coincided with outcomes described by Balgiu in Romania (11,19). Therefore, the international literature has confirmed the invariance of the scale to measure gratitude, that is, the instrument is able to detect true differences in the psychological construct without the implication of some socio-demographic characteristics such as sex (male and female). However, in this research, we also want to know if the instrument is invariant with other characteristics such as place of residence and age. The importance of this advance is to have a scale in Venezuela that measures gratitude, to find differences that are due to the construct in the trajectories of sex, age, and place of residence, and not to errors, biases, or measurement problems, this would allow adequate comparisons by groups for the design of ways to promote gratitude as a correlate of mental health.

The GQ–6 is not the only gratitude measure available. Bernabé–Valero et al. conceived the Gratitude Questionnaire–20 items (G–20), a seven–point Likert scale (9). Klos et al.’s research verified this instrument’s factorial structure (20). Watkins et al. constructed the Gratitude, Resentment, and Appreciation Test (GRAT), which was later condensed into a 16–item version (GRAT–RS) (21,22). Alarcón proposed an 18–item measure encountering an underlying three–dimension structure (23). Auné et al. adapted the Alarcón’s scale in Argentina, research in which the original three–dimensional structure was not replicated; however, a good fit was obtained with a unifactorial model that included 12 of the 18 initial items (24). Cuello and Oros developed a gratitude questionnaire for children aged 9–12 with 15 statements involving a bifactorial configuration (25).

The evidence presented highlights the importance of studying the construct of gratitude in the field of psychology and health sciences, previous studies have indicated the relationship of the construct to mental health outcomes, for example, affectivity, well-being, prosociality, positive emotions, flourishing, optimism and personality, happiness, problem-focused and

social support strategies (5,6,10,14,15–18); while gratitude has been inversely associated with indicators of distress and even possible psychopathology, including negative emotions and affectivity, depression, anxiety and stress (6,14,15,18). All the previous information justifies the development of this research. First, there is a need to deepen the understanding and broaden the dissemination of gratitude as a virtue enhancing well-being and sense of life as indicators of mental health. Secondly, valid and reliable instruments must be developed to capture this construct precisely and correctly. In this regard, it is critical to have scales with a clear and theoretically supported factor structure whose dimensions are sufficiently correlated to have high consistency but differentiated to exhibit adequate discriminant validity. Similarly, these scales must preserve their attributes when used in different environments and administered to homogeneous groups that differ in one or more factors. In other words, the instrument must meet the invariance property for adequate comparison. This assumption is important because it validates the instrument’s ability to remain invariant to characteristics that might be used as comparison factors. If an instrument lacks this property and is used to compare any construct by any sociodemographic aspect, there is a risk of obtaining inappropriate results by detecting significant differences where none exist.

Another reason for this study is the scarcity of South American publications focused on determining the GQ–6 psychometric properties and validating its structure. As far as the authors have ascertained, no similar studies were found in Argentina, Bolivia, Colombia, Paraguay, Peru, Uruguay, or Venezuela. Both have yet to be identified validations of the instrument in non–Spanish speaking countries like Guyana, French Guiana, or Suriname. This situation represents an excellent opportunity to deepen the description of this questionnaire and to improve the understanding of the gratitude construct in the Venezuelan context since no data have been reported on its psychometric performance in Venezuela. Consequently, the dissemination of gratitude will be favored by having an optimal psychometric measure that can be used by health professionals as a reliable resource for the design of interventions in health promotion and prevention

of psychosocial risks in Venezuelan adulthood, as well as a measurement resource to conduct research focused on the relationship between health variables, psychosocial functioning and psychopathology, and even as a resource that will help in the empirical theoretical development of the construct.

Based on the above, the study's objectives and hypotheses were stated. The first objective was to examine the factorial validity of the GQ-6 (2). In this regard, it is assumed that the unifactorial structure will not be reproduced in Venezuela. Therefore, specific changes will be necessary to achieve a satisfactory fit (hypothesis 1). The second objective was to evaluate the convergent validity through the average variance extracted. Consequently, the convergent validity of the GQ-6 in this work will be adequate (hypothesis 2). The third objective was to assess the reliability using Cronbach's Alpha, McDonald's Omega, and the corrected item-total correlation. Since all the references reported at least acceptable internal consistency, it is assumed that such findings will be replicated in this research (hypothesis 3).

The fourth objective was to find the correlation with the PERMA-Profiler dimensions: positive emotions, engagement, interpersonal relationships, meaning, achievement, negative emotions, loneliness, and health perception. It is expected that gratitude will exhibit a significant and positive correlation with the first five dimensions but a negative relationship with the last three. Since these constructs are theoretically differentiable, it is conjectured that the size of these correlations will be small or moderate (hypothesis 4). The PERMA scale was selected for this function because it is theoretically congruent with the positive relationships of the construct of gratitude with measures of mental health and psychological well-being; this scale measures multidimensional psychological well-being with hedonic and eudaimonic items, which allows assessment of validity with other differentiable constructs. It is also one of the variables used in the validations of the GQ-6 to assess convergent validity in international studies (6,14). The fifth objective was to evaluate the invariance according to sex, age, and residence. It is presumed that the findings of this work will be concurrent with the references. Hence, the questionnaire will be invariant to these characteristics and can be used

to contrast gratitude according to these factors (hypothesis 5).

METHODOLOGY

Type of research and design

Instrumental research was implemented to validate the GQ-6 (26). This is the recommended research design in psychology for examining the psychometric properties of measurement instruments, such as reliability and validity, which includes the design, validation, and adaptation of scales.

Participants

The sample comprised 350 Venezuelans selected through non-probabilistic sampling considering: a) aged 18-40; b) resides in Venezuela or overseas; c) identify with any gender; d) have any education level; e) have any marital status; and f) not have physical, cognitive, or emotional conditions that affect their participation. A power analysis was performed to determine the sample size considering the root mean square error by approximation and assuming a cut-off 0.08 (27). The degrees of freedom were specified by selecting the structural equation model with the greatest number of individuals. Cohen's *d* statistic was used to detect a moderate effect, setting it at 0.50 (28). The power was set to 0.80. The calculation was made with the SemTools package (29) and GPower software (30), showing that 323 people would be necessary.

The Gratitude Questionnaire-Six Item Form (GQ-6)

The Spanish version of the questionnaire originally proposed by McCullough et al. (1,2,5) and later validated by Carmona-Halty et al. (7) was administered in this research to measure the construct of interest. The instrument consists of six items configured on a seven-point Likert scale assessing the individual's disposition towards gratitude. This adaptation has adequate factorial, convergent, and discriminant validity and acceptable reliability values calculated using

Cronbach's Alpha and McDonald's Omega coefficients. Likewise, correlations have been recorded between the instrument scores and external constructs such as life satisfaction, optimism, personality, and positive affect. The Gratitude Questionnaire Six–Item Form has been administered in Spanish–speaking countries such as Spain, Chile, and Peru (7,9,14).

The PERMA–Profiler

The PERMA–Profiler is based on Seligman's multidimensional theory of well–being (31). It is a five–point Likert scale with twenty–three items, including five dimensions: Positive Emotions (P), Engagement (E), Relationships (R), Meaning (M), and Achievements (A). In addition, the questionnaire has unique items through which Perception of Health (H) and Negative Emotions (N) are used as controls. Butler and Kern (32) found adequate reliability, detecting a Cronbach's Alpha of 0.94 for the overall and values ranging from 0.71 to 0.91 for the subscales. Evidence that supported the factorial, convergent, and divergent validity was also reported in this work. Additionally, research undertaken in the Venezuelan context supported its internal consistency through Cronbach's Alpha and McDonald's Omega of 0.91 and 0.89, respectively (33).

Procedure

Data was collected through a virtual survey published on social networks. The aims and implications of the study were disclosed to all participants, emphasizing that participation was voluntary and did not imply any risk to their mental, physical, or emotional health. It was also indicated that the collaboration did not imply any remuneration, that the information would only be used for academic and research purposes, and that sensitive data would be preserved, preserving anonymity and confidentiality. In addition, it was explained that the individual could leave the study at any time without negative repercussions. All this information was carefully included in the informed consent given to all participants at the beginning of the research. Finally, the standards of the American Psychological Association (APA)

and the “Federación de Psicólogos de Venezuela” (FPV) were always followed. The study was conducted according to the guidelines of the Declaration of Helsinki and approved by the Institutional Review Board (or Ethics Committee) of Jóvenes Fuertes (protocol code: JFC130921/ September 2021).

Data analysis

First, the data set was inspected to corroborate that no transcription and tabulation errors existed. Subsequently, missing data analysis was performed, revealing at most 5 % missing values for variables and cases. Therefore, no records from the data set were eliminated from the analysis (34). Outliers were also examined using the robust Mahalanobis distances (35), detecting a moderate amount of these observations. Likewise, the normality assumption was explored with the Mardia test (36), finding significant departures from this hypothesis. In this regard, the maximum likelihood method with scaled statistics and robust standard errors proposed by Satorra–Bentler (37) was used. This technique is proper for working with an instrument with more than five options when the data are not normal, and the presence of outliers is not negligible (38).

The fit was determined through the Chi–Square test and the normed Chi–Square statistic. The Comparative Fit Index (CFI), Tucker–Lewis Index (TLI), Root Mean Square Error by Approximation (RMSEA), and Standardized Root Mean Square Residual (SRMR) were also considered. The cut–off points for these measures were based on the most common literature references and can be visualized in Table 2 (39). Convergent validity was calculated using the Average Variance Extracted (AVE) and Composite Reliability (CR) using a cut–off of 0.50 and 0.70, respectively (40). A correlation analysis was conducted with the PERMA–Profiler scale to support the validity and provide evidence for the construct nomological network. Since Pearson's coefficient assumptions were not met, the Spearman's Rho statistic was used considering the following cut–off points: weak (0.10), moderate (0.30), and strong (0.50) (41,42).

The reliability and internal consistency of the Gratitude Questionnaire Six–Item Form were

verified with Cronbach's Alpha and McDonald's Omega statistics (43). The corrected item-total correlation coefficient (CITC) was also calculated to complement this study phase. Measurement invariance (MI) was established using multigroup confirmatory factor analysis. In this regard, configural, metric, and scalar invariance was assessed by comparing the Chi-Square statistic of the nested models with its corresponding significance. The difference in the CFI was also used, considering acceptable values equal to or less than 0.010 (44). Data analysis was performed with Lavaan, SemPower, SemTools, Psych, MVN, and GPower (29,30,45-48). The significance was set at 0.05, whereas the RMSEA confidence interval was fixed at 90 %.

RESULTS

Sociodemographic characteristics of the participants

A total of 350 people participated in the study, of whom 238 identified themselves as women (68 %), whereas 106 recognized themselves as men (30.29 %). Likewise, four people preferred not to answer the question (1.14 %), while two participants associated themselves with another gender. Concerning marital status, 322 were single (92 %), 15 were married (4.29 %), two were divorced (0.57 %), and 11 were living with a partner (3.14 %). Regarding the academic level, 230 had high school degrees (65.71 %), 90 had bachelor's degrees (25.71 %), 18 had technical degrees (5.14 %), 11 had master's degrees, and only one person had a Ph.D. (0.29 %). In addition, 267 lived in Venezuela (76.29 %), while 83 lived outside the country (23.71 %). Finally, age ranged from 18 to 37 years and averaged 22.24 ± 3.00 (95 % CI: 21.92 - 22.56).

Descriptive analysis of the items

The descriptive analysis of the items is depicted in Table 1. Note that the first and fifth items exhibited an elevated negative skewness, while kurtosis was high in the first, fourth, and fifth. Shapiro-Wilk's statistics were significant for all elements, which rejected the univariate

normality assumption. Likewise, Mardia coefficients for skewness and kurtosis were significant and invalidated the multivariate normality conjecture. The corrected item-total correlation was higher than 0.30, although the third and sixth items reflected slightly lower values. The participants' scores evidenced high levels of gratitude, ranging from 4.94 to 6.40, with a standard deviation varying from 1.21 to 1.80.

Factorial validity, convergent validity, and reliability of the GQ-6's theoretical models

The GQ-6's factorial validity was tested based on the models proposed in the literature and described in the introduction. Thus, four unidimensional models were subjected to the CFA specified in the statistical analysis: a six-item model (M1), a five-item model eliminating the sixth item (M2), a five-item model excluding the third item (M3), and a four-item model eliminating both the third and sixth items (M4). Table 2 shows that none of these proposals showed satisfactory fit indexes. All the normed Chi-Square statistics were considerably higher than 3.00, and none of the TLI was higher than 0.90. In addition, the RMSEA was always greater than 0.08. Although reliability was good in all four alternatives, the AVE was always below 0.50. The above results motivated the need to evaluate other options and suggest the model described below.

Factorial validity, convergent validity, and reliability of the GQ-6's proposed model

The model proposed in the present study is based on the six-item unifactorial structure allowing for residual correlation between statements 1-4, 2-5, and 3-6 (M5). It is important to note that the employed residual correlation is justified from a theoretical point of view due to the similarity of the related items. Table 2 indicates that this configuration presents a substantial improvement in fit when compared to the reference models. Nonetheless, both the AVE and McDonald's omega coefficients were lower than the suggested cut-off point. Consequently, this model was chosen to establish the validity of the instrument through correlation with external

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Table 1. Descriptive analysis of the GQ–6 items.

Items	Description	M (SD)	g1 (g2)	SW (CITC)
1	I have so much in life to be thankful for (Tengo muchísimo en la vida por lo que estar agradecido)	6.31 (1.32)	–2.52 (6.47)	0.58 (0.50)
2	If I had to list everything that I felt grateful for, it would be a very long list (Si tuviera que hacer una lista por todo lo que me siento agradecido, sería una lista muy larga).	5.55 (1.52)	–1.14 (0.75)	0.84 (0.51)
3a	When I look at the world, I don't see much to be grateful for (Cuando miro al mundo, no veo mucho por lo que estar agradecido).	5.51 (1.80)	–1.06 (–0.10)	0.79 (0.36)
4	I'm grateful to a wide variety of people (Le estoy agradecido a muchas personas diferentes).	5.95 (1.34)	–1.65 (2.66)	0.76 (0.60)
5	As I get older I find myself more able to appreciate the people, events, and situations that have been part of my life history (A medida que pasan los años me veo más capaz de valorar a las personas, los acontecimientos y las situaciones que han formado parte de mi historia).	6.40 (1.21)	–2.83 (8.58)	0.55 (0.47)
6a	Long amounts of time can go by before I feel grateful to something or someone (Puede pasar mucho tiempo antes de que me sienta agradecido por algo o por alguien).	4.94 (1.77)	–0.53 (–0.77)	0.90 (0.34)

Items in Spanish are shown in parenthesis; M, mean; SD, standard deviation; g1, skewness; g2, kurtosis; SW, Shapiro–Wilk's statistic; a Reverse–scored item; all SW were significant at the 0.001 level; Mardia's skewness = 1 330.98 ($p < 0.001$); Mardia's kurtosis = 33.67 ($p < 0.001$).

Table 2. Comparison of the theoretical and proposed models for the GQ–6.

Fit index	Cut–off points	M1	M2	M3	M4	M5
χ^2 (gl)	NA	68.27 (9)	32.36 (5)	33.73 (5)	24.54 (2)	12.68 (6)
$p(\chi^2)$	> 0.05	< 0.001	< 0.001	< 0.001	< 0.001	0.048
χ^2 /gl	< 3.00	7.59	6.47	6.75	12.27	2.11
CFI	> 0.95	0.85	0.91	0.91	0.91	0.99
TLI	> 0.95	0.74	0.82	0.82	0.72	0.96
RMSEA	< 0.08	0.16	0.15	0.15	0.23	0.06
90 % CI	Includes 0.08	[0.12; 0.19]	[0.10; 0.20]	[0.10; 0.20]	[0.16; 0.32]	[0.01; 0.10]
SRMR	< 0.05	0.07	0.05	0.05	0.05	0.02
AVE	> 0.50	0.30	0.36	0.36	0.41	0.27
CR	> 0.70	0.33	0.47	0.49	0.78	0.71
Alpha	> 0.70	0.71	0.72	0.71	0.78	0.71
Omega	> 0.70	0.70	0.72	0.73	0.78	0.61
ACITC	> 0.30	0.46	0.49	0.49	0.59	0.46

NA, not applied; ACITC, average corrected item–total correlation.

variables, in addition to factorial invariance according to the sex, age, and residence of the participant.

Validity through correlation with external variables

The correlation between gratitude and the external constructs is shown in Table 3. As expected, the GQ-6 scores correlated significantly and positively with the psychological well-being dimensions of the PERMA-Profiler and its global construct. A positive and significant relationship was also observed between gratitude and the perceived health dimension of this instrument

but inverse with its negative emotions measure. Regarding the magnitude of the relationship between constructs, a weak correlation was observed between engagement and perceived health. In contrast, the rest of the variables exhibited a moderate or strong correlation with gratitude.

Measurement invariance according to age, sex, and residence of the participants

These results are illustrated in Table 4. The invariance assumption is most satisfied in the three specified sociodemographic characteristics. The configural models exhibited optimal fit when

Table 3. Convergent validity of the GQ-6 through correlation analysis

Constructs	SBR	p(SBR)	95 % LCL	95 % UCL	Magnitude
Well-Being (PERMA)	0.52	< 0.001	0.43	0.61	Strong
Positive emotions (P)	0.47	< 0.001	0.38	0.55	Moderate
Engagement (E)	0.22	< 0.001	0.09	0.29	Weak
Relationships (R)	0.54	< 0.001	0.45	0.61	Strong
Meaning (M)	0.42	< 0.001	0.30	0.50	Moderate
Accomplishment (A)	0.41	< 0.001	0.30	0.49	Moderate
Negative emotions (N)	-0.34	< 0.001	-0.45	-0.25	Moderate
Health (H)	0.28	< 0.001	0.17	0.38	Weak

SBR, Spearman-Brown's Rho non-parametric coefficient of correlation. Confidence limits were constructed using the method proposed by Fieller, Hartley, and Pearson.

Table 4. Measurement invariance of the GQ-6 proposed model

Factor	Level	χ^2 (gl)	p(χ^2)	$\Delta\chi^2$	Δgl	p($\Delta\chi^2$)	ΔCFI	Decision
Sex	Configural	13.39 (12)	0.341	NA	NA	NA	NA	Accept
	Metric	22.27 (17)	0.175	8.34	5	0.138	0.010	Accept
	Scalar	35.73 (22)	0.032	14.34	5	0.014	0.012	Reject
	Partial scalar ^a	26.22 (21)	0.198	3.83	4	0.429	0.0001	Accept
Age	Configural	18.90 (12)	0.091	NA	NA	NA	NA	Accept
	Metric	24.94 (17)	0.096	6.46	5	0.264	0.005	Accept
	Scalar	38.79 (22)	0.015	15.81	5	0.007	0.019	Reject
	Partial scalar ^b	33.61 (21)	0.039	9.63	4	0.047	0.010	Accept
Country of residence	Configural	15.72 (12)	0.205	NA	NA	NA	NA	Accept
	Metric	15.95 (17)	0.527	1.53	5	0.910	0.007	Accept
	Scalar	23.13 (22)	0.394	7.65	5	0.176	0.002	Accept

The difference in the fit indices used to assess measurement invariance is indicated by the delta symbol (Δ); a Partial scalar invariance was achieved by free estimation of the third item intercept; b Partial scalar invariance was achieved by free estimation of the sixth item intercept; NA, not applied. The groups used to assess invariance were as follows: female versus male, 18-21 years versus 22-37 years, living in Venezuela versus living abroad.

using the sex (female versus male), age (18-21 versus 22-37), and participants' residence (living in Venezuela versus living abroad) as factors. Similarly, metric invariance was satisfied for the three variables mentioned above. In this case, none of the Chi-Squared differences were significant, nor were differences in the CFI greater than 0.010. However, full scalar invariance could only be confirmed using the participant's country of residence. For sex and age, it was necessary to freely estimate the intercept of the third and sixth items to achieve partial scalar invariance. This outcome implies that the GQ-6 scale is partially invariant to factors such as sex and age but fully invariant to the country of residence. Therefore, the scale could be used to compare gratitude between these variables' categories with a low risk of detecting spurious differences.

DISCUSSION

Gratitude is a relatively new study variable in psychology. In the personality, health psychology, and positive psychology fields, it has been identified as a protective factor of mental health and psychological well-being. Moreover, gratitude has been inversely related to distress and psychopathology (1,2,18). Based on this context, this research aimed to examine the psychometric properties of the Spanish version of the Gratitude Questionnaire Six-Item Form (GQ-6). The original scale was proposed by McCullough et al. (5) and was subsequently adapted and validated in Spanish by Carmona-Halthy et al. (7). Specifically, the study focused on determining factorial, convergent, and discriminant validity. Likewise, the research concentrated on measuring the scale's reliability and internal consistency and establishing its measurement invariance.

Regarding factorial validity, the results suggest a one-factor structure of six items with a residual correlation between items 1-4, 2-5, and 3-6. This finding confirms the study's first hypothesis (hypothesis 1). Although the factor structure of the GQ-6 has been confirmed in Japan (6) and Chile (7,15), in other studies, it has been necessary to eliminate the sixth item. This elimination procedure has occurred in research conducted in Germany, Spain, China,

and France (8-10,18). The results of this research differ from the previously mentioned studies in which a five-item structure was needed. However, these findings coincide with those works in which complications have been found in the six-item structure, making it necessary to correlate some residuals. For example, in China, Kong et al. correlated the fourth and fifth item residuals to obtain an adequate fit (11).

Likewise, research conducted in Holland, Ecuador, and Italy uncovered complications with the sixth item due to its low factor loading (12-14). Despite this, none of these studies eliminated this element, retaining the original unifactorial model. Some authors argue that item six is difficult to understand for non-American cultures due to its wording (14,18). Other researchers contend that the wording appeals to a retrospective evaluation of life, making the item difficult to interpret in young people compared to older people (10,15,17). On the other hand, the model proposed in this research exhibited some convergent validity deficiencies. Specifically, the AVE was considerably below the suggested cut-off point of 0.50. This outcome implies that validity would be questionable since more than 50 % of the variance was captured by measurement error rather than by the construct. However, Fornell-Larcker states that the AVE is a conservative measure that underestimates validity (40). The authors remark that, based solely on appropriate values for CR, the researcher may conclude that convergent validity is adequate, even though the AVE is less than 0.50 (40). Based on this, the study's second hypothesis (hypothesis 2) could be confirmed. Nevertheless, exploring this property and analyzing the relevance of low-factor loading items in future research is essential.

Concerning reliability and internal consistency, the third hypothesis (hypothesis 3) was partially confirmed since McDonald's omega reached a questionable value of 0.61. Nevertheless, Cronbach's alpha and corrected item-total correlation were acceptable, showing values of 0.71 and 0.46, respectively. The Cronbach's alpha of this research was similar to other studies' outcomes reporting values close to 0.70. In Chile, Italy, Holland, and Brazil, where six-item models were postulated, congruent findings were

found (7,12,13,49). These results were also detected in the five-item structures in India, Romania, Spain, and Turkey (9,16,17,19). On the other hand, some investigations uncovered Cronbach's alpha of 0.80, such as those undertaken in China, Germany, Chile, Ecuador, Japan, and France (6,8,10,14,15,18). However, the present research results differed from the two proposals made in Kenya, both the five-item and the six-item models, since the values recorded in this case were around 0.40 and 0.60, respectively (50).

Another evidence of convergent validity was the significant relationship between the GQ-6 and the PERMA-Profilers scores, confirming the fourth hypothesis of the study (hypothesis 4). As expected, Spearman-Brown's Rho was positive with the well-being dimensions of the scale: interpersonal relationships, positive emotions, meaning, achievement, and engagement. Similarly, positive correlations were found with the perceived health dimension of that instrument. In contrast, the association between gratitude and the negative emotions dimension of the PERMA-Profiler was negative, which constitutes evidence of divergent validity.

The previous evidence coincides with other studies where the GQ-6 has been employed. These works have found an evident positive association between gratitude and mental health, satisfaction, well-being, and other important variables reflecting adequate psychosocial functioning. These studies have also reflected an inverse relationship between gratitude and unpleasant emotions, psychological discomfort, and some indicators of psychopathology (7,9,11-19,49,51-56). Consequently, the GQ-6 possesses construct validity through the relationship with other psychological variables. This study found a strong association between gratitude and the positive emotions components, which is consistent with several authors who conceive gratitude as a positive emotion (2,57). Similarly, the correlation magnitude with the construct of interpersonal relationships would make theoretical sense since gratitude has been identified with social and empathy components that reinforce bonds (8).

Measurement invariance was another psychometric property examined in this study.

In this sense, the results suggest that the GQ-6 is invariant to factors such as country of residence but partially invariant to socio-demographic characteristics such as sex and age, which confirms the fifth hypothesis (hypothesis 5). Hence, the scale could be used to compare gratitude according to these variables with a low risk of detecting spurious differences. Nevertheless, the results should be carefully taken due to the problems observed in the third and sixth items when testing for scalar invariance. These results coincide with those identified in Ecuador, India, Romania, Brazil, China, and Chile, where the equivalence of the instrument according to the participant's sex was endorsed (11,14-16,19,49,58). In addition, this work's findings are concurrent with other investigations in which factors other than sex were used. Specifically, the invariance of the GQ-6 according to country of residence was corroborated in Germany (8), while the equivalence according to age was verified in Switzerland (59).

One of the most important theoretical and practical implications of this research is the confirmation of the six-item unifactorial model formulated by McCullough et al. (5). Although the factorial structure has already been corroborated in other sociocultural contexts, this is the first study conducted in Venezuela to determine this validity and ratify the model mentioned above. Consequently, this is the first work in the country that focuses on determining GQ-6's psychometric properties, such as convergent validity, discriminant validity, reliability, and invariance. Regarding invariance, a relevant implication is to have identified total scalar invariance by country of residence and partial scalar invariance by sex and age. In fact, it is one of the few studies in Latin America to evaluate this attribute according to age and country of residence. To our knowledge, this is the first study in Venezuela to test the invariance for sex, age, and place of residence for the GQ-6, which opens possibilities to identify real differences in the constructs that can be explained by qualitative variations that may be based on psychological mechanisms. Another practical implication of the research is the versatility of the scale. In this sense, it is confirmed that the GQ-6 can be used in European, Asian, American, and Latin

American contexts. Likewise, it is shown that the scale has adequate indicators, being a short and brief alternative compared to other instruments mentioned in the introduction, which also show satisfactory properties (9,20-25). From the above, it is concluded that the GQ–6 is a reliable and valid instrument that could be used in young adults as a primary care psychological and psychotherapeutic tool to promote well–being and healthy living.

Thus, it is recommended that health and education institutions undertake public policies administering the GQ–6 as a starting point to promote exercises in which gratitude is used to manage both the positive and negative aspects of daily life. It is also suggested to evaluate the scale’s temporal invariance to use it as a longitudinal measure in psychological interventions. In this regard, the exercises formulated by Emmons and Bono et al. are recommended for these practices (60,61).

Although the results invite further analysis of the GQ–6’s psychometric properties, the research presents limitations that must be carefully considered. First, the sample consisted only of young adults; therefore, it is advisable not to extrapolate the conclusions to another type of population, and it is recommended to check the scale’s attributes when applying it to different age participants. The second limitation is the sampling method. Even though the number of participants was satisfactory, it was impossible to use probabilistic techniques to select them, which is why extreme caution must be taken when generalizing the findings. Another important limitation has to do with the number of women over men in the sample, although it did not affect the statistical analyses carried out, other investigations must guarantee samples by quotas within the population sampling strategy to guarantee the representativeness of the sample, in addition, it leads us to think why women participated in the study more than men. The absence of more objective indicators of gratitude should also be highlighted. Since the scale is a self–reported measure, a biased estimate of the construct could be obtained based solely on the participant’s self–perception. Additionally, it should be mentioned as a limitation the use of technological resources to contact people,

automatically excluding all those without Internet access. One of the study’s main strengths is that it was accomplished with a general population young adults sample and not only based on university students, which undoubtedly increases the scope of the research and its findings.

For future studies, it is recommended to solve the above limitations and go deep into the convergent and divergent validity of the scale using other psychological variables, such as envy, social discomfort, anxiety, and depression, together with physical health variables. It is also suggested to use a larger sample that covers the complete evolutionary cycle to explain the role of gratitude with other constructs, such as the sense of life and the normative crises formulated by Erikson. In relation to the normative crises of age, developmental psychology has conducted interesting studies in which it has found a possible advance in the development of gratitude with age, i.e. the older the chronological age, the more people develop gratitude. And this is not only because of a quantitative aspect, but also because of the psychological maturity acquired through life experiences, the balance of achievements and the analysis of the present opportunities and the remaining future time, and non–normative crises related to historical events (COVID–19, wars, and others) (62,63).

CONCLUSIONS

The Gratitude Questionnaire Six–Item Form is a brief scale with adequate factorial, convergent, and discriminant validity, as well as appropriate reliability and scalar invariance according to sex, age, and country of residence. However, it needed to be improved due to the low factor loadings of the third and sixth items, the drawbacks observed with these items when assessing scalar invariance, and the low average variance extracted. Therefore, examining these aspects at the time of administration is suggested. This is the first psychometric analysis of the GQ–6 in Venezuela, which constitutes an invitation for future psychometric work, explanatory studies, or psychological intervention designs in the country and other regions of Latin America.

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