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ORIGINAL RESEARCH

Coping Strategies Among Undergraduates: Spanish Adaptation and Validation of the Brief-COPE Inventory

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Purpose: Different studies have highlighted the importance of coping strategies in stressful situations. The Coping Orientation to Problem Experienced (COPE) by Carver et al is one of the instruments that is frequently used for measuring this aspect. The aim of this study was to carry out the cross-cultural adaptation and validation of the Brief-COPE inventory to measure coping strategies in Spanish populations.

Methods: The linguistic and cultural adaptation of the Brief-COPE was carried out using the back-translation method and, after considering the results of the pilot test, the Spanish version of the instrument was configured, and subsequently administered to a convenient sample of 2135 undergraduates. A confirmatory factor analysis was carried out to examine construct validity of the Spanish adaptation of the brief-COPE; likewise, reliability was analyzed from two approaches, internal consistency and composite reliability. Concurrent validity was also tested.

Results: The results showed that the Spanish version of Brief-COPE has adequate reliability values, as well as satisfactory fit indexes for the proposed 14-factor first-order structural model. Likewise, external evidence of the validity of the inventory with the variables perceived stress, level of satisfaction with life, and academic performance is provided.

Conclusion: The results suggest that this instrument presents a satisfactory metric quality and, therefore, it could be useful to evaluate coping strategies, which would allow further research on its incidence and consequences on health and psychological functioning.

Keywords: coping strategies, psychometric properties, Spanish adaptation, validation

Introduction

Coping is a variable pattern of thinking, feeling, and behavior through which a person attempts to manage specific external and/or internal demands, generated by a stressful situation, that exceed his or her resources.[1–3] This non-cognitive ability allows regulating the potential repercussions of stress at the somatic, psychological, and behavioral levels, thus facilitating the adjustment and adaptation of the person to situations of uncertainty, preserving his or her own physical and psychological integrity, mainly through the use of different strategies.[1,4]

Coping strategies refer to specific actions aimed at modifying the stimulus that generates stress, as well as controlling the emotions that derive from it.[1,5] Traditionally, these strategies have been grouped into two categories: (a) problem-centered, ie, actions aimed at eliminating or reducing the impact of the stressor (active coping, planning, positive reframing, and acceptance); and (b) emotion-centered, ie, actions aimed at preventing or reducing the emotional distress or discomfort caused by a stressful situation (instrumental support, emotional support, self-blaming, venting, and religion).[2,3] However, Endler and Parker[6] suggested a third category, called avoidance-centered coping strategies, which encompasses actions aimed at avoiding stressful situations through distraction techniques (behavioral disengagement, denial, substance use, self-distraction, and humor).

Stress management and the choice of the most adequate coping strategy depend on the emotional and cognitive evaluation of each person.[7] In fact, the coping strategies to use are selected depending on the stressful situation, although there is no agreement about their differential use nor is their individual or collective use.[8] The most used coping strategies seem to be problem solving, cognitive restructuring and the search for instrumental and emotional support.[9,10] However, not all coping strategies are equally effective in dealing with stressful situations.[11,12] In general terms, strategies that actively target the stressor, or the thoughts and emotions derived from it, have proven to be associated with a better adjustment to stressful situations.[1,3,4,13] Alternatively, avoidance strategies, which involve distancing oneself from the stressor and the thoughts and emotions derived from it, have been associated with a worse adaptation to such situations.[1,3,4,13] In particular, while active coping, planning, instrumental support, emotional support, positive reframing, and acceptance are often conceived as adaptive strategies, as they reduce stress and promote health in the long term, others like denial, behavioral disengagement, self-blaming, self-distraction, venting, religion, and substance use are considered maladaptive strategies, as they reduce stress in the short term, but damage health in the long term.[4,13] Humor, for its part, can be classified as an adaptive strategy when it is used to increase the well-being of oneself and others, or as a maladaptive one, when it is used to hide one's feelings, manipulate or communicate aggressively, through sarcasm or cynicism.[4]

The results of research on coping strategies have shown their relationship with several variables related to certain personality traits (eg, extraversion and use of adaptive strategies; introversion and use of maladaptive strategies),[14,15] some elements of emotional intelligence (eg, regulation, use and evaluation of emotions are associated with the use of adaptive strategies),[4,16] certain components of psychological well-being (eg, maladaptive strategies are usually associated with psychological problems, while adaptive strategies are more strongly linked to greater psychological well-being, and lower rates of stress, anxiety and depression),[17–19] academic performance (eg, adaptive strategies positively correlate with academic performance, and maladaptive ones negatively)[20,21] and satisfaction with life or quality of life.[18,22,23]

In this sense, due to the large number of stressors to which most human beings are exposed and given the relevance that stress-coping generates in people's health, it is not surprising the growing scientific interest in this non-cognitive ability and, especially, in its measurement and intervention, even if it is not an easy task.[7,11,12] Indeed, numerous instruments have been developed to assess how people cope with stress in specific situations: Ways of coping questionnaire,[24] Adolescent coping orientation for problem experiences inventory,[25] Multidimensional coping inventory,[6] Coping strategy inventory[26] and Coping Orientation to Problem Experienced (COPE).[27]

Precisely, among the various instruments used to measure coping strategies in the field of educational and health research, the COPE by Carver et al[27] stands out as one of the most frequently used (see Kato[18] for more information). This instrument initially consisted of 60 items and 15 subscales, but later on, an abbreviated version of it was developed, resulting in the Brief-COPE inventory,[28] which is composed of 14 subscales (ie, active coping, planning, instrumental support, emotional support, self-distraction, venting, behavioral disengagement, positive reframing, denial, acceptance, religion, substance use, humor, and self-blaming) of 2 items each. Brief-COPE inventory, according to the author,[28] showed adequate psychometric properties and it has been the subject of some instrumental studies,[13,17,29,30] but its adaptation and validation has proven to be inconclusive with the Spanish population.[29] In this sense, with this study, it is intended to provide evidence in this area, proceeding to the adaptation and validation of the Brief-COPE inventory[28] to the Spanish university population.

Therefore, the objective of this research was to adapt and validate the Brief-COPE inventory[28] to the Spanish population and provide evidence on its psychometric properties. In this sense, the following hypotheses were proposed: (1) a first-order factor structure will be confirmed with 14 correlated factors, in the same terms as in the studies carried out with the original version of the Brief-COPE[28] and the Chilean one[17]; (2) the internal consistency of the instrument and each of its factors will be acceptable, higher than 0.7 and therefore similar to that of the original version,[28] although improving on that of the rest of the adaptations with the Spanish population[13,17,29,30]; and (3) external evidence of validity of the instrument will be confirmed with the variables of perceived stress, satisfaction with life and academic performance (ie, adaptive strategies will be associated with a lower degree of perceived stress, a higher degree of satisfaction with life and a higher academic performance, while maladaptive strategies will be associated with a higher degree of perceived stress, a lower degree of satisfaction with life and a lower academic performance).

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Materials and Methods

Participants

The sample was made up of 2135 students enrolled in different bachelor's degree programs (44.9% from primary education, 31.5% from early childhood education, 17.3% from education, 6.3% from social education) at the University of Granada (Spain): 820 students in the first year, 541 in the second year, 460 students in the third year and 314 in the fourth year. The participants' mean age was 21.03 (SD = 3.3), with an age range between 18 and 41, while their distribution by sex was 410 males (19.2%) and 1725 females (80.8%).

A non-probabilistic purposive sampling was used.[31] The sample size included more than 200 cases,[32] and it exceeded the ratio of 10 cases per item,[33] above the minimum established in different simulation studies for relatively simple structural models.[34] However, for greater security, the minimum sample size needed for the structural complexity of the specified model was calculated (n = 400) considering the number of observed variables (28) and latent variables (14), the expected effect size (0.10), the associated probability (0.05) and the desired levels of statistical power (0.80).[35]

Instruments

Spanish adaptation of the Brief-COPE is a Likert-type scale made up of 28 items estimated between 1 (*Never*) and 5 (*Very often*) that evaluate 14 coping strategies for stressful situations:[28] (a) active coping; (b) planning; (c) instrumental support; (d) emotional support; (e) self-distraction; (f) venting; (g) behavioral disengagement; (h) positive reframing; (i) denial; (j) acceptance; (k) religion; (l) substance use; (m) humor; and (n) self-blaming. In its original version, this inventory revealed adequate levels of internal consistency, in addition to showing proof of validity of its factor structure.[28]

Spanish adaptation of the Perceived Stress Scale presents 13 Likert-type items, which are rated between 0 (*Never*) and 4 (*Very often*). A higher score indicates a lower degree of perceived stress.[36] This scale was used because it is one of the tests commonly used to evaluate perceived stress in Spanish young adults due to its adequate psychometric properties in its original version.[36] In this research, the scale showed a Cronbach's alpha (α) of 0.88 and a McDonald's omega (ω) of 0.89. Moreover, a one-factor confirmatory factor analysis (CFA) was estimated, with adequate fit indexes: Satorra–Bentler Chi-squared (S-Bχ^2) (198) = 903.19, p-value (p) < 0.001, S-Bχ^2/degree of freedom (df) = 4.56, comparative fit index (CFI) = 0.96, goodness-of-fit index (GFI) = 0.98, standardized root mean squared residual (SRMR) = 0.08, root mean squared error of approximation (RMSEA) = 0.08 (90% confidence interval [CI] = 0.07–0.08).

Spanish adaptation of the Satisfaction with Life Scale is a five-point Likert scale from 1 (*Strongly disagree*) to 5 (*Strongly agree*).[37] A higher score indicates a higher degree of satisfaction with life. This scale comprises five indicators of overall satisfaction with one's life, and its use is justified because of the need to measure this variable and of its high reliability index and acceptable validity indexes in its original version and Spanish adaptation.[37] In this study, it yielded adequate levels of internal consistency (α = 0.81, ω = 0.82), and a one-factor CFA was estimated, with excellent fit indexes: S-Bχ^2 (12) = 31.77, p < 0.001, S-Bχ^2/df = 2.65, CFI = 0.95, GFI = 0.98 SRMR = 0.03, RMSEA = 0.05 (90% CI = 0.03–0.07).

Sociodemographic and academic information self-report. It consisted of five items with multiple-choice or open-ended responses aimed at gathering information from the participants on the following dimensions: (a) sociodemographic (ie, age and gender); (b) academic information (ie, bachelor's degree program and course); and (c) grade point average (GPA), in a scale from 0 to 10 points.

Procedure

The methodological design adopted was instrumental,[38] and the process of adapting cross-cultural and review of the psychometric properties of the Brief-COPE was determined by the Guidelines of the International Test Commission.[39,40] In this sense, in the first phase, the permission needed from the author of the inventory was secured for the purpose of the adaptation, and then a systematic review on the construct was conducted to provide evidence that coping strategies can be generalized across cultures, and they are relevant to the target population.

The second phase consisted of performing the linguistic and cultural adaptation of Brief-COPE, following the back-translation method[40]: (a) two qualified professional translator generated independently their own Spanish version of the Brief-COPE (ie, parallel translation); (b) the linguistic and cultural equivalency of these translations were reviewed and analyzed by three specialists (ie, experts in the construct to be measured, in test construction, and in the Spanish culture, who kindly agreed to collaborate on the study); after making some adjustments, they proposed a consensual translation, on which a reverse translation into English was made by a third professional translator; (c) a committee of three specialists reviewed and analyzed the linguistic and cultural equivalency of Spanish version of the Brief-COPE and previous adaptations of Brief-COPE into Spanish languages (ie, Chilean, Mexican, Uruguayan); and (d) this committee specialists calculated Aiken's $V = 0.76$ to measure the degree of comprehensibility of the items in Spanish, which should be at least 0.7.[41]

In the third phase, a pilot test was conducted with a sample of undergraduates (n = 403). This pilot test allowed to confirm the direction and meaning of the psychometric properties of the inventory, its adequate online format, the approximate time needed to fill it out, and the appropriate content and format of its items.[42]

Finally, in the fourth phase, after obtaining permission from the institutional authorities, the research team used computer-assisted web interviewing technique[43] to recruit a sample of undergraduates enrolled in different bachelor's degree programs in educational sciences, in which future education professionals were being trained. Participants (n = 4951) were sent an online invitation (ie, an email was sent to undergraduates through PRADO, the University of Granada's official platform based on Moodle to support teaching) and given 2 weeks to respond. This invitation provided information on the objective of the study, the voluntary nature of their participation, and the confidentiality of their responses. Undergraduates who decided to participate were provided with a respondent-specific link to access all measures and the instructions on how to fill them out through an e-mail. Participants completed all measures simultaneously: Sociodemographic and academic information self-report, Spanish version of the Brief-COPE, Spanish adaptation of the Perceived Stress Scale,[36] and Spanish adaptation of the Satisfaction with Life Scale.[37] Responses were collected in January 2021. Response rate was 43.12%.

The study was carried out in accordance with the Ethical Committee of the University of Granada (1400/CEIH/2020).

Data Analysis

The initial analysis consisted of calculating the descriptive statistic and checking data distribution (ie, skewness, kurtosis, Shapiro–Wilk statistic, and Mardia's coefficients of multivariate skewness and kurtosis), linearity and atypical, missing, and influential cases, after reversing the items with negative formulation.

Subsequently, according to the structural model of the original version of the Brief-COPE,[28] a 14-factor CFA was estimated using the weighted least squares (WLS) method. The goodness-of-fit of the structural model proposed was evaluated using different indexes: (a) the S-Bχ^2, which should not be statistically significant to indicate a good fit,[44] although the ratio S-Bχ^2/df can also be considered (lower than 5 to be interpreted as acceptable)[45]; (b) the CFI, of more than 0.9 and, ideally, greater than 0.95[46]; (c) the GFI with values of more than 0.9[46]; and (d) the SRMR and RMSEA of 0.08 or less (ideally, less than 0.05).[46]

The reliability was analyzed from two approaches[47,48]: (a) internal consistency: α and ω, which should be greater than 0.7[49,50] and (b) composite reliability: composite reliability index (CRI), and average variance extracted (AVE), which should be greater than 0.7 and 0.5, respectively.[51,52]

The structures of the Spanish adaptation of the Perceived Stress Scale,[36] and Spanish adaptation of the Satisfaction with Life Scale[37] were also examined by means of one-factor CFAs using WLS estimation, and to determine their reliability, α, ω, CRI, and AVE were also estimated.

Finally, following the criteria proposed by Hair et al[52] concurrent validity was tested by the Pearson correlation coefficient (r) between scores on the Spanish adaptation of the Brief-COPE factors, the Spanish adaptation of the Perceived Stress Scale,[36] the Spanish adaptation of the Satisfaction with Life Scale,[37] and academic performance (ie, GPA). Moreover, in order to establish differences in the factors of the inventory according to gender variable, Mann–Whitney (U) tests were performed, including Cohen's d.

Statistical analyses were carried out using Statistical Package for the Social Sciences 26.0 (IBM Corporation, Armonk, NY, USA), and STATA 16 (StataCorp LLC, College Station, TX, USA).

Results

Table 1 shows the descriptive characteristics of the Spanish adaptation of the Brief-COPE. The values of skewness, kurtosis, and Shapiro–Wilk statistic suggest non-normal univariate distribution in all items and factors (Table 1). Moreover, Mardia's coefficients of multivariate skewness (131.41, $\chi^2 = 46,831.85$, $p < 0.000$) and kurtosis (987.72, $\chi^2 = 6933.17$, $p < 0.000$) indicate that the joint distribution of the items does not fit the normal multivariate distribution, which justifies the choice of the WLS estimator of the CFA. No missing values were detected, and the atypical cases identified through the Mahalanobis distance were processed using robust estimators. Likewise, the descriptive analysis of the items reveals mean scores ranging between 1.29 ($SD = 0.66$) on item 4 (substance use factor) and 3.13 ($SD = 0.67$) on item 20 (acceptance factor) (Table 1).

The results of the models of the different studies performed with the Brief-COPE in Spanish population are shown in Table 2. Among them, the ones worth highlighting are the goodness-of-fit indexes and statistics from this research: S-Bχ^2 (259, n = 2135) = 1198.57, $p < 0.001$, S-B$\chi^2/df = 4.63$, CFI = 0.96, GFI = 0.98, SRMR = 0.04, RMSEA = 0.04 (90% CI = 0.04–0.05). All items showed factor loadings greater than 0.40, and they were all statistically significant ($p < 0.001$) (Table 1).

The correlations between the different factors of the Spanish adaptation of the Brief-COPE ranged between −0.34 (planning-venting factors) and 0.78 (instrumental support-emotional support factors) (Table 3). The internal consistency for the overall score on the Spanish adaptation of the Brief-COPE was $\alpha = 0.75$ and $\omega = 0.77$, ranging between 0.65 on denial factor and 0.86 on self-blaming factor (Table 3). However, the elimination of items 3, 19 and 21 would increase the internal consistency of the inventory to 0.76 (α) and 0.78 (ω), as they show a corrected item-total correlation under 0.30. As expected, there was significant correlation between the factors of the Spanish adaptation of the Brief-COPE and other variables that comprise this study (perceived stress, satisfaction with life, and GPA), showing evidence of convergent validity (see Table 3). Likewise, CRI and AVE are shown in Table 3.

Finally, the results of the comparisons according to the gender variable reveal statistically significant differences in favor of females in instrumental support ($U = 268,015.00$, $p < 0.001$, $d = 0.43$), emotional support ($U = 255,422.50$, $p < 0.001$, $d = 0.49$), self-distraction ($U = 315,802.50$, $p < 0.001$, $d = 0.19$), acceptance ($U = 316,422.50$, $p < 0.001$, $d = 0.21$) and self-blaming ($U = 327,695,00$, $p < 0.05$, $d = 0.13$) and in favor of males in venting ($U = 316,645.00$, $p < 0.001$, $d = 0.19$), denial ($U = 316,422.50$, $p < 0.001$, $d = 0.15$), substance use ($U = 321,100.00$, $p < 0.001$, $d = 0.24$), and humor ($U = 310,290,00$, $p < 0.001$, $d = 0.25$).

Discussion

The purpose of this research was to undertake the transcultural adaptation and validation of the Brief-COPE inventory,[28] given the absence of instruments validated with young Spanish adults that allow the identification and analysis of the coping strategies in stress situations. In this sense, the results obtained confirm satisfactory levels of validity and reliability for the evaluation of the coping strategies that are proposed in the Lazarus and Folkman[24] model, which is structured in eight strategies (ie, cognitive restructuring, social support, problem solving, problem-avoidance, social withdrawal, emotional expression, self-criticism, and illusions).

The factor structure of the model in the Spanish version of the Brief-COPE coincides with the 14-factor first-order CFA model achieved in the studies carried out with the original version[28] and the Chilean one,[17] including the distribution of items among factors. In fact, the results of the present study reveal higher fit indices than those achieved in the previous instrumental studies. As shown in Table 2, a simple comparison between some of the indices used to evaluate the goodness-of-fit of the structural model proposed in this study with the Spanish version and the previous psychometric studies reveals that the model of the Spanish version shows outstanding fit compared to the fit of the rest of the Spanish versions.[46] Therefore, the first hypothesis of this research can be confirmed, which implies providing new evidence in favor of the use of this instrument for the evaluation of the coping strategies with young Spanish adults, as well as with regard to the measurement of the underlying theoretical construct.

Nonetheless, this result presents differences with previous instrumental studies, although that variability of the structure is possible due to the differences in the procedures applied in factor analysis (ie, EFA). Morán et al.[29]

Table 1 Descriptive Statistics and Factor Loading

Factors	Items	M (SD)	SK	KU	S-W	FL	SE
Active coping	2. I have been concentrating my efforts on doing something about the situation I am in	2.82 (0.65)	−0.25	0.18	0.80***	0.40	0.02
	7. I have been taking action to try to make the situation better	3.11 (0.64)	−0.37	0.38	0.78***	0.49	0.02
	Total	2.97 (0.55)	−0.35	0.40	0.91***	–	–
Planning	14. I have been trying to come up with a strategy about what to do	3.08 (0.65)	−0.34	0.29	0.79***	0.42	0.02
	25. I have been thinking hard about what steps to take	2.98 (0.64)	−0.42	0.79	0.78***	0.41	0.02
	Total	3.03 (0.54)	−0.48	0.94	0.89***	–	–
Instrumental support	10. I have been getting help and advice from other people	3.03 (0.77)	−0.50	−0.09	0.83***	0.72	0.01
	23. I have been trying to get advice or help from other people about what to do	2.87 (0.82)	−0.39	−0.34	0.85***	0.60	0.02
	Total	2.94 (0.73)	−0.40	−0.18	0.92***	–	–
Emotional support	5. I have been getting emotional support from others	3.02 (0.78)	−0.48	−0.20	0.84***	0.67	0.01
	15. I have been getting comfort and understanding from someone	3.08 (0.76)	−0.60	0.11	0.82***	0.66	0.01
	Total	3.05 (0.72)	−0.60	0.14	0.90***	–	–
Self-distraction	1. I have been turning to work or other activities to take my mind off things	2.78 (0.74)	−0.34	−0.02	0.83***	0.46	0.03
	19. I have been doing something to think about it less, such as going to movies, watching TV, reading, daydreaming, sleeping, or shopping	2.80 (0.86)	−0.47	−0.33	0.85***	0.41	0.03
	Total	2.79 (0.63)	−0.47	0.33	0.93***	–	–
Venting	9. I have been saying things to let my unpleasant feelings escape	2.30 (0.78)	−0.14	−0.67	0.84***	0.69	0.02
	21. I have been expressing my negative feelings	2.17 (0.79)	0.16	−0.54	0.85***	0.74	0.02
	Total	2.24 (0.75)	0.04	−0.40	0.87***	–	–
Behavioral disengagement	6. I have been giving up trying to deal with it	2.32 (0.79)	−0.91	0.07	0.77***	0.60	0.02
	16. I have been giving up the attempt to cope	2.35 (0.73)	−0.83	−0.07	0.77***	0.56	0.02
	Total	2.33 (0.67)	−0.82	0.10	0.85***	–	–
Positive reframing	12. I have been trying to see it in a different light, to make it seem more positive	3.02 (0.72)	−0.55	0.54	0.80***	0.54	0.01
	17. I have been looking for something good in what is happening	2.92 (0.75)	−0.55	0.28	0.82***	0.63	0.01
	Total	2.98 (0.66)	−0.59	0.65	0.89***	–	–
Denial	3. I have been saying to myself "this isn't real"	2.52 (1.03)	0.02	−1.14	0.87***	0.40	0.03
	8. I have been refusing to believe that it has happened	3.09 (0.83)	−0.36	−0.98	0.82***	0.80	0.05
	Total	2.80 (0.75)	−0.00	−0.74	0.94***	–	–
Acceptance	20. I have been accepting the reality of the fact that it has happened	3.13 (0.67)	−0.60	0.51	0.79***	0.56	0.02
	24. I have been learning to live with it	3.04 (0.65)	−0.44	0.51	0.79***	0.40	0.02
	Total	3.10 (0.58)	−0.57	0.77	0.90***	–	–

(Continued)

Table 1 (Continued).

Factors	Items	M (SD)	SK	KU	S-W	FL	SE
Religion	22. I have been trying to find comfort in my religion or spiritual beliefs	1.61 (0.90)	1.30	0.55	0.69***	0.61	0.03
	27. I have been praying or meditating	1.80 (0.95)	0.89	−0.36	0.78***	0.92	0.04
	Total	1.70 (0.84)	1.06	0.16	0.80***	–	–
Substance use	4. I have been using alcohol or other drugs to make myself feel better	1.29 (0.66)	2.35	4.79	0.50***	0.49	0.02
	11. I have been using alcohol or other drugs to help me get through it	1.39 (0.73)	1.75	2.06	0.59***	0.62	0.03
	Total	1.34 (0.63)	2.04	3.98	0.61***	–	–
Humor	18. I have been making jokes about it	2.66 (0.90)	−0.21	−0.92	0.88***	0.85	0.02
	28. I have been making fun of the situation	2.41 (0.94)	0.05	−0.92	0.88***	0.79	0.02
	Total	2.53 (0.89)	−0.10	−0.90	0.94***	–	–
Self-blaming	13. I have been criticizing myself	2.65 (0.98)	−0.18	−1.03	0.88***	0.97	0.02
	26. I' been blaming myself for things that happened	2.70 (1.01)	−0.28	−1.04	0.87***	0.97	0.02
	Total	2.68 (0.99)	−0.25	−0.98	0.88***	–	–

Note: ***$p < 0.001$.
Abbreviations: M, mean; SD, standard deviation; SK, skewness; KU, kurtosis; S-W, Shapiro–Wilk statistic; FL, factor loading; SE, standard error.

Table 2 Fit Indexes of the Models of the Spanish Adaptations of the Brief-COPE

Studies	Samples	EFA/ CFA	N Factors/ Items	KMO	S-Bχ^2	df	CFI	GFI	SRMR	RMSEA (90% CI)
Morán et al[29]	260 Spanish undergraduates	EFA	11/26	0.66	2290.05***	378	NE	NE	NE	NE
Ornelas et al[30]	203 Mexican women	EFA	7/17	0.69	749.49***	378	NE	NE	NE	NE
Reich et al[13]	203 Uruguayan women	EFA	12/24	0.70	506.25***	66	NE	0.96	NE	NE
García et al[17]	1847 Chilean adults	CFA	14/28	NE	1079.42***	259	0.94	NE	NE	0.04 (0.04–0.05)
Pilot test of current research	403 Spanish undergraduates	CFA	14/28	NE	454.97***	259	0.92	0.96	0.04	0.06 (0.06–0.06)
Current research	2135 Spanish undergraduates	CFA	14/28	NE	1198.57***	259	0.96	0.98	0.04	0.04 (0.04–0.05)

Note: ***$p < 0.001$.
Abbreviations: EFA, exploratory factor analysis; CFA, confirmatory factor analysis; KMO, Kaiser–Meyer–Olkin; S-Bχ^2, Satorra–Bentler Chi-squared; df, degree of freedom; CFI, comparative fit index; GFI, goodness-of-fit index; RMSEA, root mean squared error of approximation; CI, confidence interval; SRMR, standardized root mean squared residual; NE, not estimated.

Ornelas et al[30] and Reich et al[13] evaluated the internal structure using the principal component analysis method, a non-recommended factor extraction method,[53] which can explain, at least partially, the differences in the number of factors reported. The removal of items could be another factor that has influenced the differences in factor structures between

Table 3 Correlations and Reliabilities

Factor/Variable	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. Active coping	–																	
2. Planning	0.44***	–																
3. Instrumental support	0.27***	0.27***	–															
4. Emotional support	0.30***	0.26***	0.78***	–														
5. Self-distraction	0.12***	0.13***	0.21***	0.19***	–													
6. Venting	−0.15***	−0.34***	−0.31***	−0.26***	0.02*	–												
7. Behavioral disengagement	−0.17***	−0.18***	−0.15***	−0.11***	0.02*	0.01*	–											
8. Positive reframing	0.56***	0.44***	0.23***	0.25***	0.12***	−0.08***	−0.19***	–										
9. Denial	−0.09***	−0.07*	−0.03*	−0.01*	−0.07**	0.06**	0.29***	−0.18***	–									
10. Acceptance	0.30***	0.32***	0.29***	0.23***	0.03*	−0.18***	0.32***	0.45***	−0.21***	–								
11. Religion	0.05*	0.07***	0.09***	0.07**	−0.01*	−0.05*	−0.01*	0.11***	−0.15***	−0.01*	–							
12. Substance use	−0.02*	−0.06*	−0.03*	−0.09***	0.01*	0.08***	−0.19***	−0.08***	−0.12***	−0.01*	−0.07***	–						
13. Humor	0.11***	0.20***	0.04*	0.03*	−0.02*	−0.12***	0.10***	0.27***	0.01*	0.25***	−0.08***	0.05*	–					
14. Self-blaming	0.04*	0.05*	0.14***	0.20***	0.01*	−0.02*	0.32***	0.17***	0.08***	0.07**	−0.01*	−0.12***	0.06**	–				
15. Perceived stress	0.38***	0.26***	0.26***	0.20***	0.12***	0.02*	0.20***	0.50***	0.06***	0.32***	0.01*	−0.11***	0.08***	0.09***	–			
16. Satisfaction with life	0.42***	0.41***	0.32***	0.40***	−0.16***	−0.15***	−0.13***	0.41***	−0.07***	0.22***	−0.11***	−0.08***	0.09***	−0.06***	0.46***	–		
17. GPA	0.16***	0.19***	0.13*	0.14*	−0.13***	−0.02*	−0.06**	0.11*	−0.01*	0.10*	−0.04*	−0.10***	0.01	−0.01*	0.17**	0.25*	–	
18. Brief-COPE	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
M	2.97	3.03	2.94	3.05	2.79	2.24	2.33	2.98	2.80	3.10	1.70	1.34	2.53	2.68	1.88	5.56	7.78	–
SD	0.55	0.54	0.73	0.72	0.63	0.75	0.67	0.66	0.75	0.58	0.84	0.63	0.89	0.99	0.46	0.19	0.83	–
α	0.73	0.70	0.81	0.84	0.72	0.91	0.73	0.78	0.65	0.76	0.79	0.77	0.84	0.86	0.88	0.81	–	0.75
ω	0.73	0.70	0.81	0.84	0.72	0.91	0.73	0.78	0.65	0.76	0.79	0.77	0.84	0.86	0.89	0.82	–	0.77
CRI	0.75	0.72	0.73	0.73	0.72	0.88	0.73	0.73	0.61	0.71	0.77	0.71	0.81	0.88	0.87	0.85	–	0.85
AVE	0.53	0.51	0.77	0.77	0.51	0.83	0.67	0.68	0.68	0.57	0.67	0.55	0.68	0.76	0.57	0.80	–	0.64

α[29]	NE	NE	NE	NE	0.59	0.58	0.63	0.59	0.64	NE	0.80	0.93	0.79	0.58	–	–	–	NE
α[30]	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	NE	–	–	–	0.72
α[13]	0.73	0.58	NE	0.81	0.51	0.47	0.71	0.69	0.65	0.66	0.86	0.50	0.76	NE	–	–	–	0.78
α[17]	0.65	0.62	0.73	0.75	0.58	0.66	0.54	0.54	0.66	0.53	0.79	0.82	0.80	0.61	–	–	–	NE

Notes: $*p < 0.05$; $**p < 0.01$; $***p < 0.001$.

Abbreviations: M, mean; SD, standard deviation; α, Cronbach's alpha coefficient; ω, McDonald's omega coefficient; CRI, composite reliability index; AVE, average variance extracted; NE, not estimated.

previous instrumental studies with the present one. Morán et al.[29] Ornelas et al[30] and Reich et al[13] removed 2, 11 and 4 items, respectively, because they presented a low factor loading. Moreover, another aspect to take into account when comparing the results of the factorial analyzes is the size of the sample and the characteristics of the participants. The sizes of the samples used in the studies by Morán et al.[29] Ornelas et al[30] and Reich et al[13] ranged from 203 to 260 evaluated, although the minimum sample size needed for the structural complexity of the specified model is 400.[35]

In turn, the reliability results of the Spanish version of the Brief-COPE show a fairly acceptable level of internal consistency ($\alpha = 0.75$, $\omega = 0.77$), and composite reliability (CRI = 0.85, AVE = 0.64), although not all of its factors have reached values above 0.70 (ie, denial factor), as it is recommended for research work,[50] so the second hypothesis of this research is partially accepted. The level of internal consistency of the denial factor could be related to the acquiescence bias described by Tomás et al[54] although it seems that to a greater extent this can be attributed to the presence of inverse items, which can cause bias in the response. However, further research on this factor is necessary because this problem has been found also in different populations and languages. Previous studies have also evaluated the internal consistency of the scale (ie, α), finding values that range from 0.50 to 0.86,[13,17,29,30] although most of the factors have not reached values above 0.70. In this sense, the reliability results of the Spanish version of the Brief-COPE are higher than those achieved in the previous instrumental studies.

With regard to the third hypothesis on the external evidence of validity of the Spanish version of the Brief-COPE, as established in the specialized literature,[17–21] the adaptive coping strategies (ie, active coping, planning, instrumental support, emotional support, positive reframing, and acceptance) turned out to be linked to a lower degree of perceived stress, a higher degree of satisfaction with life and a higher academic performance, in the same terms as the maladaptive coping strategies (ie, denial, behavioral disengagement, self-blaming, self-distraction, venting, religion, and substance use) were linked to a higher degree of perceived stress, a lower degree of satisfaction with life and a lower academic performance. These results allow confirming the third hypothesis of the study, although the coping strategy factors showed a moderate-weak correlation with perceived stress, satisfaction with life and academic performance. In this sense, the idea that perceived stress, satisfaction with life and academic performance are related to coping strategies needs be considered in future studies.[1]

In relation to gender differences in coping strategies, according to previous studies,[55] our results showed that females used more often than males instrumental support, emotional support, self-distraction, acceptance, and self-blaming, while males used more often than females venting, denial, substance use and humor. One potential explanation to this finding could be that women are more likely to amplify their moods because they have a greater tendency to be attentive to moods.[56] However, it should be taken into account that the use of some coping strategies or others is subject to the characteristics and the valuation and perception processes of each individual towards the stressor.[19]

Regarding the limits of the study, it is necessary to mention the use of a non-probabilistic sampling that can affect the ability to generalize the results to the population. Moreover, the recruitment and participation were made online and levels of homogeneity of this study's sample may have affected the results. It would be interesting to use a random sampling method for generalizing our outcomes. However, considering the larger sample size compared to previous studies, it is considered that the results provide important evidence on the psychometric properties in the Spanish undergraduates, an aspect that may imply certain limitations in its use with other populations. Another limitation could be the instrument's stability over time was not analyzed due to the study was cross-sectional. Therefore, it would be useful to carry out longitudinal research. In this sense, it is important to emphasize the need for future research to validate this instrument with different non-university samples and therefore populations.

Despite these limitations, this research contributes to the literature in several ways. First, the Spanish adaptation of the Brief-COPE should permit researchers to go in depth in the study of emotion regulation in undergraduates and its relationship with well-being and quality of life. Second, practitioners of university counseling services could assess and analyze the coping strategies used by this specific population to manage stressful situations, and their consequences. Third, practitioners of university counseling services could train undergraduates in adaptive coping strategies and emotion regulation.

Conclusion

In summary, as a conclusion, it can be stated that the Spanish adaptation of the Brief-COPE presents a satisfactory metric quality according to the empirical evidence provided in this study, which supports its use with the Spanish population to measure coping strategies in stress situations. The original 14-factor structure had excellent fit indices, the reliability results were acceptable, and external evidence of the validity of the inventory is provided. Finally, it is important to highlight that this research represents a step forward in the adaptation of the original version of Carver's Brief-COPE[28] to different linguistic and cultural contexts, especially considering that in Spain the only precedent to it was the work of Morán et al.[29]

Abbreviations

COPE, Coping Orientation to Problem Experienced; SD, standard deviation; α, Cronbach's alpha coefficient; ω, McDonald's omega coefficient; CFA, confirmatory factor analysis; S-Bχ^2, Satorra–Bentler Chi-squared; p, p-value; *df*, degree of freedom; CFI, comparative fit index; GFI, goodness-of-fit index; SRMR, standardized root mean squared residual; RMSEA, root mean squared error of approximation; CI, confidence interval; GPA, grade point average; CEIH, Comité de ética en Investigación Humana; WLS, weighted least squares; CRI, composite reliability index; AVE, average variance extracted; *r*, Pearson correlation coefficient; *U*, Mann–Whitney test; d, Cohen's d; M, mean; SK, skewness; KU, kurtosis; S-W, Shapiro–Wilk statistic; FL, factor loading; SE, standard error; EFA, exploratory factor analysis; KMO, Kaiser–Meyer–Olkin; NE, not estimated.

Data Sharing Statement

The datasets generated during and/or analyzed during the current study are available from the corresponding author on reasonable request.

Ethics Approval and Informed Consent

This study was performed in compliance with the World Medical Association Declaration of Helsinki on Ethical Principles for medical research involving human subjects and was approved by the Ethical Committee of the University of Granada (1400/CEIH/2020). Informed consent was obtained from all individual participants included in the study.

Consent to Publication

The participant has consented to the submission of the case report to the journal.

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Author Contributions

All authors made a significant contribution to the work reported, whether that is in the conception, study design, execution, acquisition of data, analysis and interpretation, or in all these areas; took part in drafting, revising or critically reviewing the article; gave final approval of the version to be published; have agreed on the journal to which the article has been submitted; and agree to be accountable for all aspects of the work.

Disclosure

The authors report no conflicts of interest in this work.

References

1. Folkman S, Moskowitz JT. Coping: pitfalls and promise. *Annu Rev Psychol*. 2004;55(1):745–774. doi:10.1146/annurev.psych.55.090902.141456
2. Lazarus RS. Coping theory and research: past, present, and future. *Psychosom Med*. 1993;55(3):234–247. doi:10.1097/00006842-199305000-00002
3. Lazarus RS, Folkman S. *Stress and Cognitive Process*. Madrid: Martínez-Roca; 1986.

4. Augusto JM, López E, Pulido M. Perceived emotional intelligence and stress coping strategies in primary school teachers: proposal for an explanatory model with structural equation modelling (SEM). *Int J Soc Psychol*. 2011;26(3):413–425. doi:10.1174/021347411797361310

5. Sandín B. Stress: an analysis based on the role of social factors. *Int J Clin Health Psychol*. 2003;3(1):141–157.

6. Endler N, Parker JDA. Multidimensional assessment of coping: a critical evaluation. *J Pers Soc Psychol*. 1990;58(5):844–854. doi:10.1037/0022-3514.58.5.844

7. Tous J, Espinoza IM, Lucas S, Valdivieso L, Gómez MR. CSI-SF: psychometric properties of Spanish version of the coping strategies inventory-short form. *Ann Psychol*. 2022;38(1):85–92. doi:10.6018/analesps.478671

8. Rodríguez J, Neipp MC. *Handbook of the Social Psychology of Health*. Madrid: Síntesis; 2008.

9. Macías MA, Madariaga C, Valle M, Zambrano J. Individual and family copying strategies when facing psychological stress situations. *Psicol Desde Caribe*. 2013;30(1):123–145.

10. Valdivieso L, Lucas S, Tous J, Espinoza IM. Coping strategies for academic stress in undergraduate students: early childhood and primary education. *Educ XX1*. 2020;23(2):165–186. doi:10.5944/educXX1.25651

11. Alonso J, Rodríguez R, Garrido H, Ruiz M, Nieto C. Coping assessment from the perspective of the person-situation interaction: development and validation of the Situated Coping Questionnaire for Adults (SCQA). *Psicothema*. 2016;28(4):479–486. doi:10.7334/psicothema2016.19

12. Carver CS, Connor J. Personality and coping. *Annu Rev Psychol*. 2010;61(1):679–704. doi:10.1146/annurev.psych.093008.100352

13. Reich M, Costa CD, Remor E. Psychometric properties of the brief COPE in a sample of Uruguayan women. *Av Piscol Clin Latinonot*. 2016;34 (3):615–636. doi:10.12804/apl34.3.2016.13

14. Castaño EF, Del Barco BL. Stress coping strategies and interpersonal behavior styles. *Rev Int Psicol Ter Psicol*. 2010;10(2):245–257.

15. Meléndez JC, Satorres E, Delhom I. Personality and coping. What traits predict adaptive strategies? *Ann Psychol*. 2020;36(1):39–45. doi:10.6018/analesps.349591

16. Noorbakhsh SN, Besharat MA, Zarei J. Emotional intelligence and coping styles with stress. *Soc Behav Sci*. 2010;5:818–822. doi:10.1016/j.sbspro.2010.07.191

17. García FE, Barraza CG, Wlodarczyk A, Alvear M, Reyes A. Psychometric properties of the Brief-COPE for the evaluation of coping strategies in the Chilean population. *Psicol Reflex Crit*. 2018;31(22):1–11. doi:10.1186/s41155-018-0102-3

18. Kato T. Frequently used coping scales: a meta-analysis. *Stress Health*. 2015;31(4):315–323. doi:10.1002/smi.2557

19. Schäfer A, Pels F, Kleinert J. Coping strategies as mediators within the relationship between emotion-regulation and perceived stress in teachers. *Int J Emot Educ*. 2020;12(1):35–47.

20. Ávila AS, Montaña GJ, Jiménez D, Burgos JP. Coping styles and strategies and academic performance: an empirical review. *Enfoque*. 2014;1 (1):15–44. doi:10.24267/23898798.79

21. Gustems J, Calderón C, Calderón D. Stress, coping strategies and academic achievement in teacher education students. *Eur J Teach Educ*. 2019;42 (3):375–390. doi:10.1080/02619768.2019.1576629

22. McFadden P, Ross J, Moriarty J, et al. The role of coping in the wellbeing and work-related quality of life of UK health and social care workers during COVID-19. *Int J Environ Res Public Health*. 2021;18(2):815. doi:10.3390/ijerph18020815

23. Panayiotou G, Panteli M, Leonidou C. Coping with the invisible enemy: the role of emotion regulation and awareness in quality of life during the COVID-19 pandemic. *J Contextual Behav Sci*. 2021;19(1):17–27. doi:10.1016/j.jcbs.2020.11.002

24. Lazarus RS, Folkman S. *Stress, Appraisal, and Coping*. New York: Springer publishing; 1984.

25. Patterson JM, McCubbin HI. Adolescent coping orientation for problem experiences. *J Adolesc*. 1987;10(2):163–186. doi:10.1016/s0140-1971(87) 80086-6

26. Tobin DL, Holroyd KA, Reynolds RV, Wigal JK. The hierarchical factor structure of the coping strategies inventory. *Cognit Ther Res*. 1989;13 (4):343–361. doi:10.1007/BF01173478

27. Carver CS, Scheier MF, Weintraub JK. Assessing coping strategies: a theoretically based approach. *J Pers Soc Psychol*. 1989;56(2):267–283. doi:10.1037/0022-3514.56.2.267

28. Carver CS. You want to measure coping but your protocol' too long. Consider the Brief Cope. *Int J Behav Med*. 1997;4(1):92–100. doi:10.1207/s15327558ijbm0401_6

29. Morán C, Landero R, González MT. COPE-28: A Psychometric analysis of the Spanish version of the brief COPE. *Univ Psychol*. 2010;9 (2):543–552. doi:10.11144/Javeriana.upsy9-2.capv

30. Ornelas R, Anahí M, Vite A, Guerrero O, Rosas A, Sánchez J. Coping in breast cancer patients undergoing radiotherapy: the Brief COPE Scale. *Psicol Salud*. 2013;23(1):55–62.

31. Patton MQ. *Qualitative Research and Evaluation Methods*. 3rd ed. Thousand Oaks: Sage Publications; 2002.

32. MacCallum RC, Widaman KF, Zhang S, Hong S. Sample size in factor analysis. *Psychol Methods*. 1999;4(1):84–99. doi:10.1037/1082-989X.4.1.84

33. Velicer WF, Fava JL. Effects of variable and subject sampling on factor pattern recovery. *Psychol Methods*. 1998;3(2):231–251. doi:10.1037/1082-989X.3.2.231

34. Tomarken AJ, Waller NG. Structural equation modeling: strengths, limitations, and misconceptions. *Annul Rev Clin Psychol*. 2005;1(1):31–65. doi:10.1146/annurev.clinpsy.1.102803.144239

35. Soper DS. A-priori sample size calculator for structural equation models [Software]; 2021. Available from: https://www.danielsoper.com/statcalc/calculator.aspx?id=89. Accessed January 19, 2021.

36. Trujillo HM, González J. Psychometric properties of the Spanish version of the perceived stress scale. *Behav Psychol*. 2007;15(3):457–477.

37. Atienza FL, Balaguer I, García ML. Satisfaction with life scale: analysis of factorial invariance across sexes. *Pers Individ Dif*. 2003;35 (6):1255–1260. doi:10.1016/S0191-8869(02)00332-X

38. Ato M, López JJ, Benavente A. A classification system for research designs in Psychology. *Ann Psychol*. 2013;29(3):1038–1059. doi:10.6018/analesps.29.3.178511

39. Hernández A, Hidalgo MD, Hambleton RK, Gómez J. International test commission guidelines for test adaptation: a criterion checklist. *Psicothema*. 2020;32(3):390–398. doi:10.7334/psicothema2019.306

40. Muñiz J, Elosua P, Hambleton RK. International test commission guidelines for test translation and adaptation: second edition. *Psicothema*. 2013;25(2):151–157. doi:10.7334/psicothema2013.24

41. Charter RA. A breakdown of reliability coefficients by test type and reliability method, and the clinical implications of low reliability. *J Gen Psychol*. 2003;130(3):290–304. doi:10.1080/00221300309601160

42. Muñiz J, Fonseca E. Ten steps for test development. *Psicothema*. 2019;31(1):7–16. doi:10.7334/psicothema2018.291

43. Couper MP, Bosnjak M. Internet surveys. In: Mardsen PV, Wright JD, editors. *Handbook of Survey Research*. Bingley: Emerald Group; 2010:527–550.

44. Kline RB. *Principles and Practice of Structural Equation Modeling*. 4th ed. New York: Guilford Publications; 2015.

45. Bentler PM. Comparative fit indexes in structural models. *Psychol Bull*. 1990;107(2):238–246. doi:10.1037/0033-2909.107.2.238

46. Hu L, Bentler PM. Cutoff criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives. *Struct Equ Modeling*. 1999;6(1):1–55. doi:10.1080/10705519909540118

47. Dunn TJ, Baguley T, Brunsden V. From alpha to omega: a practical solution to the pervasive problem of internal consistency estimation. *Br J Psychol*. 2014;105(3):399–412. doi:10.1111/bjop.12046

48. Raykov T. Point and Interval estimation of reliability for multiple-component measuring instruments via linear constraint covariance structure modeling. *Struct Equ Modeling*. 2004;11(3):342–356. doi:10.1207/s15328007sem1103_3

49. Green SB. Evaluation of dimensionality in the assessment of internal consistency reliability: coefficient alpha and omega coefficients. *Educ Meas*. 2015;34(4):14–20. doi:10.1111/emip.12100

50. Nunnally J, Bernstein I. *Psychometric Theory*. 3rd ed. New York: McGraw-Hill; 1995.

51. Bacon DR, Sauer PL, Young M. Composite reliability in structural equations modeling. *Educ Psychol Meas*. 1995;55(3):394–406. doi:10.1177/0013164495055003003

52. Hair J, Black W, Babin BJ, Anderson R, Tatham R. *Multivariate Data Analysis*. 6th ed. Upper Saddle River: Pearson International Edition; 2014.

53. Izquierdo I, Olea J, Abad FJ. Exploratory factor analysis in validation studies: uses and recommendations. *Psicothema*. 2014;26(3):395–400. doi:10.7334/psicothema2013.349

54. Tomás JM, Galiana L, Hontangas P, Oliver A, Sancho P. Accumulated evidence on method effects associated with inverted items. *Psicológica*. 2013;34:365–381.

55. Meléndez JC, Mayordomo T, Sancho P, Tomás JM. Coping strategies: gender differences and development throughout life span. *Span J Psychol*. 2012;15(3):1089–1098. doi:10.5209/rev_SJOP.2012.v15.n3.39399

56. Fernández P, Extremera N. A review of trait meta-mood research. In: Columbus MA, editor. *Advances in Psychology Research*. San Francisco: Nova Science; 2008:17–45.