Research in Psychology and Behavioral Sciences, 2016, Vol. 4, No. 1, 15-18
Available online at http://pubs.sciepub.com/rpbs/4/1/3

DOI:10.12691/rpbs-4-1-3

Testing the BRCS Structure through a Multigroup Analysis

Pedro Belo[1,*], Ricardo Pocinho[1], Jose Rodrigues[2]

[1]Coimbra Health School, Coimbra, Portugal
[2]Universidade Portucalense Infante D. Henrique, Oporto, Portugal
*Corresponding author: pedrobelo@estescoimbra.pt

Abstract The BCRS is a measurement tool that measures resilience with satisfactory levels of reliability and validity. In this research, a sample of 314 participants (volunteers) was tested. The participants were divided into two groups: young and older adults. Results showed a Cronbach's alpha of the BRCS scale for both young and older adults of 0.67 and 0.76, respectively. The primary analyses performed to assess the psychometric characteristics of the scale showed good reliability of the Spanish translation for older adults and unsatisfactory for young people, with analogous Cronbach's alpha values than the obtained by the original instrument.

Keywords: *brief resilient coping scale, resilience, multigroup analysis, young adult, old adults*

Cite This Article: Pedro Belo, Ricardo Pocinho, and Jose Rodrigues, "Testing the BRCS Structure through a Multigroup Analysis." *Research in Psychology and Behavioral Sciences*, vol. 4, no. 1 (2016): 15-18. doi: 10.12691/rpbs-4-1-3.

1. Introduction

Resilience is an emerging concept that allows us to the human capacity to face, overcome and be transformed by experiences and adversity [1], that is, the capacity to affront threats that appear during developmental or adaptive processes, and obtain a benefit from this [2]. However, this concept has experienced different interpretations in the literature, and it is still considerably debated among researchers. Resilience has been applied to describe persons, families, groups or communities that have the capacity to prevent, minimize or overcome the effects of adverse events [3]. It has also been questioned whether this process is standard and universal, or else, depends on the traits and characteristics of people and their cognitive and emotional capacities [4]. However, it is important to have in mind that the development of a person involves several systematic changes influenced by multiple factors, including resilience. Over life span, the risk factors that the person has to face could be persistent events that are not isolated and cannot be actively changed, furthermore, as the person develops, a number of irreversible adversities that could affect them, might appear [5]. Consequently, a large body of research has examined the resilience process for children under risk circumstances [6, 7], as well as how this concept is implicated as an underlying variable for successful aging [8]. However, there is a great need for further research over these lines. The understanding of the complex definition of resilience contributes to determine its implications [5]. Thus, is very interesting to develop empirical studies on the subject, since they provide challenging guidance or evidence. There is a large number of scales that have been developed for the purpose of measuring resilience, establishing optimal psychometric properties, both in its reliability and validity. Some of the most popular scales for its measurement are the Resilience Scale [9], the Dispositional Resilience Scale [10] and the Brief Resilient Coping Scale - BRCS [11]. The main benefit of the last scale is that it features a one-dimensional structure and it is composed of four items, making it a brief test, and simplifying its application. Although the BRCS was translated to Spanish language, its psychometric properties have not been thoroughly examined among Spanish-speaking populations. The Spanish adaptation for older people showed good levels of validity and reliability [12], as well as the translated version by Limonero et al. [13], which showed satisfactory results with young population. However, was necessary to assess how this scale behaves for other adult Spanish groups. Regarding the data analyses used to compare the resilience assessments obtained from these scales, a traditional way to perform these comparisons between several samples is through the Student's T test or the analysis of variance (ANOVA), an approach that assumes that the latent factor does not involve error and represents the factor it measures [14]. Another strategy is to examine the structure of the model and its invariance. For this matter, the multigroup analysis is a structural equation modelling technique that assesses to what extent the psychometric instrument parameters are invariant (in other words, equivalent) for the different groups. Thus, this analysis involved the determination of the parameters and its associated standard error, comprising variances and the coefficients related to the relationship between variables or measures [15]. Consequently, this method required similar sample sizes [16]. In this context, to accept a model during a multigroup analysis, a hierarchical procedure must be carried out, beginning with an unconstrained model, and adding successive constrains.

The logic of this procedure was to test the factorial homogeneity structure across groups, from a stage were all parameters do not need to be equal to a stage where they must be. Cheung and Rensvold [17] recommend the invariance analysis on the development of a psychometric test. This measurement tests if the function of the distribution of the assessed values does not depend on the group variable [14]. Moreover, Vandenberg and Lance [18] highlight the relevance of these analyses on the study of parameters from different populations. Thus, for the purpose of the present study, this method would be very useful, as it might allow differentiating between the structure of the resilience between age groups and the differences in the mean values observed. The study of Zeng and Shen [19] in China with 4 groups: ages 65–79 (reference), ages 80–89, ages 90–99, and ages ≥100 put in evidence that resilience could be tested among units of age. Also centred on a Swedish trial, Nygren [20] evaluated that mean scores of resilience were higher in their oldest old sample (over age 85) compared to the scores of the younger adults, so resilience can be tested among different cohorts. The initial validation of the BRCS by Tomás et al. [21] was tested in different age clusters too. To address the need for clarification of the resilience concept, and improve the methodological approach in achieving this outcome, the aim of this study was to evaluate the one-dimensional factor structure of the BRCS in different Spanish age samples using confirmatory factor analysis (CFA), and to examine measurement invariance of the BRCS model across age.

However, it should be considered the lack of previous work in research of the possible age-related differences in BRCS for the Spanish population.

2. Materials and Methods

2.1. Participants

A sample of 314 participants volunteered to take part in this study. They were divided into two groups: young and older adults. Both groups were university students: the young participants were degree university students, while the older adults were students at a University senior program. The young group was composed of 151 participants, from whom 30.5% were male and 69.5 % were women. The average age was 19.15 years (SD = 0.844), with an age range of 18-20 years. Regarding the educational attainment, 1.3% completed basic education; 30.5% had secondary level studies completed and 68.2 % had finished third level. Respecting marital status, 98.7% were single; 0.7% widowed and 0.7% divorced. Oppositely, the older adult group was composed of 163 participants, from whom 41.7% were male and 58.3% were women. In this case, the average age was 67.62 years (SD = 4.276), with an age range of 60-75. About the educational attainment, 27% had no education; 42.3% completed basic education; 17.2% had secondary level studies completed and 13.5% had finished third level. In relation to the marital status, 5.5% were single; 63.2 % married; 23.3% widowed and 8% divorced. Sampling procedure was incidental. Participants were enrolled in university programs for young and older people from different Spanish universities during 2013-2014. The BRCS questionnaire was self-administered under the supervision of trained psychologists during one session, with permission from the University. Participants completed the mandatory informed consent documentation.

2.2. Measures

The instrument employed was the Spanish version of the Brief Resilient Coping Scale (BRCS) developed by Sinclair and Wallston [11]. This instrument was originally developed in English, but in this study, the Spanish translation by Moret-Tatay, et al. [12] was employed. This scale of resilience assimilates optimism, perseverance, creativity and positive growth in the face of adversity. The authors describe a resilient coping pattern as reflecting a model of active problem solving. The BCRS is a measurement tool that has proven to measure resilience with adequate levels of reliability and validity. The original scale consists of 4 items and a single factor or dimension, with an index of internal consistency of α = 0.69 and test-retest reliability of 0.71 ($n = 87$, $p < 0.001$). The goodness of fit (GFI) indices showed an excellent fit: $X2 = 2.13$, $p = 0.03$, as well as the comparative fit index (CFI = 0.99), standardized root mean residual (SRMR = 0.02) and root mean square approximation (RMSEA = 0.01) [11]. According to the authors of the original scale, low-resistance subjects are those who obtain scores lower than 13, while those who scored above 17 are considered highly adaptable. This is a self-administered scale, which aims to assess the ability to handle stress in an adaptive manner.

2.3. Statistical Analyses

All the statistical analyses were performed using the SPSS 21 and AMOS 21 software. Assumptions were checked to ensure the application of factor analysis, high sample size, multivariate normality, linearity and correlation between variables [22,23]. Also, the internal consistency of the scale was checked through Cronbach's alpha, items of homogeneity, KMO index and the Bartlett test of sphericity [24]. After removing the factorial solution, the next step was to proceed to the completion of confirmatory factor analysis (CFA), accompanied by the goodness of fit indices. Confirmation of the adequacy of the model have been used within the absolute fit indices; the chi-square statistic X2 [25,26]; the goodness of fit index (GFI) whose value reference is at 90 to consider an acceptable model [27]; the comparative fit index (CFI); normed fit index (NFI), also called delta 1; and the incremental fit index (IFI), in all three cases the range of values should be between 0 and 1 and the reference value is 0.90 [15,16,27], and for within parsimony adjustment indices, the error of the root mean square approximation (RMSEA), the smaller its value, the better the fit, being the reference value 0.05 [28]. Finally, a multigroup structural model was tested to fully understand the multivariate relationships and compare both samples.

3. Results

Cronbach's alpha of the BRCS scale showed an internal consistency for both young and older adults of 0.67 and 0.76, respectively. Analysing the Pearson' s inter-item

correlation values, in order to improve the reliability of the scale, it wasn't found a better variation of the alpha if any item was removed. In relation to the young group, the Bartlett's test of sphericity was $p < 0.001$ with a chi-square value of 84.237 (df = 6) and the sample index value of Kaiser-Meyer-Olkin (KMO) was 0.712. In the case of the older adults group, the Bartlett's test of sphericity was $p < 0.001$ with a value of chi-square 226.227 (df = 6) and the sample index value of Kaiser-Meyer-Olkin (KMO) was 0.76. Also, the AFC has confirmed the existence of a single factor, with a 50.58 % and a 57.64% of explained variance for young and older adults respectively. Confirmatory factor analysis using AMOS 21 was carried out on the data in order to replicate the single-factor model of the BRCS [29]. Thus, the four items of the BRCS were expected to load onto a single latent factor (Table 1).

Table 1. Fit indices for the BRCS from confirmatory factor analysis (young and older group)

Group	χ^2	*p*	χ^2/DF	CFI	NFI	IFI	RMSEA
Young	3.194	.202	1.597	.985	.963	.986	.063
Older adults	1.563	.458	.782	1	.99	1	.000

4. Discussion

The initial analyses performed to assess the psychometric characteristics of the scale showed good reliability of the Spanish translation. The internal consistency was only acceptable for older adults and unsatisfactory for young people, which are similar Cronbach's alpha values obtained by the original instrument [11]. Also, the principal components analysis for the construct validity confirmed the suitability of the test for a factor analysis, as the Bartlett test of sphericity was significant, as well as the Kaiser-Meyer-Olkin (KMO) measure, which in both groups overcomed the 0.7 value needed to confirm a good sampling adequacy [30]. Also, the AFC has confirmed the existence of a single factor, with a 50.58 % and a 57.64% of explained variance for young and older adults respectively.

The model of Tomás et al. [31] showed that on a multiple regression at a multigroup analysis, the model retained only a single predictor, the resilient coping. So, resilient coping is better predictor as a single factor.

5. Conclusion

However, this work has the following limitations: first, the sample was selected through non-probability sampling, which can introduce distortions in the results when you consider that the final sample may have a high component of self; secondly there is a significantly higher number of men than women, which means the results may vary in populations with a greater parity sample, especially considering that this phase of retirement is experienced differently according to gender variable. The fact that young adults were all university students was also a limitation, as it consists of a sample of undergraduate, and results were not generalizable to young people older than 20 years old.

Statement of Competing Interests

The authors have no competing interests.

References

[1] Benard, B., "Turnaround people and places: moving from risk to resilience", in D. Saleebey (ed.), *The Strengths Perspective in Social Work Practice*, Ally, London 2002.

[2] Masten, A. S., "Ordinary magic: Resilience processes in development", *American Psychologist, 56*(3), 227-238, 2011.

[3] Grotberg, E., "*A guide to promoting resilience in children: Strengthening the human spirit*", The Bernard van Leer Foundation, 1995.

[4] Dyer, J. G. and McGuinness, T. M., "Resilience: Analysis of the concept", *Archives of Psychiatric Nursing, 10*, 276–282, 1996.

[5] Windle, G., "What is resilience? A review and concept analysis", *Reviews in Clinical Gerontology*, *21*(2), 152-169, 2011.

[6] Cicchetti, D. and Rogosch, F. A., "The role of self-organization in the promotion of resilience in maltreated children", *Development and Psychopathology, 9*, 797-815, 1997.

[7] Masten, A., Best, K. and Garmezy, N., "Resilience and development: Contributions from the study of children who overcome adversity", *Development and Psychopathology. 2*, 425–444, 1990.

[8] Nakashima, M. and Canda, E., "Positive dying and resiliency in later life: A qualitative study", *Journal of Aging Studies, 19*, 109-125, 2005.

[9] Wagnild, G. M. and Young, H. M. "Development and psychometric evaluation of the Resilience Scale", *Journal of Nursing Measurement, 1*, 165-178, 1993.

[10] Bartone, R. T., Ursano, R. J., Wright, K. M. and Ingraham, L. H. "The impact of a military air disaster on the health of assistance workers: A prospective study", *The Journal of Nervous and Mental Disease, 177*, 317-328, 1989.

[11] Sinclair, V. G. and Wallston, K. A., "The Development and Psychometric Evaluation of the Brief Resilient Coping Scale", *Assessment, 11*(1), 94-101, 2004.

[12] Moret-Tatay, C., Fernandez-Muñoz, J., Civera-Mollá, C., Navarro-Pardo, E. and Alcover-de-la-Hera, C., "Psychometric properties and factor structure of the BRCS in an elderly Spanish sample", *Anales de Psicologia*, 31(3), 1030-1034, 2015.

[13] Limonero, J. T., Tomás-Sábado, J., Gómez-Romero, M. J., Maté-Méndez, J., Sinclair, V. H., Wallston, K. A. and Gómez-Benito, J., "Evidence for Validity of the Brief Resilient Coping Scale in a Young Spanish Sample", *Spanish Journal of Psychology, 17*(e34), 1-9, 2014.

[14] Elosua, P. and Muñiz, J., "Exploring the factorial structure of the self-concept: A sequential approach using CFA, MIMIC, and MACS models, across gender and two languages", *European Psychologist, 15*(1), 58-67, 2010

[15] Bentler, P. M., "Comparative fit indices in structural models", *Psychological Bulletin*, 107, 238–246, 1990.

[16] Bollen, K. A., "A new incremental fit index for general structural equation models", *Sociological Methods and Research, 17*, 303-317, 1989.

[17] Cheung, G. W. and Rensvold, R. B., "Evaluating goodness-of-fit indexes for testing measurement invariance", *Structural Equation Modelling, 9*(2), 233-255, 2002.

[18] Vandenberg, R. J. and Lance, C. E., "A review and synthesis of the measurement invariance literature: Suggestions, practices, and recommendations for organizational research", *Organizational Research Methods, 3*(1), 4-69, 2000.

[19] Yi Zeng and Ke Shen, "Resilience Significantly Contributes to Exceptional Longevity", *Current Gerontology and Geriatrics Research*, 2010, 1- 9, 2010.

[20] B. Nygren, L. Aléx, E. Jonsén, Y. Gustafson, A. Norberg, and B. Lundman, "Resilience, sense of coherence, purpose in life and self-transcendence in relation to perceived physical and mental health among the oldest old", *Aging & Mental Health*, 9(4), 354-362, 2005.

[21] Tomás, J.M., Meléndez, J.C., Sancho, P., and Mayordomo, T., "Adaptation and initial validation of the BRCS in an elderly Spanish sample", *European Journal of Psychological Assessment*, 28(4), 283-289, 2012.

[22] Comrey, A. L., "*A first course in factor analysis*", Academic Press, NY, 1973.

[23] Tabachnick, B. G. and Fidell, L. S., "*Using multivariate statistics*", Harper Collins Publishers, California, 1989.

[24] Kaiser, H. F., "An index of factorial simplicity", *Psychometrika, 35*, 401-415, 1974.

[25] Jöreskog, K. G. and Sörbom, D., "*Advanced in factor analysis and structural equation models*", M.A. Abl, Cambridge, 1979.

[26] Saris, W. E. and Stronkhorst, H., "*Casual modelling in non-experimental research: an introduction to the LISREL approach*", Sociometric Research Foundation, Amsterdam, 1984.

[27] Hu, L. and Bentler, P. M., "Cut-off criteria for fit indexes in covariance structure analysis: conventional criteria versus new alternatives", *Structural equation Modeling, 6*, 1-55, 1999.

[28] Steiger, J. H. and Lind, C., "Statistically based tests for the number of common factors", *Annual meeting of the Psychometric Society*, Iowa City, IA, 1984.

[29] Arbuckle, J. and Wothke, W., "*AMOS 4 user's reference guide"*, Smallwaters Corp, Chicago, 1999.

[30] Anastasiadou, S. D., "Reliability and validity testing of a new scale for measuring attitudes toward learning statistics with technology", *Acta Didactica Napocensia, 4(*1), 2011.

[31] Tomás, J.M., Sancho, P., Melendez, J.C., and Mayordomo, T., "Resilience and coping as predictors of general well-being in the elderly: A structural equation modeling approach", *Aging & Mental Health, 16*(3), 317-326, 2012.