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Psychometric Properties of 14-Item Resilience Scale in Older Adults

Propiedades psicométricas de la Escala de Resiliencia de 14-ítems en adultos mayores

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Summary

This instrumental research aimed to analyze the psychometric properties of the 14-item Resilience Scale in Spanish (RS-14) in a Mexican population aged 60 years old and over. Two hundred twenty participants (126 women and 94 men), aged between 60 and 88 years (M=67.48; SD=5.34), were tested by convenience sampling. The study instrument was the Spanish version of the Resilience Scale (ER-14) by Sánchez-Teruel and Robles-Bello. The results of the confirmatory factor analysis showed that the scale presented an adequate fit with a smaller number of items (11) and two factors; however, the internal consistency of the second factor was inadequate, and the factorial invariance showed that the solution found was not invariant according to sex. However, the results suggest that the scale with 11 items and two factors (personal competence and acceptance of oneself and life) presents adequate psychometric properties to measure resilience in Mexican people aged 60 years and over. It suggested analyzing the psychometric properties of the factorial solution found in greater depth and exhaustiveness.

Keywords: Older adults; Factor analysis; Psychometrics; Resilience; RS-14.

Resumen

Esta investigación de tipo instrumental tuvo como objetivo analizar las propiedades psicométricas de la Escala de Resiliencia de 14 ítems en español (RS-14) en población mexicana de 60 años y más. Participaron 220 sujetos seleccionados por conveniencia (126 mujeres y 94 hombres) con edades comprendidas entre 60 y 88 años (M=67.48; DT=5.34). El instrumento de estudio fue la versión española de la Escala de Resiliencia (ER-14) de Sánchez-Teruel y Robles-Bello. Los resultados del análisis factorial confirmatorio mostraron que la escala presentaba un ajuste adecuado con un menor número de ítems (11) y dos factores, sin embargo, la consistencia interna del segundo factor fue inadecuada, y la invarianza factorial evidenció que la solución encontrada no era invariante según el sexo. Aunque los resultados sugieren que la escala con 11 ítems y dos factores (competencia personal y aceptación de uno mismo y de la vida) presenta propiedades psicométricas adecuadas para medir la resiliencia en personas mexicanas de 60 años y más, se sugiere analizar con mayor profundidad y exhaustividad las propiedades psicométricas de la solución factorial encontrada.

Palabras claves: Adultos mayores; Análisis factorial; Psicometría; Resiliencia; RS-14.

INTRODUCTION

The gradual increase in the population of people aged 60 and over has motivated various international organizations and scientific associations to carry out research aimed not only at prolonging their life expectancy, but also at improving their quality of life. However, the literature addressing behavioral aspects, such as resilience, is limited, despite evidence suggesting that these factors influence individual, and possibly also population longevity to a greater or lesser extent (Ribera-Casado, 2018).

Resilience in older adults refers to their ability to adapt, overcome and even transform in the face of life's constant demands (Grotberg, 1995). This does not imply that they are exempt from experiencing difficulties or distress. It is common for people who have faced significant challenges or traumatic events to feel emotional pain and sadness, or for these emotions to intensify during the recovery process (American Psychological Association [APA], 2017). Therefore, being resilient implies recognizing and accepting these adversities, as well as mobilizing personal resources, both internal and external, that allow them to preserve their quality of life and well-being (Jiménez-Ambriz, 2011).

Although resilience was initially believed to be a relatively stable personality trait, it is now known to be behaviors, thoughts and actions that can be cultivated at any stage of life. That is, resilience does not develop definitively at any one point in time. If manifested early, it can be strengthened over time through increased self-esteem, which is achieved by coping with and overcoming trauma. However, this capacity can also change or weaken if the individual faces stress levels that exceed his or her ability to handle them (Vázquez, 2019).

Indeed, resilience is a capacity that can be developed in old age as in other stages of life as "the result of a dynamic process in which risk and protective factors interact, which facilitate the overcoming of risk or limit its negative effects in a constructive way" (Díaz-Castillo et al., 2017).

According to Díaz-Castillo et al. (2017) and García-Jiménez et al. (2019), factors that increase the likelihood of unfavorable consequences or difficulties in positive adaptation in older adults include abandonment, dementia, divorce or widowhood, chronic illness, abuse, poverty, loneliness, social violence, stressful life events or natural disasters. And among the factors involved in the development of resilience are self-esteem, optimism, good humor, a high level of spirituality and hope, support networks (friends, work and religion), healthy lifestyle, cognitive competence, health status, among others.

As can be seen, the nature of resilience is complex, involving the interaction between biological, psychological, social and cultural factors in coping with the triggering situation (Masten et al., 2021). Therefore, assessing the level of resilience in people requires considering the measurement of these factors, and the strategy employed to ensure a scientific approach to this process has been the development of measurement instruments (Zempoaltecatl, 2018), such as projective, imaging and psychometric tests (Ospina, 2007).

Within this last group, different proposals have been developed: the Baruth Protective Factors Inventory (BPFI), the Brief Resilience Coping Scale (BRCS), the Brief Resilience Scale (BRS), the Connor-Davidson Resilience Scale (CD-RISC), the Resilience Scale for Adults (RSA) and the Resilience Scale developed by Wagnild and Young (RS-25), which has a long history of validation and use in different population groups and languages (Ahern et al., 2006).

The RS-25 measures resilience at the individual level, understood as a positive and relatively stable trait that can be activated or used as personal competence and acceptance of oneself and life, which allows one to cope with change or misfortune (Wagnild & Young, 1993).

Strictly speaking, this term refers to the adaptive aspects of resilience, i.e., the capacity of an individual to recover from an adverse event by resorting to internal and external sources of support (Arango-Arango, 2005).

Originally, the development of the RS-25 was based on a five-factor theoretical model: equanimity, meaningfulness, perseverance, self-reliance, and existential loneliness (Wagnild & Young, 1993); however, later analyses showed a better model fit when the 25 items were grouped into only two factors: 1) personal competence (self-reliance, self-sufficiency, independence, invincibility, mastery, resourcefulness and perseverance) and 2) acceptance of oneself and life (adaptability, flexibility and balanced outlook on life) (Wagnild, 2009).

Although the RS-25 has presented adequate psychometric properties in the different contexts and languages where it has been applied, the search for a shorter and easier to apply instrument led researchers to develop a shorter version of this instrument: the 14-item RS (Wagnild, 2009).

Like the original version, the RS-14 has also presented adequate psychometric properties to measure resilience in different population groups: mainland Chinese young adults (Chen et al., 2020); Chinese students (Chung et al., 2020); Iranian, Italian and Lithuanian adolescents (Ahadianfard et al., 2023; Cuoco et al., 2022; Zelviene et al., 2021).

However, in 2015, Sanchez-Teruel and Robles-Bello presented an adapted version of the RS-14 with the acronym ER-14 (Spanish 14-item Resilience Scale), which, also, has been validated in different population groups.

In this regard, Rosario et al. (2024) conducted a study in a sample of young Peruvians between 18 and 29 years of age in order to evaluate the psychometric properties of the Spanish version of the ER-14. According to the reported findings, this scale presented a good fit and (x^2/df=1.47, CFI=.94, TLI=.92, SRMR=.04 and RMSEA=.04), and acceptable values of reliability (α=.91 and ω=.92).

Gonzales-Ramirez et al. (2023), using a sample of 542 university students from Lima, aged between 18 and 40, conducted a similar study and concluded that the ER-14 presented a unidimensional structure (x^2/gl=2.78, CFI=.95, TLI=.94, SRMR=.03, RMSEA=.05, IC 90% [.05, .06]), with saturations above .40 and high internal consistency (ω= 93).

Meanwhile, Sánchez-Teruel & Robles-Bello (2019), in a study along the same lines, reported that the adjusted model of the ER-14 with 11 items (eliminating items 6, 9 and 11) and a single dimension was the one that presented the best goodness-of-fit indices in a sample of older adults aged between 65 and 96 (x^2/gl=1.98, RMSEA=.02, RMR=.04, GFI=.91, AGFI=.89). They also reported good internal consistency (α=.79) and adequate criterion validity with other measures of general resilience (CD-RISC) (r=.87, p<.01).

However, considering that there is still little research devoted to the study of resilience in older adults and, therefore, there are also few instruments in Spanish that are valid and reliable, simple and easy to apply in the elderly, the objective of this study was to analyze the psychometric properties of the 14-item Resilience Scale in Spanish (ER-14) in a Mexican population aged 60 and older.

This instrument was chosen because it is a valid adaptation of a scale with adequate psychometric properties in the different contexts and populations in which it has been applied, and because it is expected to enhance its applicability in a population group that demands the shortest possible measurement instruments that are sensitive to differences in sex, age or other sociocultural aspects (Sánchez-Teruel & Robles-Bello, 2015).

METHOD

Design

Since this work analyzed the psychometric properties of an existing psychological measurement instrument, instrument-type research was developed (Ato et al., 2013).

Participants

The requirements for participation were the following: to be 60 years old or older, to reside in Mexican territory, to be autonomous for activities of daily living, and not to have cognitive impairment. The study included 220 subjects selected by convenience (126 women and 94 men) aged between 60 and 88 (M=67.48; DT=5.34). As for their place of residence, 71.36% stated that they live in the State of Mexico and 26.36% in Mexico City (CDMX).

With respect to the level of education, 24.55% said they had higher education; 24.09%, basic education (primary and secondary); around 18% of the respondents said they had not completed basic education, and a similar percentage, higher secondary education (baccalaureate). Only 7.73% of the participants mentioned having completed graduate studies.

Regarding marital status, 55.91% were married, 15.00% were widowed, 10.00% were divorced, 8.64% were single, 7.73% said they were living in a common-law relationship and 2.73% said they were separated. With respect to their occupation, 38.18% had a pension or were retired, 28.18% were engaged in household chores and 33.18% mentioned that they were still performing some remunerated activity.

Regarding health services, 77.73% said they were affiliated with a social security institution, 17.91% said they paid for this service and 3.64% said they did not have access to this type of service. With respect to their chronic conditions, 46.36% said they had neither diabetes nor high blood pressure, 24.44% said they had only high blood pressure and 15.00%, diabetes, and the remaining 14.09% said they had both conditions. Of the subjects surveyed, 75.91% stated that they had sufficient economic resources to subsist and 28.18% were affiliated with a group, club or church.

Instruments

To ascertain the resilience of older adults to adverse events, the Spanish version of the Resilience Scale (ER-14; Sánchez-Teruel & Robles-Bello, 2015) was used. This instrument comprises 14 self-report items organized in two dimensions: personal competence (items 1, 2, 5, 6, 6, 7, 9, 10, 11, 12, 13, 14) and acceptance of oneself and life (items 3, 4, 8), with a 7-point Likert-type response scale, where 1 meant strongly disagree and 7, strongly agree. To determine the position of each participant within the scale, the final score was calculated by summing the response values to each item; thus, values below 65 points indicated low resilience; between 65 and 81, moderate resilience; and above 81, high levels of resilience (Wagnild, 2009).

Although Sánchez-Teruel and Robles-Bello (2015) found that the adjusted model with 11 items (eliminating items 6, 9 and 11) and a single dimension was the one with the best fit and good internal consistency (α=.79), in this paper the three models proposed by these specialists were evaluated, with the intention of confirming the factorial solution found.

Procedure

The instrument was designed in digital and printed format. The digital format was developed in Google Forms and sent by e-mail and instant messaging, while the printed format was administered personally by one of the researchers. In both cases, the questionnaire included an informed consent form in which the terms, the form of participation and the objective of the research were made known; therefore, the questionnaire was only administered to those participants who gave their consent to be surveyed. It was also made clear that only the group of researchers would have access to the data provided, and that the responses would be coded and reported together for scientific dissemination purposes.

Data analysis

First, the data set recovered was analyzed descriptively. Second, prior to the model estimation analysis, the total sample was evaluated for multivariate normality, the presence of outliers, initial multicollinearity, and the suitability of the data for factorization.

The third stage consisted of evaluating the psychometric properties of the ER-14, through construct validity, factorial invariance according to sex and internal consistency. It was not necessary to perform an Exploratory Factor Analysis (EFA) due to the existence of previous analyses on the structure of the construct (Herrero, 2010).

Construct validity was assessed by a Confirmatory Factor Analysis (CFA) using a Maximum Likelihood (ML) fitting procedure for the following three solutions (Sánchez-Teruel & Robles-Bello, 2015):

- Model 1 = Original scale with two factors (personal competence and acceptance of oneself and life).
- Model 2 = Scale with 11 items (eliminating items 6, 9 and 11) and two factors (personal competence and acceptance of oneself and life); and
- Model 3 = Scale with 11 items (eliminating items 6, 9 and 11) and one factor (resilience).

To evaluate the fit of these three models, the same indicators reported in the original proposal were used: Chi-square goodness-of-fit index (x^2/gl, adequate ≤3), root mean squared error of approximation (*RMSEA*; good fit ≤.05), root mean square residual (*RMR*, adequate ≤.08), goodness-of-fit index (*GFI*; adequate ≥.85) and modified goodness-of-fit index (*AGFI*; adequate ≥.85); as well as the comparative fit index (*CFI*; adequate ≥.95).

In the next stage, we proceeded to test the invariance of the scale according to sex. For this purpose, a multigroup CFA was carried out, following the procedure recommended by Sainz-Palafox et al. (2022), which contemplates the estimation of three nested models that are progressively compared with each other: a first model on which no restrictions are imposed (configural invariance); a second model with restrictions in which the regression coefficients are equalized (metric invariance), and a third model where the intercepts are equalized to the factor loadings (scalar invariance). Finally, the internal consistency for the solution found was evaluated by means of the McDonald omega coefficient (ω, acceptable values between .65 and .90 points), as it provides a more accurate measure of the level of reliability, regardless of the number of items (Ventura-León & Caycho-Rodríguez, 2017). All analyses were carried out with IBM SPSS v. 25 software and the structural equation modeling program Amos v.25.

RESULTS

The analysis of descriptive statistics revealed that 82.27% (88 points, SD=8.76) of the participants present a high ability to cope with life's adversities. When analyzing the results according to the sociodemographic variables, it was observed that there were no significant differences in the level of resilience, except for the sex variable, where there was a difference of 11 percentage points among the participants, which showed that, in proportion, men (88.29%) are more resilient than women (77.77%).

It is striking that the group of people who mentioned having incomplete studies (25%), insufficient resources (24.09%) or little social interaction (71.82%) achieved high levels of resilience, since these factors usually have a negative effect on it (Díaz-Castillo et al., 2017).

Basic Descriptors

The results obtained showed that there was no multivariate normality in the distribution of the items (Mahalanobis distance (*MD*)=107.93, *gl*=23.69) and that there were ten outliers (5 major and 5 minor). It was also found that multicollinearity did not represent a problem in the regression model, since the variance inflation factor (VIF) of the predictor variables was in the range of 1.27 to 3.03; and because Bartlet's tests of sphericity, (x^2=1158.06, *gl*=91, *p*=.001) and *KMO* test (.852) demonstrated the suitability of the data for factoring, all cases were included in subsequent analyses.

Construct Validity

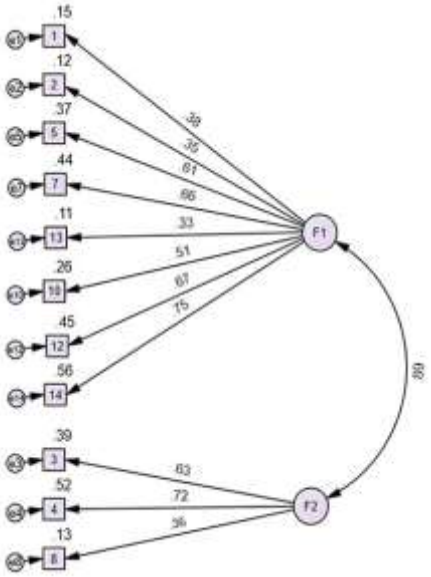
Since the data did not satisfy the requirement of multivariate normality, the Maximum Likelihood (*MV*) method associated with the bootstrap method was used in order to mitigate possible biases in the estimates; therefore, the results obtained showed that Model 2 with 11 items and two factors (personal competence and acceptance of oneself and life) presented adequate goodness-of-fit indices (see Table 1). Although the RMSEA (≤.05) and CFI (≥.95) values were not completely adequate, the other indicators were favorable. An RMR value below .08 was recorded, while GFI as well as AGFI exceeded the limit of .85. Figure 1 shows the graphical representation of the Model described.

Table 1.
Goodness-of-fit indices for the three ER-14 models

Solution	x^2	*gl*	x^2/gl	*p*	boot*	RMSEA	RMR	GFI	AGFI	CFI
Model 1	275.40	76	3.62	.000	.01	.10	.06	.84	.79	.818
Model 2	104.42	43	2.43	.000	.20	.08	.05	.92	.87	.892
Model 3	108.82	44	2.47	.000	.17	.08	.05	.91	.87	.886

Note. *Bollen-Stine bootstrap (p≥0.05)

Figure 1.
ER-11 model with two factors in a sample of people aged 60 years old and over.



Factorial Invariance

After estimating the three models (configural, metric and scalar invariance), they were compared according to the base model where they were nested, looking for differences in the Chi-square values (Δx^2) to yield a non-significant *p-value* (>.05) y un ΔCFI<-.01 and $\Delta RMSEA$≥.01 (Moreta-Herrera et al., 2021).

The results revealed that as the restrictions (metric and scalar invariance) increased in the model evaluated (scale with 11 items and two factors), the variations of the fit indices were not within the expected range (see Table 2), i.e., the model did not represent the groups separately.

Table 2.
Factorial invariance models

Model	x^2(DF)	x^2/DF	CFI	RMSEA	Δx^2	ΔCFI	ΔRMSEA
Configural	165.81	1.93	.86	.07			
Metric	193.27	2.03	.82	.07	27.46 p=.001	-.04	0
Scalar	217.68	2.06	.80	.07	24.40 p=.011	-.02	0

Internal Consistency of the Scale

The reliability estimated by means of the McDonald omega coefficient was .72 for dimension 1 (8 items) and .60 for dimension 2 (3 items). Considering the small number of items that made up the model, these values were considered acceptable.

DISCUSSION

Evidence of construct validity, factorial invariance and internal consistency of the Spanish version of the 14-item Resilience Scale (ER-14) in the Mexican context is presented, with the intention of having a brief measurement instrument, suitable for people aged 60 years old and older.

Psychometric results suggest that Model 2 of the Spanish version of the ER-14 (Sánchez-Teruel & Robles-Bello, 2015) presents an adequate fit. The factor solution found is composed of two factors and 11 items: personal competence (items 1, 2, 5, 7, 10, 12, 13, 14) and acceptance of self and life (items 3, 4 and 8). This scale reflects values consistent with the parameters established in the original proposal, except for the RMSEA. Although none of these values provides a complete picture of the quality of the model, it is suggested that this study be replicated in a larger sample to reduce the variability of this indicator. In addition, it is recommended that the traditional cut-off points of the CFI and SRMR be considered in future research. The former tends to be more robust in situations where model assumptions are not fully met, while the latter is more effective than RMSEA in discarding models that do not fit optimally, especially in relatively small samples, such as the one used in this paper (Jordan, 2021).

Another aspect worth noting is that the factorial solution found in this work is different from the original (Sánchez-Teruel & Robles-Bello, 2019) and from that reported by other authors (Gonzales-Ramirez et al., 2023; Rosario et al., 2024); therefore, it is concluded that the resulting scale has not been completely confirmed. It is also noteworthy that this scale cannot be used to assess resilience in people aged 60 years old and over, regardless of their sex.

Although the evidence confirms that the items of the first factor measure the same construct and are correlated with each other, the same is not true for factor two; however, there is still no information with which to contrast and interpret these results. Based on the above, it is recommended that we continue to contribute to the analysis of this instrument in order to identify the origin of the discrepancies observed.

Since the study was conducted on a relatively small sample, the reported findings should be viewed in light of the following limitations. First, the findings cannot be generalized, since the study was conducted on a non-representative sample. Second, it is not possible to establish significant correlations between variables, because the study was cross-sectional. And third, there may be some biases when comparing data by sex, since the samples were not equivalent. Hence the importance of analyzing the psychometric properties of the ER-11 with two dimensions in an expanded sample of people aged 60 years old and over that is representative and randomly selected, both globally and by stratum (sex, age, educational level, among others) in order to corroborate the adequacy of the validated model and the invariance according to sex in the level of resilience reported.

Likewise, it is suggested to conduct research in samples made up of different population groups (young people and adults), over a prolonged period of time (years, decades), with the aim of expanding the evidence of validity, factorial invariance and internal consistency provided in this work (Sánchez-Teruel & Robles-Bello, 2015).

Despite the limitations, it is considered that having a theoretical model with a good fit and high reliability not only improves the quality of the measurements made, but also provides relevant information to mitigate the adverse effects of living in a sector of the population that seeks to live longer and aspires to a better quality of life (Consejo Estatal de Población [COESPO], 2019). In addition, this study sets a relevant precedent, since it presents the first evidence of validity of the Spanish version of the RS-14 in Mexican individuals aged 60 years old and over.

In summary, although this study provides reasonable evidence that the resilience scale with 11 items and two factors (personal competence and acceptance of oneself and life) has adequate psychometric properties to assess resilience in Mexican people aged 60 years and older, it is suggested that the psychometric properties of the factorial solution found should be analyzed in greater depth and exhaustiveness.

Author contributions: Adriana Rangel-Baca conceived and designed the study, collected the data, wrote the original article and monitored the entire research process. María Isabel Ramírez-Ochoa analyzed and interpreted the data. Both reviewed and edited the manuscript and read and approved the final version of the manuscript.

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