

Psychometric properties of Connor-Davidson Resilience Scale in a Spanish sample of entrepreneurs

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Abstract

Background: The literature regarding entrepreneurship suggests that the resilience of entrepreneurs may help to explain entrepreneurial success, but there is no resilience measure widely accepted by researchers. This study analyzes the psychometric properties of the Connor and Davidson Resilience Scale (CD-RISC) in a sample of Spanish entrepreneurs. **Method:** A telephone survey research method was used. The participants were entrepreneurs operating in the business services sector. Interviewers telephoned a total of 900 entrepreneurs of whom 783 produced usable questionnaires. The CD-RISC was used as data collection instrument. We used principal component analysis factor and confirmatory factor analysis to determine the factor structure of the CD-RISC. **Results:** Confirmatory factor analysis failed to verify the original five-factor structure of the CD-RISC, whereas principal component analysis factor yielded a 3-factor structure of resilience (hardiness, resourcefulness and optimism). In this research, 47.48% of the total variance was accounted for by three factors, and the obtained factor structure was verified through confirmatory factor analysis. **Conclusions:** The CD-RISC has been shown to be a reliable and valid tool for measuring entrepreneurs' resilience.

Keywords: CD-RISC, entrepreneurs, resilience, small business, Spain.

Resumen

Propiedades psicométricas de la Escala de Resiliencia de Connor-Davidson en una muestra de emprendedores españoles. Antecedentes: la literatura sugiere que la resiliencia de los emprendedores puede ayudar a explicar el éxito de sus empresas. Sin embargo, no existe una medida de resiliencia ampliamente aceptada por los investigadores. Este trabajo analiza las propiedades psicométricas de la escala de resiliencia de Connor y Davidson (CD-RISC) en una muestra de emprendedores españoles. **Método:** el método de investigación usado fue la encuesta telefónica. Participaron emprendedores que operan en el sector servicios. Los entrevistadores telefonaron a 900 emprendedores, de los cuales 783 rellenaron correctamente el cuestionario. El instrumento utilizado para la recogida de datos fue el CD-RISC. Usamos el análisis de componentes principales y el análisis factorial confirmatorio para determinar la estructura factorial del CD-RISC. **Resultados:** el análisis confirmatorio falló en la verificación de la estructura original de cinco factores del CD-RISC, mientras que en el análisis de componentes principales emergieron tres factores de resiliencia (personalidad resistente, recursos y optimismo). El 47,48% de la varianza fue explicada por los tres factores y la estructura factorial obtenida fue verificada a través del análisis factorial confirmatorio. **Conclusiones:** el CD-RISC ha mostrado ser una herramienta fiable y válida para medir la resiliencia de los emprendedores.

Palabras clave: CD-RISC, emprendedores, resiliencia, pequeña empresa, España.

An entrepreneur is an individual with a special gift for recognizing opportunities and the capacity to mobilize external resources, generally the property of others, in order to exploit said opportunities (Sánchez, 2011). Interest in entrepreneurs is based on their capacity to generate employment and their contribution to the dynamism of the economy by means of the addition of new firms to the business network (Tang & Koveos, 2004).

The pursuit of the generation of value by entrepreneurial activities, through the creation or expansion of economic activity, by identifying and exploiting new products, processes or markets

is often associated with high stress, a multiplicity of obstacles, and a high uncertainty regarding outcomes. Moreover, decision-making in entrepreneurial settings often leads to various degrees of error or misjudgments due to the simple fact that the information available is either incomplete or ambiguous. To deal with these highly uncertainty situations, entrepreneurs often have to adjust their goals and strategies continually to keep up with changing contingencies as the new venture develops.

As entrepreneurs encounter repeated obstacles with many uncertain outcomes, resilience, or the ability to withstand and quickly overcome adversity, would be an important personal advantage (Markman & Baron, 2003). Resilient entrepreneurs can explore and exploit opportunities because, when an unexpected event occurs, resilience enables them to drop a venture or modify it to take advantage of the new situation.

The complexity of defining the construct of resilience has been widely recognized (Luthar, Cicchetti, & Becker, 2000), and this has

created considerable challenges when developing an operational definition of resilience. Although a number of scales have been developed for measuring resilience, they are not widely validated (Windle, Bennert, & Noyes, 2011). Consequently researchers have little robust evidence to inform their choice of a resilience measure and may make an inappropriate selection for the study of a specific population.

Theoretical framework

Resilience is a dynamic process in which the individual displays positive adaptive skills despite experiencing significant traumatic adversity; it is a measure of the ability to cope with stress. Assets and resources within the individual, their life, and environment facilitate this capacity for adaptation and “bouncing back” in the face of adversity (Windle, Bennert, & Noyes, 2011).

Resilient people unflinchingly accept reality, have an extraordinary ability to adapt to significant change, and deeply believe that life is meaningful (Burns & Anstey, 2010). Other qualities associated with resilience are patience, tolerance of negative affect, optimism, and faith. Resilience, or the capacity to rebound from adversity, strengthened and more resourceful, is an important quality for entrepreneurs (Sutcliffe & Vogus, 2003). Resilience refers to entrepreneurs' ability, despite destabilizing events, difficult markets and living conditions, to continue projecting themselves into the future. This capacity enables them to impede, diminish or overcome the harmful effects of adversity. In other words, it is entrepreneurs' ability to overcome especially difficult circumstances, thanks to their qualities of behavior and adaptation, combined with the culture in which they are immersed.

According to London (1993) and Cooper, Estes, and Allen (2004), resilient entrepreneurs: show a high tolerance for ambiguity, demonstrate that they are adaptable of changing circumstances, and welcome rather than resist changes; have a hardiness about them that comes from their willingness to work hard in order to reach their goals and aspirations; demonstrate determination in their quest for success, particularly when encountering a major challenge. In doing so, they often respond to problems with “more power and more smarts”; are optimistic, they have a positive attitude, they are able to learn from their mistakes and, where others see threats, they see opportunities.

Resilient entrepreneurs believe they can have a strengthening effect, are more capable of adapting to change, can use past successes to confront current challenges and use positive emotions to recover from negative emotional experiences (Tugade & Fredrickson, 2004). The positive attitude towards deviation from the expected and desired results shown by resilient entrepreneurs can, for example, enhance their willingness to learn from a failure situation and help gain insights and change mindsets so that mistakes are not repeated. Markman and Baron (2003) reached the conclusion that the characteristics of resilient entrepreneurs gave them the tools, skills, and dexterity that are the key to the success of their companies. Hayward, Foster, Sarasvathy, and Fredrickson (2010) argue that there is a positive relationship between entrepreneurs' resilience and the success of their businesses.

In spite of the importance that researchers grant to entrepreneurs' resilience as an explanatory factor regarding entrepreneurial success, there is as yet no consensus on the most suitable instrument for measuring this multidimensional construct (resilience). The scales that are most commonly used in researching

adult resilience are: the Resilience Scale in nursing literature; the Clinical Assessment Package for Assessing Client Risks and Strengths; the Ego Resilience Scale; and the Resilience Scale for Adults (Karairmak, 2010).

Resilience measures commonly comprise self-report and have not been extensively validated, nor has their application been widely documented (Windle et al., 2011). Among these instruments, a newly developed scale has earned widespread attention from researchers: the Connor-Davidson Resilience Scale (CD-RISC) (Connor & Davidson, 2003). Interest in the CD-RISC is due to its established psychometric properties, on the one hand, and to the fact that it is applicable to different populations, as it was not developed for a specific group, on the other.

Connor and Davidson (2003) performed exploratory factor analysis, using a sample of 577 adults from the general population. This analysis yielded five factors, labeled as personal competence, high standards, and tenacity; trust in one's instincts, tolerance of negative affect, and the strengthening effects of stress; positive acceptance of change and secure relationships with others; control and spiritual influences. A preliminary study of the psychometric properties of the CD-RISC in general population and patient samples supported its internal consistency and test-retest reliability. Cronbach's alpha was calculated as .89 for the general population and, concerning test-retest reliability, the correlation coefficient between Time 1 ($M= 52.7$) and Time 2 ($M= 52.8$) was .87 for the group with generalized anxiety disorders and trauma and posttraumatic stress disorder ($N= 24$).

The CD-RISC has been tested on general population (Yu & Zhang, 2007), teenagers (Jorgensen & Seedat, 2008), graduate students (Singh & Yu, 2010), young adults (Burns & Anstey, 2010), young women (Claus-Ehlers, 2008), older women (Lamond et al., 2008), earthquake survivors (Karairmak, 2010), nurses (Gillespie, Chaboyer, & Walli, 2007), etc. Nevertheless, we are unaware of any study that has used the CD-RISC with a sample that exclusively includes entrepreneurs. Previous research has shown that the CD-RISC has good internal consistency: values found for Cronbach alpha were above .70 (Yu & Zhang, 2007; Singh & Yu, 2010). However, diverse studies have revealed a range of different factor structures. Therefore, the objective of this study was to evaluate the psychometric properties of the Connor-Davidson Resilience Scale (CD-RISC) with the aim of determining whether it can be used as a reliable and valid tool to assess entrepreneurs' resilience.

Method

Participants

Participants were 900 entrepreneurs operating in the business services sector, selected randomly from the SABI (*Sistema de Análisis de Balances Ibéricos — Iberian Balance Sheet Analysis System*) database, managed by the Bureau of Van Dyck and Grupo Informa, S.A. This database contains economic and financial information on Spanish companies. Statistically, the sample size was calculated so that it would be representative of the population with a 5% standard error and a 95% confidence level. The final sample is composed of 783 individuals. For the purposes of our analysis, the sample was randomly divided into two subsamples of a similar size. Subsample I included 389 entrepreneurs and Subsample II included 394.

Entrepreneurs were required to meet the two following requirements: (a) Be the sole founder/owner and manager of a consolidated company that has been operating for over 42 months (established business owners in the terminology of the Global Entrepreneurship Monitor –GEM Spain, 2010); (b) the company has 19 employees or fewer.

A profile of the respondents is provided in Table 1. A comparison of this data with those from the Global Entrepreneurship Monitor of Spain (GEM Spain, 2010) shows that the characteristics of our sample are very similar to those shown by established Spanish business owners.

Procedure

A questionnaire survey research method was used. Four interviewers, who had been trained in interview techniques and who knew the objective of this study, telephoned potential responders and requested personal interviews. All of the phone calls were made to the entrepreneur’s workplace. Interviewers telephoned a total of 900 entrepreneurs of whom 783 produced usable questionnaires (overall response rate of 87%). All the data was collected in the second quarter of 2011.

Instruments

The Connor-Davidson Resilience Scale (CD-RISC; Connor & Davidson, 2003), consisting of 25 items, was used. Respondents indicated their level of agreement using a 5-point Likert scale from *strongly disagree* (0) to *strongly agree* (4). The total score was achieved by adding up all responses, and ranges from 0 to 100, with higher scores reflecting greater resilience.

The adaptation to the CD-RISC was done taking into account the general rules of translation and test adaptation (Muñiz & Hambleton, 1996, 2000). An entrepreneur, fluent in Spanish and English, translated the CD-RISC into Spanish (Table 2),

	GEM	Entire sample (N= 783)	Subsample 1 (n= 389)	Subsample 2 (n= 394)
Sex (%)				
Men	67.8	68.33	68.50	68.16
Women	32.2	31.67	31.50	31.84
Ages				
Range		20-50	20-50	20-50
Average age	44.8	45.20	44.90	45.50
Educational level (%)				
Primary education		34.00	35.73	32.30
Secondary education		35.00	34.44	35.55
University degrees		31.00	29.83	32.15
Entrepreneurs with experience (%)	23.4	24.30	24.00	24.6
Employees (%)				
0	39.70	37.93	38.10	37.76
1-5	50.10	51.14	50.40	51.87
6-19	10.20	10.94	11.5	10.37

Note: GEM= Global Entrepreneurship Monitor

after which two other bilingual Spanish entrepreneurs translated the Spanish version back into English. After this, five bilingual Spanish entrepreneurs completed the surveys. The entrepreneurs were then asked to compare the Spanish translation with the English translation, and they concluded that the back-translation was sufficiently similar to the original scale.

The scale showed an adequate internal consistency ($\alpha > .80$) in both Connor and Davidson’s original research (2003) and in later works (Jorgensen & Seedat, 2008; Karairmak, 2010). In our research, considering the entire sample, the total mean scale was 79.95 ($SD= 9.78$) and the instrument achieved a composite reliability of .89.

Data analysis

To begin with, confirmatory factor analysis (CFA) was conducted on Subsample I to validate the prior factor structure of the CD-RISC reported by Connor and Davidson (2003). Next, as confirmatory factor analysis could not verify the original five-factor structure, principal component analysis factor (PCA) with Varimax rotation and Kaiser normalization was performed. To avoid the overdetermination of the factors, only those principles that showed eigenvalues greater than 1 and a minimum number of three items were considered (Gorsuch, 1997). Furthermore, following the criteria of Hair, Anderson, Tathan, and Black (1998), all the items that present factorial loads greater than .50 in a single factor were considered significant in composing the said factor.

To conduct PCA, we used IBM SPSS version 19.

To ratify the established factorial structure in the sample of Spanish entrepreneurs and confirm that the dimensions of the scale

Soy capaz de adaptarme a los cambios
Tengo relaciones estrechas y seguras
En ocasiones, el destino o Dios pueden ayudar
Puedo enfrentarme con todo lo que encuentro en mi camino
El éxito pasado me da confianza para los nuevos desafíos
Veo el lado gracioso de las cosas
Lidiar con el estrés me fortalece
Tiendo a recuperarme después de una dificultad o enfermedad
Las cosas ocurren por alguna razón
Me esfuerzo al máximo
Puedo conseguir mis metas
Cuando las cosas parecen perdidas, no me doy por vencido
Sé a dónde acudir en busca de ayuda
Bajo presión, me concentro y pienso con claridad
Prefiero tomar la iniciativa en la solución de los problemas
No me desanimo fácilmente por el fracaso
Pienso en mí mismo como una persona fuerte
Puedo tomar decisiones impopulares o difíciles
Puedo manejar los sentimientos desagradables
Actúo por corazonadas
Tengo un fuerte sentido del propósito
Siento que controlo mi vida
Me gustan los retos
Trabajo para alcanzar mis metas
Me siento orgulloso de mis logros

found in our PCA are valid and independent, confirmatory factor analysis was conducted on Subsample II.

The statistical method used for both confirmatory factor analyses was the structural equations analysis based on the variance or on components —partial least squares —PLS—(Chin, 1998). The data was analyzed using PLS-Graph software version 3.00, build 1130 by W. Chin (Houston, TX., C.T. Bauer College of Business).

Individual item reliability was assessed by examining the loading factors (λ), or simple correlations of the measurements or indicators with their respective construct. In general, to accept an indicator as being integral to a construct, it must have a load equal to or over .70 (Carmines & Zeller, 1979). However, λ values between .50 and .60 can be accepted in initial phases of scale development or when the scales are applied in different contexts.

The reliability of a construct analyzes the evidence of internal consistency for a given group of indicators and is measured using composite reliability (ρ_c) as an indicator. This indicator was interpreted using the guide proposed by Nunnally (1978), who suggested .70 as a “modest” level of reliability applicable in the initial stages of research.

Evidence of the valid relationship amongst the constructs is measured by average variance extracted (AVE), and its value should be above .50 (Fornell & Larcker, 1981). This indicates that more than 50% of the variance of the construct is due to its indicators. Furthermore, if the correlations between the constructs are lower than the square root of average variance extracted, this indicates that a given construct is different from other constructs.

Results

Confirmatory factor analysis of the original five-factor structure of the CD-RISC

Table 3 shows the estimates of the confirmatory factor analysis of the original five-factor structure reported by Connor and Davidson (2003).

Regarding the individual reliability of the items, apart from Items 10 and 25 of Factor 1 (Personal Competence, High Standards, and Tenacity) and Items 15 and 20 of Factor 2 (Trust in one’s Instincts, Tolerance of Negative Affect, and Strengthening Effects of Stress), the remaining items presented values of λ over .50, indicating the convergence of these items with their respective factors.

With regard to the composite reliability (ρ_c), the value for Factor 5 (Spiritual Influences) was below .70 ($\rho_c = 0.49$).

The AVE for Factors 1, 2 and 3 was below .50, which indicates that less than 50% of the variance of the construct is due to its indicators. Furthermore, for Factor 2, the square root of the AVE (.58) was smaller than the correlation between Factor 1 and Factor 2 ($r = .62$). This result does not allow confirming that Factors 1 and 2 are significantly different.

Because confirmatory factor analysis could not verify the original five-factor structure, we conducted CPA to derive the factor structure of the CD-RISC.

Principal component analysis factor

The value of the KMO statistics (0.68), Bartlett’s test of sphericity ($\chi^2_{(300)} = 3011.62, p < .001$) and the determinant of the matrix (1.29E-007) indicate that factor analysis was appropriate.

As in the original study, principal component analysis factor with Varimax rotation and Kaiser normalization was conducted on the 25 items, extracting any factor with an Eigenvalue over 1. Seven factors were extracted. The total amount of explained variance for those factors was 70.83%.

As there is only one item in the last factor and two items in Factors 4, 5 and 6, factor analysis was extracted a second time with three factors. The three factors accounted for 47.48% of the total variance. The factor loadings of the items exceeded .30 except for Items 3 (“Sometimes fate or God can help”) and 9 (“Things happen for a reason”). Therefore, these items were excluded from further analysis.

Table 3
Individual Reliability of the Item, Composite Reliability and Convergent Validity for factors of the CD-RISC

Factor	Indicator	λ Original sample	λ Mean of subsamples (500)	SE	t	ρ	AVE
1. PHT						0.84	0.41
	PHT1	0.28	0.29	0.10	2.75*		
	PHT2	0.73	0.73	0.03	22.46**		
	PHT3	0.59	0.59	0.05	11.5**		
	PHT4	0.64	0.65	0.05	12.11**		
	PHT5	0.77	0.77	0.03	23.07**		
	PHT6	0.79	0.79	0.04	20.33**		
	PHT7	0.71	0.71	0.04	18.28**		
PHT8	0.32	0.39	0.11	2.88*			
2. TTS						0.78	0.34
	TTS1	0.58	0.56	0.08	7.38**		
	TTS2	0.62	0.61	0.09	7.16**		
	TTS3	0.56	0.53	0.13	4.38**		
	TTS4	0.42	0.43	0.15	2.99*		
	TTS5	0.75	0.74	0.05	13.84**		
	TTS6	0.59	0.6	0.08	7.75**		
TTS7	0.43	0.43	0.12	3.92**			
3. PS						0.80	0.45
	PS1	0.78	0.78	0.04	20.46**		
	PS2	0.58	0.57	0.09	6.42**		
	PS3	0.67	0.66	0.05	13.29**		
	PS4	0.76	0.76	0.04	18.97**		
PS5	0.53	0.53	0.13	4.06**			
4. C						0.86	0.67
	C1	0.83	0.83	0.03	30.85**		
	C2	0.67	0.67	0.04	15.87**		
C3	0.93	0.93	0.01	107.42**			
5. S						0.49	0.53
	E1	0.73	0.72	0.03	28.33**		
E2	0.73	0.72	0.03	28.33**			

Note: PHT= personal competence, high standards, and tenacity; TTS= Trust in one’s instincts, tolerance of negative affect, and strengthening effects of stress; PS= Positive acceptance of change and secure relationships with others; C= Control; S= Spiritual influences; λ = Standardized factor loadings; SE= Standard Error; t= statistic based on test for significance; ρ = Composite reliability; AVE= Average Variance Extracted
* $p < .01$; ** $p < .001$

Table 4 shows the three factors with their eigenvalues and the percentages of variance explained by each. The items in Factor 1 (4, 12, 14, 15, 16, 17, 18, 23 and 24) representing Hardiness implied that the entrepreneurs were not easily frustrated when facing an adverse situation and had strong internal belief or boldness. Factor 2 consists of seven items (1, 2, 5, 11, 13, 22, and 25). No single characteristic emerges, but the greatest number of items suggest Resourcefulness, implying that entrepreneurs possess sufficient resources and imagination to control the multiple adverse situations that they are faced with and feel in control of their lives. Factor 3

Table 4
Factor Loadings for Exploratory Factor Analysis of the CD-RISC

Item numbers	Factor I Hardiness	Factor II Resourcefulness	Factor III Optimism
14. Under pressure, I focus and think clearly	0.69	0.18	
12. When things look hopeless, I don't give up	0.68		
16. I am not easily discouraged by failure	0.67		0.22
17. I think of myself as a strong person	0.66	0.16	0.39
23. I like challenges	0.64	0.21	0.16
15. I prefer to take the lead in problem solving	0.64	0.21	-0.17
18. I can make unpopular or difficult decisions	0.59	-0.11	0.39
4. I can deal with whatever comes my way	0.55	0.50	-0.11
24. I work to attain my goals	0.52	0.40	
25. I take pride in my achievements		0.79	
2. I have close and secure relationships		0.72	0.12
13. I know where to turn to for help	0.34	0.68	
5. Past success gives me confidence for new challenges		0.68	0.21
11. I can achieve my goals	0.44	0.63	0.14
1. I am able to adapt to change		0.59	0.21
22. I feel in control of my life	0.37	0.57	0.29
9. Things happen for a reason	-0.16	0.14	0.19
19. I can handle unpleasant feelings	0.3	-0.19	0.67
20. I have to act on a hunch			0.65
21. I have a strong sense of purpose	0.17	0.2	0.63
6. I see the humorous side of things	0.14	0.31	0.52
8. I tend to bounce back after a hardship or illness	0.36	0.21	0.46
7. Coping with stress strengthens me	0.16	0.21	0.46
10. I give my best effort, no matter what		0.26	0.44
3. Sometimes fate or God can help	-0.13		0.24
Eigenvalue	6.89	2.64	2.33
Variance Explained	27.57	10.57	9.33

Note. Extraction Method: Principal Component Analysis; Rotation method: Varimax with Kaiser Normalization.

consists of seven items (6, 7, 8, 10, 19, 20, and 21) of which at least four are elements of Optimism/View of a benevolent world. Similar to Factor 2, identification of a single characterization of this factor is challenging, but the predominant, though not exclusive, nature of the items is compatible with Optimist/Meaning.

Confirmatory factor analysis

Table 5 shows the estimates made in the CFA of the three-factor structure of the CD-RISC in the current sample found in the previous PCA factor stage.

All the items presented values of λ above .50. Based on the findings, it can be concluded that items present adequate psychometric quality in relation to the factor to which they belong. Moreover, all the factors were reliable with internal consistency values (ρ_c) above .80. Our results show that entrepreneurs' resilience is characterized by a high degree of Hardiness ($M= 21.91, SD= 5.44$) resourcefulness ($M= 22.8, SD = 4.44$) and optimism ($M= 13.97, SD= 2.53$).

Table 5
Individual Reliability of the Item, Composite Reliability and Convergent Validity for the Resilience Factors (Hardiness, Resourcefulness and Optimism)

Factor	Indicator	λ Original sample	λ Mean of subsamples (500)	SE	t	q	AVE
1. Hardiness (H)						0.88	0.57
	H1	0.67	0.67	0.04	18.27**		
	H2	0.65	0.65	0.04	16.09**		
	H3	0.73	0.73	0.02	33.26**		
	H4	0.66	0.66	0.04	16.48**		
	H5	0.63	0.64	0.06	10.11**		
	H6	0.73	0.73	0.03	22.14**		
	H7	0.58	0.58	0.05	11.24**		
	H8	0.72	0.72	0.05	14.76**		
	H9						
2. Resourcefulness (R)						0.87	0.60
	R1	0.60	0.60	0.07	8.14**		
	R2	0.70	0.70	0.06	11.11**		
	R3	0.69	0.69	0.05	15.28**		
	R4	0.76	0.76	0.03	26.18**		
	R5	0.79	0.77	0.03	24.04**		
	R6	0.77	0.77	0.05	15.60**		
	R7	0.76	0.76	0.04	17.75**		
3. Optimism (O)						0.81	0.52
	O1	0.61	0.61	0.05	11.36**		
	O2	0.59	0.60	0.05	11.15**		
	O3	0.67	0.67	0.06	11.85**		
	O4	0.54	0.54	0.09	6.33**		
	O5	0.57	0.57	0.06	9.59**		
	O6	0.62	0.61	0.05	11.40**		
	O7	0.64	0.64	0.05	12.86**		

Note. λ = standardized factor loadings; SE= Standard Error; t= statistic based on test for significance; q= Composite reliability; AVE= Average Variance Extracted; ** p<.001

The AVE of each construct was above the critical value of .50. The correlations between the constructs were less than the square root of AVE, thus allowing us to confirm that this construct is significantly different from the rest.

Table 5 shows strong evidence of the internal structure of the CD-RISC, supporting the hypothesis that the CD-RISC is a reliable and valid tool to assess entrepreneurs' resilience.

Discussion

The factor structure of the CD-RISC obtained with a sample of Spanish entrepreneurs provides strong evidence of internal structure. Consistent with this study, previous research has found strong psychometric properties for the instrument, but the original factor structure (Connor & Davidson, 2003) was not obtained in any of them (Jorgensen & Seedat, 2008; Karaimak, 2010; Singh & Yu, 2010; Yu & Zhang, 2007).

Both CFA and CPA failed to validate the original five-factor structure. Confirmatory factor analysis of the five original factors of the CD-RISC has shown that in Factor 1 (Personal competence, High Standards, and Tenacity), Factor 2 (Trust in one's Instincts, Tolerance of Negative Affect, and Strengthening Effects of Stress), and Factor 3 (Positive Acceptance of Change and Secure Relationships with Others), less than 50% of the variance of the construct (factor) is due to its indicators. Furthermore, the results show that Factors 1 and 2 are not significantly different, which indicates that some of the items in Factor 1 contain similar information to the items in Factor 2.

This lack of convergent and discriminant validity between the five original factors of the CD-RISC may be one of the reasons why, in our study, as in those conducted by Yu and Zhang (2007), Jogersen and Seedat (2008), and Karaimak (2010), among others, structures of three factors consisting of items from a reclassification of the 25 original items were found.

The sample may be the main key to explain the different results obtained by researchers and the difficulty to reproduce the structure of five factors proposed by Connor and Davidson (2003). Different sampling techniques or different samples can generate different results. As suggested by Jogersen and Seedat (2008) or Baek, Lee, Joo, and Choi (2010), the different factorial structure between the samples may be reflecting cultural differences in the meaning of resilience, or even the interpretation that different groups make of some of the items of the scale.

In our study, Factor 1 was identified as Hardiness, and was represented by 9 items in the questionnaire. This factor included items from the original Factor 1 in addition to Items 18 ("I can make unpopular or difficult decisions") and 23 ("I like challenges"), which were also implied in Factor 1 (Hardiness) of the Korean version of the CD-RISC (Baek et al., 2010). This implies that resilient Spanish entrepreneurs integrate goal-setting behavior, commitment and decision-making when they are drawn into unexpected events or situations of uncertainty, frustration, and setback.

Factor 2 was identified as Resourcefulness and included three items from the original Factor 2, two items from the original Factor 4, and two items from the original Factor 1. It suggests that resilient entrepreneurs are subjects who possess skills that enable them to handle adverse situations, allow them to feel capable of achieving their goals, and feel that they have control over their

lives. In other words, resilient Spanish entrepreneurs believe in their own personal capacity to control events and influence the results of situations in which they are immersed.

In Factor 3 most of the items refer to the positive attitude of the entrepreneurs in the face of adverse situations and risk events. Resilient Spanish entrepreneurs are optimistic, work to improve a situation beyond simply doing what is expected, and know how to control their unpleasant feelings.

One modest contribution this study makes is to illustrate that resourcefulness, hardiness, and optimism are distinct factors in entrepreneurs' resilience, despite their relatedness.

Another difference found in this study when applying the CD-RISC is that Items 3 ("Sometimes fate or God can help") and 9 ("Things happen for a reason"), which load on Factor 5 (Spirituality) of the original structure, failed to load higher than .30 onto any factor. The reasons behind this are probably related to the fact that resilient entrepreneurs are confident of their resources and capabilities. Entrepreneurs believe that rewards or recompense are a direct result of their own behavior. They do not think that the result of their actions is fundamentally determined by luck or by destiny. This result echoes those of Yu and Zhang (2007), Burns and Anstey (2010), or that of Singh and Yu (2010), in whose studies the factor of spirituality does not emerge.

Limitations and future prospects

This study presents some limitations. First, the sample was recruited from entrepreneurs from a single country (Spain), which has its own cultural characteristics, which are different from those of the United States or China, for example. We know that the resilience of entrepreneurs can be influenced by cultural characteristics (Jogersen & Seedat, 2008). It would be of great interest to carry out more cross-cultural or cross-national studies to verify whether the results of our work are sustainable for culturally different countries. Second, resilience is a multidimensional concept and might be affected by other factors such as biological, demographic, or contextual factors. Future research could search for biological, demographic or contextual markers that can increase or decrease resilience. Another limitation comes from the use of self-reporting to measure the constructs, as it can give different results depending on the current emotional state (e.g., individuals in a positive emotional state may overestimate their resilience; the reverse may be true for those in a negative emotional state). These limitations of self-report measures suggest that future studies should attempt to replicate these findings using additional methods of assessing resilience.

Conclusions

This paper is important because it is the first empirical study that operationalizes the dimensions of resilience in a representative sample of Spanish entrepreneurs. Resilience provides information about how entrepreneurs face uncertain situations and high stress, and how this can have an influence both on their mental health as on the success of their company. For that reason, it can be useful to have a valid and reliable measure of resilience. In this respect, our findings provide supporting evidence that the CD-RISC has good psychometric properties and can be used as a reliable and valid tool to assess resilience among Spanish entrepreneurs.

References

- Baek, H.S., Lee, K.U., Joo, E.J., Lee, M.Y., & Choi, K.S. (2010). Reliability and validity of the Korean version of the Connor-Davidson Resilience Scale. *Psychiatry Investigation*, 7, 109-115.
- Burns, R.A., & Anstey, K.J. (2010). The Connor-Davidson Resilience Scale (CD-RISC): Testing the invariance of a uni-dimensional resilience measure that is independent of positive and negative affect. *Personality and Individual Differences*, 48, 527-531.
- Carmines, E.G., & Zeller, R.A. (1979). *Reliability and validity assessment (Quantitative applications in the social sciences)*. Thousand Oaks, CA: Sage.
- Chin, W.W. (1998). The partial least squares approach to structural equation modeling. In G.A. Marcoulides (Ed.), *Modern methods for business research* (pp. 295-336). Mahwah, NJ: Erlbaum.
- Clauss-Ehlers, C.S. (2008). Sociocultural factors, resilience, and coping: Support for a culturally sensitive measure of resilience. *Journal of Applied Developmental Psychology*, 29, 197-212.
- Connor, K.M., & Davidson, J.R. (2003). Development of a new resilience scale: The Connor-Davidson Resilience Scale (CD-RISC). *Depression and Anxiety*, 18(2), 76-82.
- Cooper, N., Estes, C.A., & Allen, L. (2004). Bouncing back. *Parks & Recreation*, 39(4), 28-35.
- Fornell, C., & Larcker, D.F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 19, 440-452.
- Global Entrepreneurship Monitor Spain (2010). *Executive report*. Retrieved from: <http://www.ieedu/gem/img/informes/61pdf>.
- Gillespie, B.M., Chaboyer, W., & Walli, M. (2007). The influence of personal characteristics on the resilience of operating room nurses: A predictor study. *International Journal of Nursing Studies*, 46(7), 968-976.
- Gorsuch, R.L. (1997). Exploratory factor analysis: Its role in item analysis. *Journal of Personality Assessment*, 68, 532-560.
- Hair, J.F., Anderson, R.E., Tathan, R.L., & Black, W.C. (1998). *Multivariate data analysis*. Englewood Cliffs, NJ: Prentice Hall.
- Hayward, M., Foster, W.R., Sarasvathy, S.D., & Fredrickson, S. (2010). Beyond hubris: How highly confident entrepreneurs rebound to venture again. *Journal of Business Venturing*, 25, 569-578.
- Jorgensen, I.E., & Seedat, S. (2008). Factor structure of the Connor-Davidson Resilience Scale in South African adolescents. *International Journal of Adolescent Medicine and Health*, 20(1), 23-32.
- Kararmak, Ö. (2010). Establishing the psychometric qualities of the Connor-Davidson Resilience Scale (CD-RISC) using exploratory and confirmatory factor analysis in a trauma survivor sample. *Psychiatry Research*, 179, 350-356.
- Lamond, A., Depp, C., Allison, M., Langer, R., Reichstadt, J., Moore, D., ..., Jeste, D. (2008). Measurement and predictors of resilience among community-dwelling older women. *Journal of Psychiatric Research*, 43(2), 148-154.
- London, M. (1993). Relationship between career motivation, empowerment and support for career development. *Journal of Occupational & Organizational Psychology*, 66(1), 55-69.
- Luthar, S., Cicchetti, D., & Becker, B. (2000). The construct of resilience: A critical evaluation and guidelines for future work. *Child Development*, 71(3), 543-562.
- Markman, G.D., & Baron, R.A. (2003). Person-entrepreneurship fit: Why some people are more successful as entrepreneurs than others. *Human Resource Management Review*, 13(2), 281-301.
- Muñiz, J., & Hambleton, R.K. (1996). Directrices para la traducción y adaptación de los tests [Guidelines for the translation and adaptation of tests]. *Papeles del Psicólogo*, 66, 63-70.
- Muñiz, J., & Hambleton, R.K. (2000). Adaptación de los tests de unas culturas a otras [Adaptation of tests from one culture to another]. *Metodología de las Ciencias del Comportamiento*, 2(2), 129-149.
- Nunnally, J. (1978). *Psychometric theory*. New York: McGraw-Hill.
- Reinmoeller, P., & Baardwijk, N. (2005). The link between diversity and resilience. *Mit Sloan Management Review*, 46(4), 61-66.
- SABI (2010). *Data file*. Retrieved from: <http://sabi.budep.com> (accessed April 3, 2011).
- Sánchez, J.C. (2011). Entrepreneurship as a legitimate field of knowledge. *Psicothema*, 23(3), 427-432.
- Singh, K., & Yu, X. (2010). Psychometric evaluation of the Connor-Davidson Resilience Scale (CD-RISC) in a sample of Indian students. *Journal of Psychology*, 1(1), 23-30.
- Sutcliffe, K.M., & Vogus, T.J. (2003). Organizing for resilience. In K.S. Cameron, J.E. Dutton, & R.E. Quinn (Eds.), *Positive organizational scholarship: Foundations of a new discipline* (pp. 94-110). San Francisco: Berrett-Koehler.
- Tang, L., & Koveos, P. (2004). Venture entrepreneurship, innovation entrepreneurship, and economic growth. *Journal of Developmental Entrepreneurship*, 9, 161-171.
- Tugade, M.M., & Fredrickson, B.L. (2004). Resilient individuals use positive emotions to bounce back from negative emotional experiences. *Journal of Personality and Social Psychology*, 86(2), 320-333.
- Windle, G., Bennert, K.M., & Noyes, J. (2011). A methodological review of resilience measurement scales. *Health and Quality of Life Outcomes*, 9(8), <http://www.hqlo.com/content/9/1/8>. doi:10.1186/1477-7525-9-8.
- Yu, X., & Zhang, J. (2007). Factor analysis and psychometric evaluation of the Connor-Davidson Resilience Scale (CD-RISC) with Chinese people. *Social Behavior and Personality*, 35(1), 19-30.