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Psychometric properties and diagnostic capacity of the scale of resilience to suicide attempts-18

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ABSTRACT

Objective: Early detection of suicide attempts remains a handicap for suicide prevention. Most studies have focused on risk factors, but few have assessed protective factors that promote resilient outcomes, especially in subpopulations vulnerable to suicide re-attempts. This study aims to create and adapt a new Scale of Resilience to Suicide Attempts (SRSA), and to analyse its predictive validity and diagnostic capacity for the detection of suicide re-attempts at six months in people who have made a previous attempt.

Design and main outcome measures: The psychometric properties and diagnostic capacity of the resulting SRSA-18 scale were assessed in 229 persons (where 133–58.1% were women, aged 18- to 76-year old) who had made a previous suicide attempt.

Results: Factor analyses (AFE and AFC) yielded a three-dimensional structure with excellent goodness-of-fit indices RMSEA, high levels of reliability and adequate convergent validity with the Suicide Resilience Inventory-25 (SRI-25) scale. Additionally, the SRSA-18 has significant diagnostic power on suicide re-attempts across months of follow-up.

Conclusion: Reliable and valid protective factor-based instruments for the detection of future suicide re-attempts may help in the prevention of suicide-associated mortality in specific clinical subpopulations.

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Introduction

Suicide is one of the leading causes of death worldwide (World Health Organization (WHO), 2018), with prior attempt being the only behaviour that can predict, within six to twelve months, a more lethal future reattempt (Irigoyen et al., 2019), especially in clinical subpopulations (Goñi-Sarriés et al., 2018). Due to its epigenetic and multi-dimensional nature, there is no universally accepted definition of suicide attempt or reattempt, which creates significant challenges (Franklin et al., 2017). However, some authors have offered advances in this regard, considering suicide attempt as a

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potentially harmful, non-fatal self-injurious behaviour, in which there is implicit or explicit evidence of an intention to cause death (Silverman et al., 2007). Additionally, it may have a higher or lower lethality (Sánchez-Teruel et al., 2020), depending on the interaction of psychosocial risk factors (Fehling & Selby, 2020), making it difficult to predict more lethal future attempts (Mars et al., 2019; O'Connor & Portzky, 2018). Risk factors such as gender or age (Sánchez-Teruel et al., 2018) or socio-cultural aspects (Lopez-Castroman et al., 2015) also influence their level of lethality. Nevertheless, there seem to be other ways of managing suicide risk as a first fundamental step towards its prevention (Ryan & Oquendo, 2020).

Along these lines, most studies on suicide prevention tend to focus exclusively on risk factors (Sher, 2019), leaving little room to examine the influence of protective factors. Indeed, a significant proportion of people who make a first suicide attempt have resilient outcomes in the face of future adverse situations, avoiding a more lethal future reattempt or completed suicide (Deuter et al., 2020). Despite this, most of the literature has focused on the construction of assessment instruments that measure suicidal vulnerability (Innamorati et al., 2011a, 2011b), and very few tools have been created in order to assess protective factors (Masten, 2019).

Theoretically, the presence of protective factors can buffer the influence of suicidal risk factors, increasing the individual's level of resilience (Espinet et al., 2019). Resilience is understood as the perceived ability, resources or competence to regulate thoughts, feelings and attitudes related to suicide (Osman et al., 2004). Nonetheless, a person may be resilient to some specific risk situations but not to others (Matel-Anderson et al., 2019). The protective factors promoting resilience are diverse and depend on the adverse situation experienced (Clement et al., 2020). Hence, the importance of creating tools which can measure resilience specifically in people who have made previous suicide attempts, as the protective factors may be different depending on the future outcome (ideation, reattempt or suicide) (Al-Halabí & Fonseca-Pedrero, 2021).

The *Suicide Resilience Inventory-25* (SRI-25) by Osman et al. (2004) measures resilience to suicide. The SRI-25 has a three-dimensional structure (internal protection, emotional stability and external protection) and adequate internal consistency in university students. Furthermore, its three-dimensional structure and psychometric properties have been confirmed in another sample of university students (Rutter et al., 2008), and it has been successfully applied to assess suicidal vulnerability in adolescents and young adults with a variety of psychiatric disorders. However, the heterogeneity of the sample with respect to suicidal behaviour was considered a limitation even by the authors themselves (Gutiérrez et al., 2012). Subsequent studies have translated the SRI-25 into Spanish and adapted it to young adults from Colombia without previous suicide attempts (Villalobos-Galvis et al., 2012). In addition, adequate gender invariance has been observed in university students from the United States and China, although cultural aspects influence differences in the degree of vulnerability measured by the scale (Fang et al., 2015).

Taking into account the few existing measurement instruments to assess resilience to suicide attempts and the importance of the cultural modulation of this behaviour, the aim of this study was to create and adapt a new instrument to assess resilience in a sample of Spanish population with a previous suicide attempt, while assessing its predictive capacity for future suicide attempts at six months.

Methods

Participants

A favourable report was obtained from the Research Ethics Committee of the second Author's University and the Health Research Bioethics Committee of the Government of the South Region of Spain. The total sample was of 229 participants, where 133 (58.1%) were women, ranging in age from 18- to 76-year old ($M = 41.12$; $SD = 7.9$). All participants met the following inclusion criteria: (1) Age between 18- and 95-year old; (2) Having made a previous suicide attempt; (3) Having been admitted through the emergency services of any of the public or private hospitals from any of the provinces in the South of Spain; (4) With an access medical diagnosis of 'self-harm', 'self-injurious behaviour' or 'suicide attempt'; (5) Having signed the informed consent for their participation in the study. The total sample was divided into two for the factor analyses (Goretzko et al., 2021): $n_1 = 98$ people, where 56(57.02%) were women, aged 18-71 ($M = 39.11$; $SD = 8.33$) and $n_2 = 131$, where 77(58.7%) were women, aged 18–73 ($M = 39.6$; $SD = 9.7$). No significant statistical differences were found between the two subsamples. The characteristics of the samples are summarised in Table 1.

Instruments

Sociodemographic data sheet

An *ad hoc* data sheet was prepared to collect the identification data (name and telephone numbers) and all the data indicated in Table 1.

Suicide resilience inventory-25 by Osman et al. (2004)

Translated and adapted to Spanish by Villalobos-Galvis et al. (2012). This scale measures resilience to suicidal ideation. The total score ranges from 0 to 75 points, with a cut-off of 57. The original version in university students shows a Cronbach's alpha of .95 (Osman et al., 2004) and the Spanish version in a similar sample has an alpha of .92. In this study, a Cronbach's alpha of .77 was obtained.

Table 1. Sociodemographic data of both samples.

	N (%)	n_1 (%)	n_2 (%)	*t*	Phi
Civil status				6.71 ns	.71
Single	71(31.0)	32(32.7)	39(29.8)		
Married/Domestic partner	138(60.2)	59(60.2)	79(60.3)		
Separated/Divorced	15(6.6)	5(5.1)	10(7.6)		
Widow/Widower	5(2.2)	2(2.0)	3(2.3)		
Employment situation				4.22 ns	.69
Unemployed	171(74.7)	73(74.5)	98(74.8)		
Self-employed	52(22.7)	22(22.4)	30(22.9)		
Employed	6(2.6)	3(3.1)	3(2.3)		
Family suicide attempt				6.35 ns	.59
Yes	56(24.5)	26(26.5)	30(22.9)		
No	173(75.5)	72(73.5)	101(77.1)		
Attempt prior to current				4.38 ns	.62
0	213(93.0)	91(92.9)	122(93.1)		
1	13(5.7)	6(6.1)	7(5.3)		
2	3(1.3)	1(1.0)	2(1.6)		
Total	229(100)	98(100)	131(100)		

t = *t* student * = $p < .05$; ** = $p < .01$; n.s.: not significant; Phi: effect size.

Interviewing

After the discharge date, the first author conducted a telephone interview with each participant, approximately on a monthly basis. The same questions were always asked: (1) how they were feeling (0 = very good to 5 = very bad), (2) whether there had been any adverse situations (none, interpersonal, financial, work, study or others), (3) how these situations had affected them (0 = not at all to 5 = very much), (4) finally, whether there had been any suicide attempts since the last time (yes/no) (if a high level of vulnerability was detected, a family member was asked about this).

Scale of resilience to suicide attempts-18

This scale was used in this study and is described within the following sections.

Procedure

The scale of resilience to suicide attempts (SRSA) items were obtained following the recommendations for the creation of new psychological assessment instruments in clinical populations through different consecutive phases (Hernández et al., 2016; Wilson, 2005).

Process of creating the scale

First, a review of the literature on resilience to suicide attempts was conducted (Cronin et al., 2008; Grant & Booth, 2009). The search was conducted on different databases (Medline, Pubmed, Psycinfo, Psychology database, Psicodoc and Psyke) with the following inclusion criteria (1) peer-reviewed articles in Spanish or English; (2) articles written between 1980 and 2018, since it was in the 1980s when empirical studies related to resilience began to appear (Rutter, 2008); (3) articles where the key words were 'Resilience-Resilience' or 'protective factors-protective factors', always combined with 'suicide attempt-suicide attempt'; (4) articles where the methodology used was empirical and based on the interaction between two or more variables (using ANOVA or regression analysis); (5) articles with one or more variables being a psychological construct (cognitive, emotional or behavioural), excluding socio-demographic variables. This process allowed us to identify the initial protective factors on which the SRSA would be based, namely: self-concept (SC), cognitive flexibility (CF), positive attributional style (PAS, understood as external, unstable and specific causes for negative events and internal, stable and global causes for positive events), empathy (E), sense of humour (SH), dispositional optimism (DO), problem-focused coping (PFC), self-regulation and emotional self-control (SRESC), impulse control (IC), hope (H), ability to express emotions and problems (AEE), help seeking (HS), social skills (SS) and emotional social support (ESS). Subsequently, a psychologist with more than 25 years of clinical experience created five items for each variable with five Likert-type response options (0 = never; 1 = sometimes; 2 = half the time; 3 = almost always; 4 = always), where the items were linearly matched to the underlying trait (variable) to be measured, i.e. as the amount of variable expressed by each participant increases

or decreases, his or her score on the item increases or decreases (from 0 to 4 points) (Muñiz et al., 2005). The total score was obtained by adding the scores to each of the items, considering the value assigned to each item as a direct score for that item (Hernández et al., 2016). This process resulted in an initial inventory of 70 items.

Expert panel and application on first pilot sample (N = 9)

Four judges with expertise in resilience and suicide (psychologists) tried to analyse whether or not the created item corresponded to the psychological construct (Muñiz & Fonseca, 2017). This strategy would help to ensure the content validity of the new instrument (García-Nieto et al., 2012). Based on this process, modifications were made to the scale. Some of them were: Item 2 was initially stated as 'I am a person who is worth a lot' (self-concept), and was transformed into 'I am a valuable person' (self-concept) or item 7: 'I am flexible to achieve my goals' (cognitive flexibility), was transformed into 'I can manage my thoughts to achieve my goals' (cognitive flexibility). Additionally, the experts detected that some items did not clearly correspond to their theoretical protective construct, namely the items of the variables of attributional style, the ability to express emotions and problems, the empathy and social skills. Then, in order to test the level of understanding of the 70-item SRSA, it was provided to nine people who worked at the Hope Telephone (first pilot sample) (6–66.7% female) who had made a previous suicide attempt (Wilson, 2005). These people based on their own experience, assessed the level of understanding of the items and whether or not the psychosocial variable was significant in suicide attempts. Finally, this whole process of evaluation with experts and with people who had made previous suicide attempts allowed the elimination of some items and some variables which had a consensus of less than 85%, and resulted in a new version of the SRSA in which the number of items was reduced to 34, maintaining all the protective variables.

Implementation on the second pilot sample (N = 18) and final version

The SRSA-34 was used with twenty-seven other people who had attempted suicide in the past. Out of the total, only 18 people responded to the scale (14–77.8% women), arguing that they were tired or had little time, or even some did not give any reason at all. Descriptive analyses were carried out on this second pilot sample, as well as analyses regarding discrimination and understanding of the items and the time taken to complete them (Supporting Information Appendix 1). The overall score obtained ranged from 7 to 52 points ($M = 31.12$; $SD = 8.43$), with no univariate normality. Moreover, 16 items were detected (number 3, 4, 7, 8, 9, 12, 13, 14, 17, 23, 26, 30, 31, 32, 33 and 34), which presented a high difficulty in their comprehension (below .40 in the difficulty index) and whose corrected item-total correlation index (discrimination) did not exceed .30 (Haladyna & Rodríguez, 2013), with Cronbach's alpha (α–i) increasing in all cases when these items were eliminated (Muñiz & Fonseca, 2017). The average time to complete the scale (start and end time) was 21 min. As a result of this process, 16 items were discarded (Muñiz & Fonseca-Pedrero, 2019). The final

version of this scale consisted of 18 items, and was, therefore, called SRSA-18 (Supporting Information Appendix 2).

Psychometric properties of the SRSA-18 and prediction of suicide reattempts

After obtaining the necessary permissions from the health administration and the hospitals themselves, trained emergency department staff were contacted to help people who met the inclusion criteria to complete the tests (SRI-25 and SRSA-18). Finally, telephone interviews were conducted with each participant after being discharged from the emergency service or hospital for six months (one interview approximately every 30 days). All pilot samples and the quantitative sample were different.

Data analysis

Incomplete data represented less than 2% of the responses, and for these a multiple imputation method (SPSS) was used for missing values (Graham, 2012). Internal consistency tests and item analysis were performed. Second, an exploratory factor analysis (EFA) was conducted on a subsample. An EFA was applied with the programme FACTOR 10.10.3, which is suitable for the exploration of ordinal data, it offers the possibility of calculating the proportion of the shared variance explained for each of the extracted factors (Baglin, 2014) and it is considered as a semi-confirmatory procedure (SCFA) where it is possible to inspect the residues (Ferrando & Lorenzo-Seva, 2017). For the EFA, the selected factor extraction procedure was the Unweighted Least Squares (ULS) using the parallel analysis (PA) with Pearson correlations because the univariate distributions of ordinal items are asymmetric or with excess of kurtosis and an optimal implementation for the evaluation of the ordinal level data dimensionality (Timmerman & Lorenzo-Seva, 2011). Regarding the rotation procedure used to obtain the maximum parsimony when interpreting the factorial solution, the Promin method was employed (Lorenzo-Seva, 1999). The methodological criteria considered for the elimination of items were: (a) factorial loads below .30 depending on the size of this sample (Hair et al., 2006) (b) complex items with cross loads on several factors or subdimensions of the instrument (c) For a model to be considered acceptable, the expected root mean square (RMSR) value must be less than .035 (Kelley's criterion) (Harman, 1962, p. 21). A confirmatory factor analysis (CFA) was then performed with SPSS 23 AMOS (IBM Corporation, 2013). The method used in the confirmatory analysis was the generalised least squares (GLS). The fit indices employed were χ^2/df, the root mean square error of approximation (RMSEA), the comparative fit index (CFI), the Tucker–Lewis index (TLI) and the Goodness of fit index (GFI). The goodness of the fit model was considered satisfactory when the TLI and the CFI were ≥0.95, the RMSEA was close to .06 and the Goodness of fit index (GFI) was close to 0.90 (Kline, 2015). Convergent validity was assessed with the SRI-25 and reliability was also assessed using the internal consistency procedure (Cronbach's alpha and McDonald's omega coefficients). Finally, binary logistic regression was calculated for suicide reattempts as well as the level of sensitivity, specificity and area under the curve (AUC) of the

scale for the six-month follow-up. The level of statistical significance required in all tests was a minimum of $p < .05$.

Results

Descriptive and item analysis

The results showed significant variability in the asymmetry and kurtosis of the total sample (Table 2), which is indicative of a lack of univariate normality. The item-total correlations were adequate (r item-total > .50) and the total Cronbach's alpha did not improve when any of the items were removed.

The Kaiser–Meyer–Olkin measure of the sampling adequacy index (KMO = .92), the Bartlett's test of sphericity (χ^2 = 1361; $df = 97$; $p < .001$), and the determinant of the correlation matrix (.01) showed data suitability for factor analysis. If the observed percentage of a factor exceeds the random percentage, the factor is retained. This occurred three times in the case of SRSA-18 (Table 3). All factor loadings were greater than .30, no complex cross-loaded items were observed, and the inspection of residuals through the root mean square residuals (RMSR) was .0261 (below Kelly's criteria). Therefore, three dimensions were extracted that explained 59.12% (Factor I), 41.25% (Factor II) and 30.63% (Factor III) of the variance (based on eigenvalues), as shown in Table 3. These three dimensions were named as: (a) Internal Protection (factor 1) with 6 items and which brings together all those protective factors coming from the individual, (b) Emotional Stability (factor 2) with 6 items and which brings together all those factors referring to variables related to psychological stability and (c) External Protection (factor 3) with 6 items and which brings together all those protective

Table 2. Descriptive statistics, asymmetry, kurtosis and item analysis of SRSA-18.

			A	*K*		
	M(*SD*)	*K-S*	*SE*(.16)	*SE*(.31)	$r_{i\text{-}t}$	α_{-i}
ITEM 1	.11(.24)	.56**	.19	−.61	.58	.48
ITEM 2	1.28(1.11)	.93**	−1.02	1.27	.63	.59
ITEM 3	.34(.42)	.16**	−.09	1.03	.45	.66
ITEM 4	.13(.28)	.42**	.11	−1.23	.61	.74
ITEM 5	1.65(1.23)	.49**	.28	−.73	.71	.81
ITEM 6	1.14(1.22)	.74**	.09	−.82	.73	.79
ITEM 7	.49(.91)	.13**	−.76	−.91	.56	.81
ITEM 8	1.12(1.75)	.22**	.15	−.43	.65	.73
ITEM 9	.11(.43)	.85**	.12	−.78	.79	.86
ITEM 10	1.22(.27)	.37**	−.26	.92	.65	.68
ITEM 11	.02(.11)	.43**	.17	−.32	.80	.78
ITEM 12	1.32(1.95)	.27**	.15	−.54	.78	.76
ITEM 13	.36(.11)	.98**	−.16	−.91	.84	.76
ITEM 14	1.39(1.45)	.82**	.57	−.69	.71	.52
ITEM 15	1.38(1.57)	.62**	−.39	−1.27	.81	.62
ITEM 16	.12(.93)	.22**	1.01	−1.35	.69	.73
ITEM 17	.16(.04)	.38**	−.39	−.91	.64	.72
ITEM 18	.11(.62)	.54**	−1.11	−1.92	.59	.64
	25.07(11.43)	.26**	−1.03	.38	1	.89

M: Mean; *SD*: Standard Deviation; *A*: Asymmetry; *K*: Kurtosis; *SE*: Standard error of asymmetry and kurtosis; *K-S*: Kolmogorov–Smirnov; $r_{i\text{-}t}$: corrected item-total correlation; α_{-i}: alpha when item is removed * significant correlation at the .05 level (bilateral); ** significant correlation at the .01 level (bilateral).

Factor analysis, reliability and convergent validity of the SRSA-18.

Exploratory factor analysis (EFA) (n_1 = 98).

Table 3. Rotated factorial matrix of the SRSA-18 Exploratory Factor Analysis.

		Dimensions			
	PV	Factor 1	Factor 2	Factor 3	h^2
1. I always see the glass half full, instead of half empty	Dispositional optimism	**.90**	.11	–.21	.49
2. I am a valuable person	Self-concept	**.81**	.65	.18	.56
5. I take problems with humour	sense of humour	**.85**	.11	.04	.71
8. I am as good at what I do as my colleagues or friends	Self-concept	**.86**	.14	.07	.59
17. I know how to bring out the funny side in problems	sense of humour	**.89**	.09	–.16	.74
18. In tough times I usually hope for the best	Dispositional optimism	**.96**	–.21	.04	.81
4. I have plans for the future	Hope	.06	**.86**	.12	.96
6. Emotions don't overwhelm me	emotional self-control	.13	**.97**	–.09	.59
9. I hope to have a happy life	Hope	–.18	**.81**	.14	.86
10. I am able to control my anger	emotional self-control	.21	**.87**	.11	.93
11. I often think before I act	impulse control	.16	**.93**	–.13	.82
16. I control my impulses, even if I feel pressured	impulse control	–.22	**.87**	.07	.78
3. If I have a problem, I ask my family or friends for help	Help-seeking behaviour	.06	.24	**.76**	.51
7. I make friends easily	social skills	.15	.19	**.83**	.53
12. There are people who are interested in me and what happens to me	emotional social support	.11	–.25	**.87**	.72
13. I am able to share my problems with family or friends	Help-seeking behaviour	.09	16	**.91**	.67
14. I have a group of friends to have fun with	social skills	.12	.03	**.84**	.53
15. When something worries me I have people to comfort me, listen to me and encourage me	emotional social support	.15	–.21	**.58**	.79
% of variance explained		59.12	41.25	30.63	

PV: Protective variables; Rotated load with values >.30 in bold type; Factor 1: Internal protection; Factor 2: Emotional stability; Factor 3: External Protection; h^2: size of communalities.
Confirmatory Factor Analysis (n_2 = 131).

factors coming from the environment. Thus, it was decided to keep all items for the following analyses.

The results of the normality analysis showed that there was no multivariate normality (Mardia = 437.51). The ratio χ^2/df obtained significant values lower than 3, showing a good fit. The Residual Mean Square-RMR achieved an acceptable fit with values equal to or below .06. The goodness-of-fit indices were excellent (RMSEA [95% CI] = 03[.01; .04]; CFI = .98; TLI = .97; GFI = .95).

Reliability and convergent validity of the SRSA-18

The internal consistency of the three dimensions and the total score of the SRSA-18 were calculated using the alpha and omega coefficients. The internal consistency (α = .88, ω = .89) yielded high values, also for each subdimension: Internal Protection-IP (α = .81, ω = .87), Emotional Stability-ES (α = .79, ω = .82) and External Protection-EP (α = .71, ω = .78). Conversely, in order to determine whether the SRSA-18 assesses resilience to suicidal attempts, the relationship between the SRSA-18 and the resilience to suicidal ideation (SRI-25) was verified (r = .91; p < .01). Regarding SRSA-18 dimensions, the internal protection dimension showed high positive correlations with the SRI-25 scale, (r = .84; p < .01) as did the emotional stability (r = .83; p < .01) and the external protection dimension (r = .77; p < .01).

Prediction of suicide re-attempts and analysis of diagnostic efficacy

Preliminary analyses of fit binary logistic regression (predictive power of SRSA-18 as an independent variable-IV on monthly suicide reattempt (Yes/No) as dependent variable-DV) confirmed that: (a) the non-multicollinearity assumptions were fulfilled (<5, PIV = 1.00 and 1.77) (Kleinbaum et al., 1988), (b) the tolerance values (1–0.1) were between 1 and .98 (Lomax & Hahs-Vaughn, 2012), (c) there was no autocorrelation of the variables, so the independence of the error assumption was met (Durbin–Watson = 1–3), (d) the results can be applied to the general population, with a maximum coefficient of 2.11 (D–W = 1.86–2.11) (Yoo et al., 2014). The significant result given by the statistical efficiency score (χ^2; $p < .05$) indicated that there is an improvement in the prediction of the probability of occurrence of the DV categories during the follow-up months, with an increase in the probability of success in the DV result when the IV (SRSA-18) has a low score (Table 4; Figure1). Furthermore, the R2 Nagelkerke value (part of the variance explained by the DV) reported that the model proposed for the SRSA-18 explains between 10.4% (first month) and 68.2% (sixth month) of the variance of the DV according to each month. Likewise, the results of the EXP(β) regression equation revealed that for people with a previous suicide attempt (<1 of the EXP(β), the probability of making a suicide re-attempt would increase from the third month and especially in the fourth month after the first attempt if their SRSA-18 score is known.

Regarding the diagnostic efficacy of the SRSA-18 and the SRI-25 instruments used and bearing in mind that a third of the subjects in the clinical sample attempted suicide during the 6-month follow-up period (44 of the 131), it was decided to use this cut-off point. Thus, the 33rd centile coincided with the 18 score of the SRSA-18 and 49 for the SRI-25. In this way, any score above that cut-off point would be considered as high resilience and, conversely, a score below that cut-off point would be regarded as low resilience. If these scales are dichotomised, they can be used as predictors of suicide reattempts during follow-up. In order to analyse the predictive efficacy of each of these dichotomised instruments in the classification of subjects who would or would not attempt suicide during the 6-month follow-up, the area under the curve (AUC) of each instrument was calculated, as well as other indices of diagnostic efficacy such as sensitivity and specificity (Sun et al., 2020). Other cut-off points in addition to the one matching the 33rd centile were tested to verify if results could be improved with other

Table 4. Predictive model of the SRSA-18 for a 6-month follow-up period.

								I.C. (95%)	
Month	χ^2	% *I/P*	R^2N	*B*	*SE*	Wald	Exp(β)	LL	UL
1st	5.95*	87.21/98.51	.104	–.01	.09	1.40 ns	.10	.75	1.08
2nd	9.78**	72.90/95.42	.232	–.20	.08	5.73 ns	.61	.70	.97
3rd	3.71*	93.27/97.13	.290	–.08	.05	3.32*	.72	.84	1.01
4th	13.51**	67.20/72.43	.316	–.27	.14	3.59**	.76	.57	1.01
5th	11.96**	62.41/85.41	.409	–.15	.05	9.46**	.87	.78	.95
6th	11.83**	63.12/89.39	.682	–.11	.03	11.41**	.90	.84	.96
Total	141.99**	159.13/163.07	.818	–.51	.12	18.13**	.60	.48	.76

χ^2: Statistical efficiency test with 1 degree of freedom; % *I/P*: global percentage observed and global percentage; R^2 Nagelkerke: Variance explained by IV (goodness of fit); *B*: Beta coefficient; *SE*: Standard error; Wald: Contrast power statistic; Exp(β): Result of the regression equation (Odds ratio); LL: Lower limit; UP: Upper limit; *significant correlation at the .05 level; ** significant correlation at the .01 level; ns = not significant.

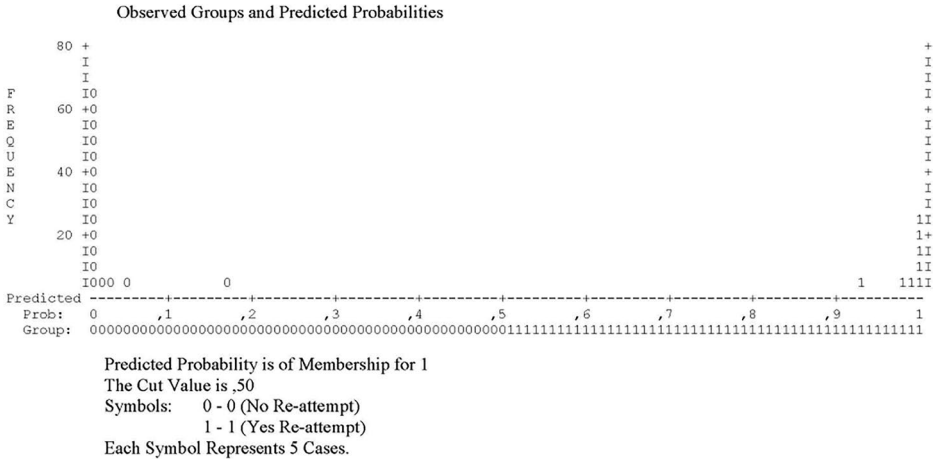

Figure 1 . Binary logistic regression of SRSA-18 over six months.

thresholds. Only on the SRSA-18, the best indices coincided with the 33rd centile (direct score: 18; Sensitivity = .86; Specificity = .95; Odds Ratio = 131.42; AUC (CI95%) = .91[.84–.97]; $p < .01$). In the SRI-25, the cut-off point had to be changed to obtain an improvement in the indices assessing the quality of the prediction, thus, for SRI-25 = 52 (40th centile; Sensitivity = .46; Specificity = .63; Odds Ratio = 1.4; AUC (CI95%) = .54[.44–.65]; p > .05). Therefore, the AUC level of statistical significance reports that the SRSA-18 has a higher diagnostic ability in this sample of people with a previous suicide attempt than the SRI-25 (DeLong et al., 1988).

Discussion

The objective of this research was to construct and validate an instrument for the assessment of resilience based on protective factors in a Spanish clinical population with a previous suicide attempt, and to verify its efficacy for predicting suicide re-attempts at six months together with their convergent validity and diagnostic efficacy.

Factor analyses confirmed a three-dimensional structure of the SRSA-18 scale (internal and external protection and emotional stability). The internal consistency was high both in the total score and in each of the subdimensions, these results agreeing with other studies on this construct (Gutiérrez et al., 2012). This result was expected, as the scale was based in the most relevant literature on protective factors that modulate resilience to a specific risk behaviour (suicide attempt) and on a clinical subpopulation in contrast to other studies (Osman et al., 2004). This confirms that different assessments of resilience are obtained according to the different severity of the result (ideation vs. suicide attempt). In addition, the SRSA-18 does not include words or phrases related to suicide in any of its items, which differentiates it from the SRI-25. This would suggest that the SRSA-18 measures suicide attempts in an indirect way, focusing more on protective factors than risk factors, which really defines resilience as a result, as other studies on resilience have proposed (Masten, 2019; Rutter, 2008).

A score below 18 points on the SRSA-18 predicts a suicide re-attempt within six months of a first attempt, that is, the probability of a suicide re-attempt increases during at least the first six months after discharge from the emergency service. Other studies report that the greatest vulnerability to death by suicide is found between 6 and 12 months after the first attempt, especially in some clinical subpopulations (Mustanski & Liu, 2013). The SRSA-18 showed high specificity and sensitivity, with an 86% probability that a person will make a suicide re-attempt if their direct score is 18 or less and a 95% probability of detecting people who will not make a re-attempt within the six months after the first suicide attempt if your direct score is above 18 points. A surprising finding is that the only instrument that assessing resilience to suicide (SRI-25) displayed low indexes of specificity and sensitivity and area under the curve compared to the SRSA-18. The measurement of the resilience towards different outcomes in suicide (ideation in SRI-25 vs. attempt in SRSA-18), could be the basis of the diagnostic discrepancies between both scales. This hypothesis is confirmed by previous studies on the specific clinical typology of attempt compared to other phases of suicide such as ideation (Harmer et al., 2021), self-inflicted injuries (Sánchez-Teruel et al., 2020) or planning (Nock et al., 2018).

The SRSA-18 scale measures resilience-based exclusively on protective variables, and not on risk variables. Measuring protective factors is key to minimising the negative impact of suicide risk variables (Rutter, 2008; Siegmann et al., 2018). Moreover, this scale is short (18 items) and has been adapted and validated in people with previous suicide attempts, which could facilitate its application in diverse contexts such as research or mental health for the prevention of suicidal lethality in other clinical subpopulations. The results of this research are in line with those obtained by other studies (Lopez-Castroman et al., 2015), and confirm the need to validate suicide assessment instruments adapted to the clinical population so that their risk assessment levels are adequate (WHO, 2018), as well as to create and carry out methodological adaptations focused on the target population of the country of origin, due to the tremendous cultural differences which may exist, even in areas with a similar language (Alcorta-Garza et al., 2016; Sánchez-Teruel et al., 2018). In addition, this study opens up new lines of research to promote specific treatments to increase protective factors in people who have already made a non-lethal suicide attempt, as it is being undertaken in other countries (Lester et al., 2020).

This study has some limitations worth mentioning. In the first place, the sample consisted mostly of women, so it would be appropriate to homogenise this variable. A second important limitation was the territorial contextualisation of the data obtained, which also made it difficult to generalise the results to other countries. However, it also opens up a necessary line of research to test the similarities and differences in psychometric properties of the SRSA-18 in other languages. Lastly, the 6-month follow-up period was short, so it would be advisable to propose longer follow-up processes to check whether the prediction of suicide attempts through the instrument created is really fulfilled beyond the six months assessed in this study.

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No potential conflict of interest was reported by the authors.

Authors' contributions

David Sánchez-Teruel: Conceptualization, writing- original draft preparation, supervision, experimentation, modelling validation, investigation, modelling reviewing, methodology, reviewing and editing. María Auxiliadora Robles-Bello: Writing- original draft preparation, modelling reviewing, methodology supervision, reviewing and editing. Ana García-León: Methodology, supervision, writing- reviewing and editing. José Antonio Muela-Martínez: Supervision; experimentation, investigation, modelling reviewing.

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Data availability statement

Data available on request due to privacy/ethical restrictions. The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

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