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Validation of a brief version of the Resilience Scale for Adults on an Italian non-clinical sample

Resilience Scale for Adults: riduzione degli item e validazione iniziale di una versione italiana ridotta in un campione non clinico

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SUMMARY. Aim. The Resilience Scale for Adults (RSA) is a self-administered 7-point Likert scale of 33 items, structured in 6 factors measuring personal and interpersonal resources. We aimed to develop and validate a brief form of the RSA, in order to produce a short, fast and handy tool for assessing resilience. **Materials and methods.** A non-clinical sample of 500 university students was recruited using a research website. Reduction of the RSA-33 was performed using an item response theory (IRT) analysis by means of a Graded Response Model (GRM) protocol on the 6 RSA factors separately. After the IRT reduction process, a Pearson's correlation matrix of the original RSA-33 and the reduced version was estimated. Finally, a CFA was estimated to assess factorial validity. The estimation of item discrimination from the GRM ranged from 0.69 and 5.94 and allowed to retain 11 items. **Results.** For both the original RSA-33 and the brief RSA-11, the strongest correlations were between Family Cohesion and Social Resources factors. CFA was estimated to assess factorial validity in a simplified model with two latent first-order factors, i.e., Personal and Contextual resources. **Conclusions.** The availability of short and psychometrically robust measures is needed to improve evaluation and monitoring in mental health programs. For this reason, we provided a brief and effective tool to assess resilience resources in both research and clinical settings.

KEY WORDS: resilience, positive psychology, validation, Item Response Theory.

RIASSUNTO. Scopo. La Resilience Scale for Adults (RSA) è una misura autosomministrata costituita da 33 item, strutturata in 6 fattori di misurazione della resilienza personale e interpersonale. L'obiettivo dello studio è stato quello di sviluppare e validare una versione ridotta della RSA al fine di ottenere uno strumento di misurazione della resilienza valido e di facile somministrazione. **Materiali e metodi.** A tal fine, lo studio ha previsto il reclutamento di un campione di popolazione generale non clinico composto da 500 studenti universitari utilizzando una piattaforma digitale. La costruzione della versione ridotta è stata realizzata mediante un'analisi Item Response Theory (IRT) con protocollo Graded Response Model (GRM) sui 6 fattori della RSA separatamente. Successivamente, è stata stimata una matrice di correlazione di Pearson della scala RSA-33 originale e della versione ridotta e un'analisi fattoriale di conferma (CFA) per valutare la validità fattoriale della versione ridotta. L'analisi dei parametri di discriminazione dei singoli item, compresi tra 0.69 e 5.94, ha consentito di selezionare, a partire dalla versione originale, 11 item altamente discriminanti. **Risultati.** Le analisi di correlazione tra i fattori per la versione originale e per la versione RSA-11 hanno evidenziato correlazioni significative, in particolare tra i fattori Coesione Familiare e Risorse Sociali. Infine, l'analisi fattoriale ha evidenziato un buon adattamento per il modello semplificato a due fattori latenti di primo ordine (Risorse Personali e Risorse Contestuali). **Conclusioni.** La disponibilità di misure valide, affidabili e di facile utilizzo si rivela una risorsa necessaria per implementare la valutazione e il monitoraggio nei programmi di salute mentale. La versione ridotta RSA-11 costituisce uno strumento breve ed efficace per la valutazione delle risorse di resilienza in contesti clinici e di ricerca.

PAROLE CHIAVE: resilienza, psicologia positiva, validazione, Item Response Theory.

BACKGROUND

Resilience has been defined by the American Psychological Association as «the process of adapting well in the face of adversity, trauma, tragedy, threats or even significant sources of stress» (para.4)[1]. However, it has been suggested that this definition may be too simplistic as it would not reflect the complex nature of resilience, to include a host of mutually interacting biological, psychological, social and cultural factors in determining the individual response to stressful experiences[2]. Resilience is a key construct to psychopathology, as it has been demonstrated its association with poor mental health outcomes in both clinical and community samples. Furthermore, it is well-established that resilience is associated with better functional outcomes in persons with severe psychiatric conditions[3].

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In recent years, resilience has been gaining attention as an intermediate variable between stressful life events and psychopathology[4], with increasingly more complex models being proposed in the literature.

In particular, resilience is a complex and multidimensional construct, that may be split into at least two broad factors expressing personal or individual resources and contextual or environmental assets[5,6], that play different roles in the relation between traumatic events and psychopathology. In particular, personal resilience resources mediate the impact of stressful life events on psychopathology[7].

As a matter of fact, invoking resilience as a mediator between stressful events and psychopathological outcomes implies that resilience is a dynamic process, rather than a stable trait, where one's individual characteristics buffer against life adversities, promoting positive outcomes[8,9].

Assessing resilience on a routine basis in both research and clinical settings could therefore represent a relevant advantage.

The Resilience Scale for Adults (RSA) is a self-administered 7-point Likert scale of 33 items, structured in four factors measuring personal features, namely Perception of Self, Planned Future, Social Competence and Structured Style, and two factors measuring interpersonal resources, i.e. Family Cohesion, and Social Resources[10,11]. The early operationalizations of resilience according to the RSA implied a unidimensional model, with the six factors loading onto a single dimension. However, further studies have found that a two-dimension model would better explain this construct[6,12]. Resilience could be described both as personal resilience, including self-resources and coping capacities, and contextual resilience, i.e. network and social connectedness, community help and family support.

A consistent number of validations in different languages have been carried out on RSA, ranging from Danish[13] to Turkish[14] and Italian[15]. In the latter, the authors have also underscored the scale validity showing significantly positive correlations with measures of life satisfaction and social connectedness, and, vice versa, negative correlations with measures of hopelessness and psychological distress.

Despite its remarkable diagnostic utility and its excellent value for scientific purposes, RSA suffers from being too long and therefore time-consuming. Indeed, this does not fit well in the swirling and overloaded clinical practice.

In the present article, the responses of 500 university students to the RSA-33 were examined with the aim to develop and validate a shorter form of the RSA, to produce a fast and handy version of this instrument. To do so, we performed an item response theory (IRT) analysis on each factor of the scale, aiming at reducing the number of items within each factor.

METHODS

Participants were university students at the University of L'Aquila. Data were collected over the period of June 2018 until April 2019 using a research website designed for this purpose (LimeSurvey®). Participants were recruited via advertisements on various social networks connected to the University. Inclusion criteria were being a student at University of L'Aquila at the time of recruitment. Recruitment was automatically closed when five hundred persons had participated. To detect random answering, six verification items were included as a measure of validity throughout the survey. Two thousand six hundred and sixty-seven volunteers visited the survey site, five hundred gave consent, correctly answered all the attention checks and completed the questionnaire. Participants provided written consent for data collection and analysis. Ethical approval was obtained from the local Law and Ethics Committee and the local research ethics (IRB n 24/2018, dated 12/06/2018 at University of L'Aquila). The research adheres to the tenets of the Declaration of Helsinki.

Measures

Resilience was measured by means of the RSA, Italian version[15]. The RSA is a 33-items scale evaluating six first-order factors (Perception of Self, Planned Future, Social Competence, Structured Style, Family Cohesion and Social Resources) and two-second order dimensions (Personal and Contextual Resilience). RSA is a reliable (Cronbach's from .67 to .81) and stable (test-retest, Pearson r from .73 to .80) instrument[16]. RSA has a semantic differential format on a 1 to 7 Likert scale with higher scores indicating stronger resilience resources. The original back translation process together with the initial validation analyses are reported in a previous work[15].

Analysis

Reduction of the RSA-33 was performed using an item response theory (IRT) analysis using a Graded Response Model (GRM) protocol on the six RSA factors separately, in order to maintain the original factor structure. IRT is a group of psychometric models for the analysis of items, item responses and whole scale properties. The essential principle of IRT is that the probability of a response to a certain item is a function of an underlying latent trait [denoted by Theta (θ)]. The aim of IRT is to validate or modify existing scales that measure latent traits, in this case each of the six resilience factors. Furthermore, as GRM assumes unidimensionality, it is appropriate to perform GRM IRT on six factors separately in order to maintain the unidimensionality of each analysis conducted. A Confirmatory Factor Analysis (CFA) on the same dataset on the original RSA-33 has been already presented in another paper[12] and on the original validation paper of the Italian version[15].

After the IRT reduction process, a Pearson's correlation matrix of the original RSA-33 and the reduced version was estimated.

Finally, a CFA on the resulting items was estimated to assess factorial validity. Differently from the RSA-33 factorial structure in which a two second-order latent factor with six first-order factors was the best solution, due to the smaller number of items in the resulting scale, we tested a simplified model with only two latent first-order factors, i.e., personal and contextual resources.

All analyses were conducted using Stata 16®.

RESULTS

Graded response model

The estimation of item discrimination from the GRM calibration was shown for each item in Table 1. Most of the items had discrimination values above 1.0, and they can be considered highly discriminant, except for items 6, 9 and

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Table 1. Item response theory coefficients (discrimination parameter).

		Coef	Lower CI	Upper CI
	Family Cohesion			
My family is characterized by: disconnection/healthy coherence	**RSA16**	**3.96**	**3.28**	**4.65**
I feel: very happy with my family/very unhappy with my family	**RSA10**	**3.23**	**2.71**	**3.74**
Facing other people, our family acts: unsupportive of one another/loyal towards one another	RSA27	2.31	1.96	2.66
In difficult periods my family: keeps a positive outlook on the future/views the future as gloomy	RSA22	2.05	1.74	2.36
In my family we like: to do things on our own/do things together	RSA31	2.04	1.74	2.35
My family's understanding of what is important in life is: quite different than mine/very similar to mine	RSA4	1.58	1.32	1.84
	Social Resources			
I get support from: friends/family members/no one	**RSA28**	**4.38**	**3.46**	**5.31**
Those who are good at encouraging me are: some close friends/family members/nowhere	**RSA11**	**2.72**	**2.27**	**3.16**
I can discuss personal issues with: no one/friends/family-members	RSA5	2.49	2.09	2.89
When needed, I have: no one who can help me/always someone who can help me	RSA32	2.23	1.86	2.60
My close friends/family members: appreciate my qualities/dislike my qualities	RSA33	1.84	1.53	2.15
The bonds among my friends is: weak/strong	RSA17	1.2	20.99	1.44
When a family member experiences a crisis/emergency: I am informed right away/it takes quite a while before I am told	RSA23	0.96	0.74	1.17
	Planned Future			
I feel that my future looks very promising/uncertain	**RSA8**	**2.86**	**2.34**	**3.37**
My future goals: I know how to accomplish/I am unsure how to accomplish	**RSA14**	**2.49**	**2.07**	**2.90**
My plans for the future are: difficult to accomplish/possible to accomplish	RSA2	2.16	1.79	2.52
My goals for the future are: unclear/well thought through	RSA20	2.15	1.79	2.51
	Social Competence			
Meeting new people is: difficult for me/something I am good at	**RSA21**	**5.94**	**4.23**	**7.64**
New friendships are: something I make easily/I have difficulty making	**RSA15**	**4.58**	**3.64**	**5.52**
For me, thinking of good topics for conversation is: difficult/easy	RSA30	1.68	1.41	1.95
I enjoy: being together with other people/by myself	RSA3	1.08	0.86	1.30
When I am with others: I easily laugh/I seldom laugh	RSA26	1.06	0.83	1.29
To be flexible in social settings: is not important to me/is really important to me	RSA9	0.69	0.49	0.88
	Perception of Self			
In difficult periods: I have a tendency to view everything gloomy/find something good that help me thrive	**RSA25**	**2.11**	**1.73**	**2.49**
Believing in myself: helps me to overcome difficult times/is of little help in difficult times	**RSA19**	**1.87**	**1.52**	**2.22**
My personal problems: are unsolvable/I know how to solve	RSA7	1.69	1.39	1.99
Events in my life that I cannot influence: I manage to come to terms with/are a constant source of worry/concern	RSA29	1.60	1.31	1.89
When something unforeseen happens: I always find a solution/I often feel bewildered	RSA1	1.45	1.19	1.72
My judgements and decisions: I often doubt/I trust completely	RSA13	1.09	0.86	1.33

(Continued)

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(Continued) - Table 1. Item response theory coefficients (discrimination parameter).

		Coef	Lower CI	Upper CI
	Structured Style			
I am good at organizing my time/wasting my time	**RSA18**	**2.19**	**1.41**	**2.98**
When I start on new things/projects: I rarely plan ahead, just get on with it/I prefer to have a thorough plan	RSA12	1.26	0.89	1.63
Rules and regular routines: are absent in my everyday life/simplify my everyday life	RSA24	1.06	0.78	1.34
I am at my best when: I have a clear goal to strive for/can take one day at a time	RSA6	0.72	0.48	0.95

In bold: retained items. RSA: Resilience Scale for Adults.

23. The estimation of slope ranged from 0.69 to 5.94, showing great variability in discrimination among all the items. The most discriminant items for each RSA factors were selected: items 28 (*I get support from: friends/family members/no one*) and 11 (*Those who are good at encouraging me are: some close friends/family members/nowhere*) for Social Resources; item 18 (*I am good at organizing my time/wasting my time*) for Structured Style; items 16 (*My family is characterized by: disconnection/healthy coherence*) and 10 (*I feel: very happy with my family/very unhappy with my family*) for Family cohesion; items 8 (*I feel that my future looks very promising/uncertain*) and 14 (*My future goals: I know how to accomplish/I am unsure how to accomplish*) for Planned Future; items 25 (*In difficult periods I have a tendency to view everything gloomy/find something good that help me thrive*) and 19 (*Believing in myself: helps me to overcome difficult times/is of little help in difficult times*) for Perception of Self, and items 21 (*Meeting new people is difficult for me/something I am good at*) and 15 (*New friendships are something I make easily/I have difficulty making*) for Social Competence.

Item information curves for each RSA factor were displayed in Figure 1. The item information functions (IIFs) plot the amount of information that was provided by each item for estimating the latent trait. The height of an IIF and therefore the amount of information an item provides around the difficulty parameter is proportional to the item's estimated discrimination.

Items with the most information for each RSA factor were retained for the shortened form. Specifically, we chose

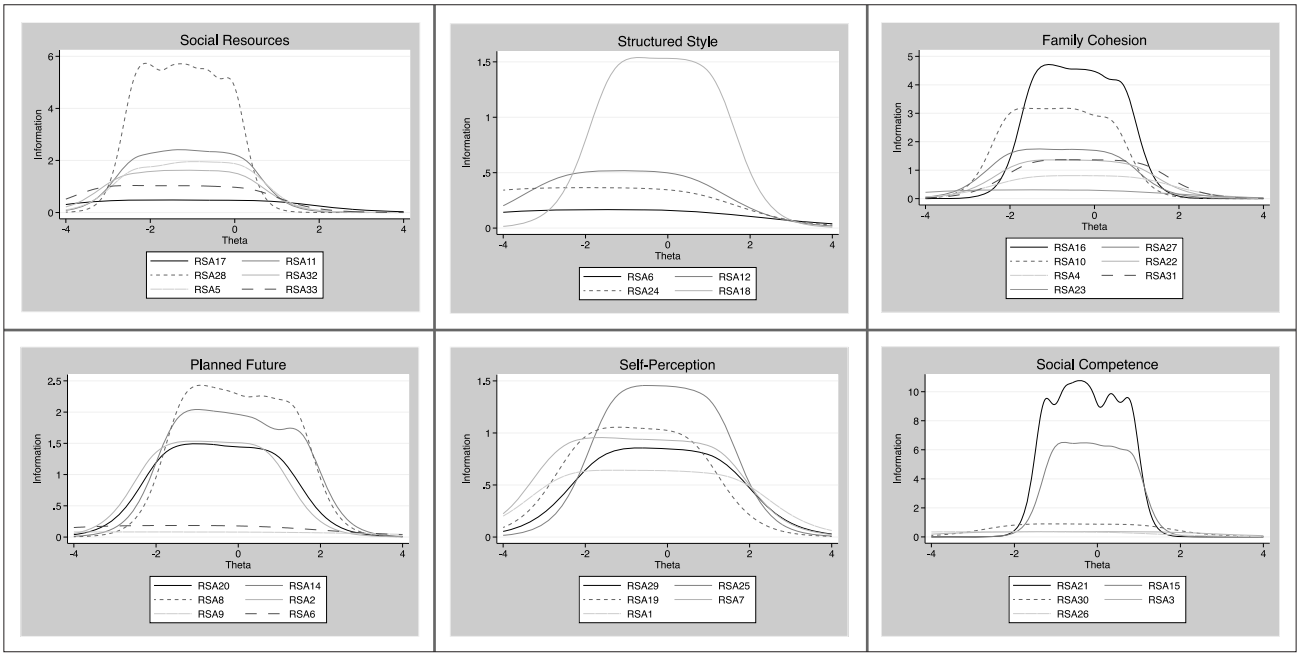

Figure 1. Items information functions (IIFs) for the six RSA factors.

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to select the two most discriminant items for each RSA factor, except for the original 4-items Structured Style factor, for which we selected only one item with a significantly greater discriminant value (i.e., item 18) (Table 1).

Correlations

Pearson's correlation matrices for RSA-33 and RSA-11 factors are reported in Table 2. For both the original RSA-33 and the brief RSA-11, the strongest correlations were between Family Cohesion and Social Resources factors (RSA-33: r=0.62, p<0.001; RSA-11: r=0.61, p<0.001), Perception of Self and Planned Future factors (RSA-33: r=0.62, p<0.001; RSA-11: r=0.53, p<0.001) and Planned Future and Structured Style factors (RSA-33: r=0.45, p<0.001; RSA-11: r=0.46, p<0.001).

Confirmatory factor analysis

CFA was estimated to assess factorial validity in a simplified model with two latent first-order factors, i.e., Personal and Contextual resources. The first-order confirmatory factor analyses results (absolute and comparative fit-indexes) are summarized in Table 3 and 4. The measurement two factors model fitted the data reasonably well, showing good comparative and incremental fit indexes (RMSEA<.05, SRMR= .04, CFI= .94, TLI= .91) (Table 3).

Table 2. Pearson's correlation Matrices for RSA-33 and RSA-11 factors.

RSA-33	**1**	**2**	**3**	**4**	**5**	**6**
1. Family Cohesion	-					
2. Social Resources	0.66	-				
3. Planned Future	0.30	0.42	-			
4. Perception of Self	0.29	0.37	0.62	-		
5. Social Competence	0.24	0.43	0.39	0.38	-	
6. Strucutred Style	0.28	0.32	0.45	0.35	0.23	-
RSA-11	**7**	**8**	**9**	**10**	**11**	**12**
7. Family Cohesion	-					
8. Social Resources	0.61	-				
9. Planned Future	0.27	0.35	-			
10. Perception of Self	0.23	0.25	0.53	-		
11. Social Competence	0.14	0.23	0.36	0.30	-	
12. Strucutred Style	0.21	0.25	0.46	0.39	0.23	-

All correlation coefficients are statistically significant at p<0.001. RSA: Resilience Scale for Adults.

Table 3. Confirmatory fit indexes of the two first-order factors model.

chi2_bs (55)	RMSEA	CFI	TLI	SRMR	CD
824.04 p<0.001	0.047 [0.03, 0.06]	0.94	0.919	0.049	0.98

RMSEA = Root mean square error of approximation; CFI = Comparative fit index; TLI = Tucker-Lewis index; SRMR = Standardized root mean residuals; CD = Coefficient of determination.

Table 4. Confirmatory factor analysis factor loadings.

Personal Resilience	coef.		95% CI
RSA8	1.00	Cons.	
RSA14	1.10		[0.98, 1.21]
RSA21	0.68		[0.54, 0.82]
RSA15	0.64		[0.50, 0.78]
RSA25	0.99		[0.83, 1.15]
RSA19	0.91		[0.76, 1.07]
RSA18	0.85		[0.72, 0.99]
Contextual Resilience			
RSA16	1.00	Cons.	
RSA10	0.96		[0.84, 1.07]
RSA28	0.98		[0.83, 1.13]
RSA11	1.00		[0.85, 1.16]

DISCUSSION

The 33 items-RSA is a direct outcome measure exploring personal and interpersonal protective factors that facilitate adaptative responses to psychosocial adversities[17]. Despite its good psychometric properties, the RSA-33 can be lengthy and time-consuming, especially when included in large research questionnaires together with other instruments for diagnostic and research purposes. This study aimed to develop and examine a brief version of the RSA-33 using IRT analysis in a convenience sample of 500 university students.

In clinical and research contexts, IRT models are increasingly becoming a method of choice for shortening existing psychometric tests due to their ability to identify the most discriminating items, thus informing the item selection process. Given the categorial ordered nature of the items, RSA-33 reduction was performed using a Graded Response Model protocol for the six RSA factors separately. Results of the GRM analysis allowed us to identify a subset of 11 highly discriminant RSA items that were retained in the shortened form for subsequent testing.

Correlational analysis performed for both the original RSA-33 and the brief RSA-11 showed similar patterns of relations among the six factors, particularly between Family Cohesion and Social Resources factors, Perception of Self

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and Planned Future factors and Planned Future and Structured Style factors.

Furthermore, RSA-11 was examined for factorial validity. In the original RSA-33, a factorial structure including two second-order latent factor with six first-order factors was suggested[6]. Regarding the factor structure of RSA-11, CFA results showed a good fit for a simplified model specifying two latent first-order factors, i.e., Personal Resources and Contextual Resources, thus confirming the intrapersonal and interpersonal dimensions of resilience.

Overall, the current results suggest that RSA-11 can be considered a brief and effective measure of resilience that demonstrates psychometric strengths, potentially minimizing the response burden.

This study has several limitations. Firstly, this study is based on a convenience sample of university students. This could hinder the generalizability of the results. Secondly, no measure of external validity nor test-retest reliability could be estimated due to lack of suitable psychometric constructs addressed in this study.

The availability of short and psychometrically robust measures is needed to improve evaluation and monitoring in mental health programs and clinical practice. Moreover, one of the potential uses of the RSA-11 in research settings may be as a large scale assessment of resilience resources in the general population and specific at-risk groups[4]. In this respect, a brief, effective tool to assess resilience resources could be additionally relevant in emergency contexts such as the current covid-19 pandemic when timely preventive and treatment strategies are crucial to mitigate the detrimental impact on the population's mental health worldwide.

Conflict of interests: the authors have no conflict of interests to declare.

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