



Assessing psychological resilience: translation and validation of the Chinese version of the resilience evaluation scale (RES)

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ABSTRACT

Background The Resilience Evaluation Scale (RES) is a novel and freely available measure of psychological resilience (factored into self-confidence and self-efficacy). To date, psychometric properties were evaluated in Dutch and American samples, but not yet in a Chinese sample.

Objective We aimed to validate the RES in a Chinese sample by examining its factor structure, reliability, and construct validity.

Methods The RES was translated into Chinese following a cross-cultural translation and adaptation procedure. Self-report questionnaires including the RES, exposure to potentially traumatic events (PTE's), the PTSD checklist for DSM-5 (PCL-5), and scales for conceptually related constructs of psychological resilience were then administered via an online survey.

Results In total, 484 Chinese adults (females, 66.9%; age: 27.33 ± 6.86 years) participated. Parallel analysis results suggested a one-factor structure for the Chinese RES. The Chinese RES demonstrated good internal consistency (Cronbach's alpha = 0.88). Construct validity was demonstrated through significant associations with hypothesised related constructs and through a relation with lower levels of PTSD among the PTE-exposed subsample ($n = 116$) via the mediating role of avoidant coping strategies, i.e. behavioural disengagement and self-blame.

Conclusion Our results suggest that the RES is a reliable and valid assessment of psychological resilience to use in Chinese, in addition to its Dutch and English versions. The RES could potentially be adopted to measure psychological resilience in cross-cultural contexts.

Midiendo la Resiliencia Psicológica: Traducción y Validación de la Versión China de la Escala de Evaluación de la Resiliencia (RES)

Antecedentes: La Escala de Evaluación de la Resiliencia (RES en su sigla en inglés) es una medida nueva y disponible de forma gratuita de la resiliencia psicológica (conformada por los factores de autoconfianza y autoeficacia). A la fecha, las propiedades psicométricas fueron evaluadas en muestras danesas y americanas, pero no en una muestra china todavía.

Objetivo: Buscamos validar la RES en una muestra china evaluando su estructura factorial, confiabilidad, y validez de constructo.

Métodos: La RES fue traducida al chino siguiendo un procedimiento de traducción y adaptación intercultural. Se administraron en una encuesta en línea los cuestionarios de autoinforme incluyendo la RES, exposición a eventos potencialmente traumáticos (PTE's en su sigla en inglés), y la lista de chequeo del TEPT para el DSM-5 (PCL-5 en su sigla en inglés), y las escalas de constructos conceptualmente relacionados a la resiliencia psicológica.

Resultados: En total, participaron 484 adultos chinos (mujeres, 66.9%; edad: 27.33 ± 6.86 años). Los resultados de los análisis paralelos sugirieron una estructura de un factor para la RES china. La RES china demostró una buena consistencia interna (alfa de Cronbach = 0.88). La validez de constructo fue demostrada a través de asociaciones significativas con los constructos hipotéticamente relacionados y a través de una relación con niveles más bajo de TEPT en la sub-muestra expuesta a PTEs ($n = 116$) por medio del rol mediador de los mecanismos de afrontamiento evitativos, es decir, desconexión conductual y autculpa.

Conclusión: Nuestros resultados sugieren que la RES es una evaluación fiable y válida de resiliencia psicológica para usar en chino, en adición a sus versiones danesa e inglesa. La RES podría potencialmente ser adaptada para medir la resiliencia psicológica en contextos

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Escala de Evaluación de la Resiliencia (RES); resiliencia psicológica; propiedades psicométricas; chinos; evento potencialmente traumático (PTE)

关键词

韧性评估量表 (RES); 心理韧性; 心理测量特性; 中文; 潜在创伤事件 (PTE)

HIGHLIGHTS

- Psychological resilience refers to self-perceived capacities contributing to a favourable outcome after potentially traumatic events.
- The RES is a brief and freely available assessment of psychological resilience.
- The Chinese RES shows good reliability and validity.
- The RES could potentially be used in both Western and Eastern cultural backgrounds.

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interculturales.

评估心理韧性：中文版韧性评估量表（RES）的翻译与验证

背景：韧性评估量表（RES）是一项新颖且免费的心理韧性测量工具（以自信和自我效能因素）。迄今为止，在荷兰和美国样本中评估了心理测量特性，但尚未在中国样本中进行评估。

目的：我们旨在在一个中国样本中通过考查因子结构、信度和结构效度来验证RES。

方法：RES按照跨文化翻译和改编流程翻译成中文。然后通过在线调查进行了自我报告问卷，包括RES、潜在创伤事件暴露（PTE）、DSM-5 PTSD检查表（PCL-5）以及心理韧性概念相关构念的量表。

结果：总共有484名中国成年人（女性，66.9%；年龄：27.33 ± 6.86岁）参加。平行分析结果表明中文版RES的单因素结构。中文版RES表现出良好的内部一致性（Cronbach's alpha = 0.88）。通过与假设的相关结构的显著相关以及通过回避应对策略的中介作用（即行为脱离和自责）与PTE暴露子样本（n = 116）中较低水平的PTSD的关系来证明结构效度。

结论：我们的结果表明，除了荷兰语和英语版本之外，中文版RES也是一项可靠和有效的心理韧性评估。RES可能可以被用来衡量跨文化背景下的心理韧性。

1. Introduction

Worldwide research shows that most people across their life span experience at least one potentially traumatic event (PTE; Bryant, 2019), such as the sudden death of loved ones, serious accidents, or life-threatening medical or violent conditions. Despite the inherently distressing nature of PTE's, up to 84% of individuals cope effectively and are minimally impacted by the adverse effects (Galatzer-Levy et al., 2018; Southwick et al., 2014). In the literature, the conceptualisation of resilience has long been debated – and it still is (cf. Bolton et al., 2015; Denckla et al., 2020). Recent reviews showed that resilience could be defined as an outcome, a predictor, a trait, or a process (cf. Denckla et al., 2020; Fletcher & Sarkar, 2013; Southwick & Charney, 2012). As a result, various scales were proposed to measure resilience such as the Connor-Davidson Resilience Scale (CD-RISC; Connor & Davidson, 2003) and the Resilience Scale for Adults (RSA; Friborg et al., 2003). Although widely used, these multidimensional scales do not distinguish between internal capacities and the external or contextual aspects of resilience (Chmitorz et al., 2018; Windle et al., 2011). Moreover, trait resilience scales (e.g. CD-RISC) are often used to measure resilience as a process, as was shown by a recent review of Chinese studies (Xie & Wong, 2020). Such issues have led the resilience field to be criticised as 'poorly operationalised and loosely conceptualised' (Bolton et al., 2015), leading to ambiguous results in research and challenges to inform policy and practice (Denckla et al., 2020; Windle, 2011).

In an endeavour to address this issue, the Resilience Evaluation Scale (RES; van der Meer et al., 2018) was developed. In contrast to the other scales that measure resilience as an outcome or process, the RES measures psychological resilience as a resource and focuses on the internal capacities that may be prerequisites of a

favourable outcome in the face of PTE's (named 'psychological resilience'), as opposed to the external or contextual factors (e.g. a supportive familial and social environment, degree and timing of exposure). Posited by the stress-coping model of Folkman & Lazarus (1984), an event will be perceived as stressful when individuals believe the demands of the situation exceed their coping abilities and resources. This response to a potentially stressful situation results from the primary and secondary appraisal processes in combination. The primary appraisal assesses the threat or demand from the situation, while the secondary appraisal assesses if the individual's capability and resources can adaptively deal with the previously appraised threat or demand. In the secondary appraisal, a general positive belief in oneself (i.e. self-confidence) and in one's coping capacities to meet the demand (i.e. self-efficacy) affect the individual's self-assessment of a stressful situation. Inspired by this model, the RES was conceptualised to contain two factors of self-confidence and self-efficacy simultaneously to operationalise the construct of 'psychological resilience'. In the aftermath of a PTE, psychological resilience has been shown to be positively related to favourable outcomes (e.g. meaning-making, adaptive coping; Benight & Bandura, 2004; Schok et al., 2010) while protecting against adverse consequences and reducing the susceptibility to symptoms of posttraumatic stress disorder (PTSD; Benight & Bandura, 2004; Major et al., 1998). To date, the RES has shown sound psychometric properties and measurement invariance between English – and Dutch-speaking groups (van der Meer et al., 2018).

Another criticism of established resilience scales was their lack of cultural sensitivity while the role of culture in determining resilience is well acknowledged (Southwick & Charney, 2012; Xie & Wong, 2020). While the concept of resilience is well understood in Chinese culture, the comparability between its

conceptualisation among the Chinese population and other cultures may be limited (Lau et al., 2020; Lei et al., 2012; Yu & Zhang, 2007). Chinese culture is largely influenced by values and beliefs from Confucianism, Taoism, and Buddhism and shows a unique focus on the interconversion between adversity and blessing (Xie & Wong, 2020). While the individual-oriented Western ways of dealing with adversities rely more on internal sources of strength and individual characteristics (Fletcher & Sarkar, 2013), Chinese culture emphasises that adversity can result in character-building and improved psychological wellbeing. For instance, the ascription of positive meaning to adversity has been related to increased self-efficacy and self-confidence (i.e. strengthened mind, expanded capacity and improved characters; Chan, 2002; Pan et al., 2008).

When validated cross-culturally, these aforementioned broad-focused resilience scales sometimes showed poor psychometric properties or manifested cultural variance in factor structures or loadings (Lau et al., 2020; Lei et al., 2012; Windle, 2011; Xie & Wong, 2020; Yu & Zhang, 2007). For example, the original 5-factor structure of CD-RISC failed to be replicated in a mainland China community sample (Yu & Zhang, 2007) and in a sample of Chinese newly employed males (Wu et al., 2017) because the original factors of 'spiritual influence' or 'control' did not emerge. Conversely, locally developed Chinese culture-specific measurements of resilience often failed to be validated in Western samples (e.g. Essential Resilience Scale; Lau et al., 2020) due to the incorporation of cultural values and beliefs (e.g. Confucianism). This challenge could be due to the cultural differences as well as the fact that some psychometric properties of the items (e.g. choice of items) are culturally and contextually more sensitive (Jowkar et al., 2010; Xie & Wong, 2020).

Whereas multidimensional scales of resilience seem to be more susceptible to cultural variance and hence led to poor cross-cultural adaptation, the stress-coping model (Folkman & Lazarus, 1984) and the RES may be more suitable/promising to capture internal capacities that may foster favourable outcomes after difficult situations regardless of cultural contexts. Therefore, we expected that psychosocial resilience (constructed by self-confidence and self-efficacy) as a prerequisite of better adaptation to adversities would be universally interpreted in both Western and Eastern (including Chinese) cultures. Previous studies in China supported that self-confidence and self-efficacy were associated with better adherence to the treatment program of AIDS (Wen et al., 2020) and better adaptation to workplace stress among health care workers (Ren et al., 2018).

To facilitate future cross-cultural comparison and understanding, this study aimed to validate the RES

in a Chinese sample. First, we translated the RES into Chinese following a recommended approach of cross-cultural translation and adaptation (Sousa & Rojjanasrirat, 2011). Next, we evaluated psychometric properties, including factor structure, reliability, and construct validity of the Chinese version of the RES. We expected satisfactory reliability and good convergent validity as indicated by positive associations between the RES and scales of related constructs (i.e. resilience, self-esteem, and global functioning) and by demonstrating its interrelatedness with PTSD symptoms via coping strategies after PTE's exposure in a path model. Specifically, individuals with higher levels of psychological resilience would use more active coping strategies and less avoidant coping strategies and are less likely to display PTSD symptoms (Benight & Bandura, 2004; Folkman & Lazarus, 1984; Groth et al., 2019; Horn et al., 2016)

2. Materials and methods

2.1. Procedures and participants

An online survey for the adult general population in mainland China was conducted using a convenience sample from March to May 2016. Information about the study and the link to access the online survey were disseminated: (1) via social media and personal social networks of the first author (YQ) in China; and (2) at lectures for college students of psychology major in four universities in China (located in Guangxi, Sichuan, Hunan, and Guizhou). The study aims were introduced on the title page of the online survey. Participants were informed that by entering the main page of questionnaires, they consented to the use of their data in this study. The study was conducted under the principles of the Declaration of Helsinki. The Medical Ethical Committee of the Academic Medical Center Amsterdam exempted the RES validation project from a formal review (IRB letter W13_307).

2.2. Measures

2.2.1. Demographic information

Participants reported their age, gender, ethnicity, education level, marital and employment status.

2.2.2. The resilience evaluation scale (RES)

The RES contains 9 items answered on a 5-point Likert scale from 0 (completely disagree) to 4 (completely agree). Participants indicate to which extent they agree with the 9 listed statements referring to how they 'usually respond to difficult situations'. The original authors of the RES demonstrated a two-factor structure: self-efficacy (items 2, 3, 4, 5, 6, and 8) and self-confidence (items 1, 7, and 9). Higher sum scores

(range: 0–36) indicate greater levels of psychological resilience. The Dutch and English versions of the RES were validated among Dutch ($n = 296$) and US ($n = 266$) samples and manifested good internal consistency with Cronbach's alpha of 0.825 and 0.898 for the total scale, respectively (van der Meer et al., 2018).

2.2.3. Cross-cultural translation of the RES

We systematically translated the RES from its original Dutch version into Simplified Chinese. The process of translation and relevant cultural adaptation was conducted following a multi-stage procedure recommended by Sousa and Rojjanasrirat (2011). First, two bilingual and bicultural translators separately forward translated the Dutch RES into Chinese. Both translators are native Chinese speakers with no background in psychology. Second, the first author (YQ), who is native Chinese, compared the two versions of the forward translations. Ambiguities and discrepancies in words, sentences, and meanings in the two versions were discussed in a committee formed by YQ and two other co-authors (AB and CvdM), who are both native Dutch and the authors of the original Dutch RES. Afterward, translators of the forward translation resolved the noted ambiguities and discrepancies together and derived a preliminary translated version of the Chinese RES. Third, a third bilingual and bicultural translator back-translated the preliminary Chinese version into Dutch. The back-translator is a native Dutch speaker with no background in psychology. Fourth, AB and CvdM compared the back-translation with the original RES to confirm the conceptual, semantic, and content equivalence between the two Dutch versions. As the fifth and final step, a pilot test was conducted online among 10 native Chinese-speaking adults, representing the target population of interest for the future use of the Chinese RES. For the purpose of cultural adaptation, participants at this step were asked to answer the Chinese RES without seeing the Dutch or English version. Later, they were asked to give feedback on the clarity of instructions, response format, and items. Feedback demonstrated the Chinese RES was easily understandable, readable, and quick to answer. Thus, no further adaptations were made to the Chinese RES based on the positive results of the pilot test. Table 2 presents the final version of the Chinese RES used in the current study and the English version.

2.2.4. Related constructs

Three measures were included in the survey to check for convergent validity of the RES. **The Resilience Scale (RS)** consists of 25 items designed to measure five factors of resilience among adults: equanimity, perseverance, self-reliance, meaningfulness, and existential aloneness (Wagnild & Young, 1993). Each

item of the RS is answered on a 7-point Likert scale from 1 (strongly disagree) to 7 (strongly agree). Higher sum scores of the 25 items (range 25–175) indicate greater levels of resilience. The reliability and validity of the Chinese version of the RS have been well documented among Chinese samples with Cronbach's alpha ranging from 0.85–0.94 (Wagnild, 2009). Cronbach's alpha of the RS in the current sample was 0.92. **The Rosenberg Self-Esteem Scale (RSES)** is a 10-item instrument to measure the sense of self-worth and self-acceptance of an individual (Rosenberg, 1965). Items are answered on a 4-point Likert scale ranging from 1 (strongly disagree) to 4 (strongly agree). Higher sum scores on the RSES (range 10–40) reflect higher levels of self-esteem. Cronbach's alpha of the RSES was 0.91 in the current sample. **Global functioning (GF)** in both private life and work was rated by participants on a 10-point Likert scale from 1 (extremely bad) to 10 (excellent).

2.2.5. PTE exposure

The exposure item from the Primary Care PTSD Screen for DSM-5 (PC-PTSD-5; Prins et al., 2016) with examples of DSM-5 criterion A traumatic events (i.e. actual or threatened death, serious injury) was used for this purpose. A brief description of the event(s) and the age(s) at the time of occurrence were filled in if applied. The author YQ reviewed the reported PTE's based on Life Events Checklist for DSM-5 (LEC-5; Weathers et al., 2013) in consultancy with AB. Only eligible DSM-5 A-criterion events and related PCL-5 scores were used in the analyses.

2.2.6. PTSD checklist for DSM-5 (PCL-5)

The PCL-5 is a self-report questionnaire assessing 20 DSM-5 PTSD symptoms in the past month (Weathers et al., 2013). Each item is answered on a 5-point Likert scale ranging from 0 (not at all) to 4 (extremely). Participants were instructed to answer the PCL-5 items regarding their previously reported PTE('s). Higher total PCL-5 scores (range 0–80) reflect more severe levels of PTSD symptoms. The Chinese version of the PCL-5 has been validated in a Chinese traumatised population (Wang et al., 2017). Cronbach's alpha of the PCL-5 in the current PTE-exposed subsample was 0.94.

2.2.7. The Brief COPE

The Brief COPE was used to assess coping strategies in daily settings (Carver, 1997). The Brief COPE consists of 28 items on a 4-point Likert scale ranging from 1 (*I haven't been doing this at all*) to 4 (*I've been doing this a lot*) which are categorised in 14 subscales. Higher subscale sum scores (range 2–8) reflect more frequent utilisation of the specific coping strategy. Cronbach's alphas of the subscales ranged from 0.453 (self-distraction) to 0.828 (substance use) in the current study.

2.3 Statistical analyses

Statistical significance was set at $p < .05$ (two-tailed). Non-parametric statistics were used for non-normally distributed variables. Spearman's rho correlations were computed for bivariate associations. Associations between demographic variables with the RES and the PCL-5 were calculated using Mann Whitney U Test or Kruskal Wallis H tests for categorical variables and Spearman's rho correlations for continuous variables. Descriptive analyses were conducted in SPSS Version 25 and mediation analyses were conducted in Mplus 8.

2.3.1 Factor structure of the RES

First, we conducted a confirmatory factor analysis (CFA) using Mplus 8 to validate the two-factor structure of the RES proposed by van der Meer et al. (2018). A multivariate normality test indicated that the Chinese RES data were not normally distributed. Thus, maximum likelihood estimation with standard errors and a mean-adjusted chi-square (MLM) was used in evaluating measurement models of the RES. Items 1, 7, and 9 were loaded on self-confidence, while the remaining items (items 2–6 and 8) were loaded on self-efficacy.

If the result of CFA was not satisfactory based on the fit indices (Hu & Bentler, 2009), additionally parallel analysis (PA; Schmitt, 2011) would be conducted to explore the alternative factor structure of the RES. PA with maximum likelihood estimation was employed to determine the number of factors to retain, following the procedure recommended by O'Connor and O'Connor (2000) using SPSS.

2.3.2 Reliability and construct validity of the RES

Internal consistency reliability of the RES was evaluated according to Cronbach's alpha, inter-item, and item-total correlations. A Cronbach's alpha value ≥ 0.80 indicates good internal consistency (Schmitt, 1996).

Convergent validity was investigated by computing the bivariate Spearman's rho correlations between the RES total score and RS, RSES, and GF in the total sample. We then defined a PTE-exposed subsample categorised by using participants that endorsed PTE exposure. In this subsample, the direct association between the RES and PCL-5 was first analyzed. Then, following the methods used by Thompson et al. (2018), we selected the Brief COPE subscales, which were significantly associated with both the RES and PCL-5 using Spearman's correlation, to enter in one mediation model simultaneously as mediators. Demographic variables significantly associated with the RES and the PCL-5 would be included in the mediation models as covariates.

3. Results

3.1. Demographics and PTE's Exposure of the total sample

In total, 485 participants completed the online survey. One non-adult participant was excluded based on the inclusion criteria (age above 18). The final sample ($n = 484$) concerned predominantly young adults (age = 27.3 ± 6.9 years), females ($n = 324$, 66.9%), singles ($n = 320$, 66.1%), of Han ethnicity ($n = 456$, 94.2%), and university students or higher level of education ($n = 374$, 77.3%). See Table 1.

RES total score of the total sample was 22.43 ± 5.64 . Female participants (21.59 ± 5.66) showed significantly lower RES total scores than male participants (24.16 ± 5.22 ; $p = .00$, $\eta^2 = 0.045$). All the other demographic variables and PTE exposure were not significantly associated with RES total scores after Bonferroni correction (all p -value $> .007$; see Table 1).

In total, 116 participants (23.92%) were exposed to at least one PTE (see details in the supplementary material). The average time since a PTE was 8.3 years (range 0–40 years). The PCL-5 total score of this PTE-exposed subsample ($n = 116$) was 14.48 ± 13.52 . Fourteen participants (12.1%) were identified as potential PTSD cases with PCL-5 total scores above 33 and they reported significantly lower RES total scores than non-PTSD cases (Mean_{case} = 18.5 ± 7.18 , Mean_{non-case} = 23.67 ± 5.44 , $p = .005$, $\eta^2 = 0.068$).

Table 1. Demographic characteristics of participants and associations with the RES total score among the total sample ($n = 484$).

	N (%)/ Mean \pm SD	RES total score, Mean \pm SD	p
Total sample	484 (100)	22.43 \pm 5.64	
Gender			.000
Male	160 (33.1)	24.16 \pm 5.22	
Female	324 (66.9)	21.59 \pm 5.66	
Ethnicity			.126
Han ethnicity	456 (94.2)	22.33 \pm 5.66	
Ethnic minority	28 (5.8)	24.04 \pm 5.27	
Education level			.147
Below college	110 (22.7)	21.19 \pm 5.67	
College	228 (47.1)	22.27 \pm 5.69	
Above college	146 (30.2)	23.15 \pm 5.50	
Marital status			.027
Single	233 (48.1)	21.64 \pm 5.99	
In relationship	86 (17.8)	22.50 \pm 5.56	
Married/cohabitating	151 (31.2)	23.39 \pm 5.01	
Divorced	14 (2.9)	24.71 \pm 4.86	
Employment status			.187
Student	166 (34.3)	22.09 \pm 5.46	
Employed	279 (57.6)	22.51 \pm 5.76	
Freelancer	25 (5.2)	24.40 \pm 5.61	
Unemployed/retired	14 (2.9)	21.29 \pm 5.09	
Self-reported PTE's exposure			.074
Yes	116 (24.0)	22.24 \pm 5.55	
No	368 (76.0)	23.01 \pm 5.62	
Age, year	27.33 \pm 6.86	$\rho = .117$.010

Note: RES: Resilience Evaluation Scale. PCL-5: PTSD Checklist for DSM-5. PTE's: potential traumatic events. SD: standard deviation.

3.2. Factor structure

Among the total sample ($n = 484$), CFA results showed adequate to mediocre model fit of the 2-factor structure of the RES: $\chi^2(26) = 137.197$, CFI = 0.923, TLI = 0.893, SRMR = 0.063, RMSEA (90% CI) = 0.094 (0.079–0.110). While the CFI value (>0.9) and SRMR value (<0.08) indicated an adequate model fit, the TLI value (<0.9) and the RMSEA value (>0.08) only indicated a mediocre model fit (Bentler, 1990; Hu & Bentler, 1999).

This pattern of fit indices indicated room for improvement for the 2-factor structure. Thus, we conducted PA to explore an alternative factor structure of the Chinese RES. Principal component analysis results showed that for the actual RES data set, the first three 95th eigenvalues were 4.86, 1.11, and 0.93; for the 100 SPSS-generated data sets, the aggregated (first three 95th percentile) eigenvalues were 1.29, 1.20, and 1.14. When comparing these two sets of eigenvalues, only the first 95th percentile eigenvalue (4.86) in the actual data set could outperform the corresponding eigenvalue (1.29) in the generated data sets, suggesting that a single factor accounting for 49.92% of the total variance should be retained. All RES items exhibited salient factor loadings (>0.607 , see Table 2).

3.3. Reliability

Cronbach's alpha of the RES total scale was 0.88 and did not improve if any item was deleted. Inter-item correlations ranged from 0.22–0.67, and item-total correlations ranged from 0.63 to 0.77 (all p -values $<.01$), indicating sufficiently high internal consistency.

3.4. Construct validity

The RES total score was positively correlated with the RS, RSES, and GF total scores ($\rho = 0.80, 0.67$, and

0.48, respectively, all p -values $<.01$) in the total sample.

In the PTE-exposed sub-sample, a higher level of psychological resilience was significantly related to a lower level of PTSD symptom severity ($\rho = -0.18$), more frequent use of active coping, planning, positive reframing, acceptance, and humour ($\rho = 0.33$ – 0.49), and less frequent use of avoidant strategies (i.e. behavioural disengagement and self-blame; $\rho = -0.29$ and -0.35 respectively). See Table 3.

The mediation model with the three coping strategies that were both significantly related to psychological resilience and PTSD symptoms demonstrated significant mediation effects through behavioural disengagement ($b = -0.220$, $SE = 0.092$, 95% CI = -0.403 – 0.092) and self-blame ($b = -0.615$, $SE = 0.103$, 95% CI = -0.379 to -0.030) but not positive reframing ($b = -0.064$, $SE = 0.111$, 95% CI = -0.257 – 0.103). There were no differences found in the mediation effects magnitudes (all 95% CI contained 0). See Table 4.

4. Discussion

In the current study, we examined the psychometric properties of the RES among a healthy sample drawn from the general population in China. The results indicated that the 9-item Chinese RES is a unidimensional scale, as opposed to the originally proposed two-factor structure (van der Meer et al., 2018). The RES demonstrated sound psychometric results in terms of internal consistency and convergent validity.

Regarding the factor structure, our current finding may not be surprising as the original two factors of the RES, self-confidence and self-efficacy, are closely related. Derived from the secondary appraisal concept of the stress-coping model (Folkman & Lazarus,

Table 2. Factor loadings in the one-factor model of the 9-item RES.

RES Items (in English and Chinese)	Factor loadings
1. I have confidence in myself 我对自己有信心	.785
2. I can easily adjust in a difficult situation 我可以很容易就适应困境	.728
3. I am able to persevere 我有毅力	.611
4. After setbacks, I can easily pick up where I left off 遇到挫折后我可以很容易地继续下去	.735
5. I am resilient 我很有韧性	.725
6. I can cope well with unexpected problems 我能很好的应对突发问题	.700
7. I appreciate myself 我欣赏我自己	.695
8. I can handle a lot at the same time 我可以同时处理很多事情	.607
9. I believe in myself 我相信我自己	.747

Note: RES: Resilience Evaluation Scale. Factor loadings above 0.40 are considered salient.

Table 3. The Spearman's rho correlations between the RES, PCL-5, and 14 subscales of the Brief COPE ($n = 116$).

	RES	PCL-5
PCL-5	-.183*	
Active coping		
Active coping	.489**	-.084
Instrumental support	-.184*	.159
Planning	.487**	-.105
Emotional support	-.112	.224*
Positive reframing	.428**	-.205*
Acceptance	.325**	-.137
Religion	-.041	.173
Humour	.432**	-.032
Avoidant coping		
Self-distraction	.133	.296**
Denial	-.114	.329**
Substance use	-.035	.203*
Behavioural disengagement	-.287**	.314**
Venting	-.098	.142
Self-blame	-.347**	.257**

Note: RES: Resilience Evaluation Scale. PCL-5: PTSD Checklist for DSM-5.

*Correlation is significant at the 0.05 level (2-tailed).

**Correlation is significant at the 0.01 level (2-tailed).

Table 4. Mediation effect of psychological resilience on PTSD symptoms through coping strategies of behavioural disengagement, self-blame, and positive reframing among the PTE-exposed subsample ($n = 116$).

	Estimate	SE	p	Bias-corrected 95% CI	
				Lower	Upper
Indirect effects					
Behavioural disengagement	-0.220	0.092	.017	-0.403	-0.092
Self-blame	-0.165	0.103	.110	-0.379	-0.030
Positive reframing	-0.064	0.111	.568	-0.267	0.103
Contrasts					
Behavioural disengagement vs. Self-blame	-0.055	0.143	.702	-0.282	0.179
Behavioural disengagement vs. Positive reframing	-0.156	0.156	.316	-0.410	0.104
Self-blame vs. Positive reframing	-0.101	0.162	.532	-0.400	0.135

Note: Demographic variables were not related to the total scores of either RES or PCL-5 after Bonferroni correction (all p -values > 0.008). Thus, no covariates were entered in the mediation models. We conducted bias-corrected bootstrap tests based on 5000 bootstrap samples (Preacher and Hayes, 2008) to test the significance of the total, direct, and indirect effects in each of the models. The indirect effect is the amount of mediation effects accounted by the mediators. The direct effect is the effect of the independent variable on the dependent variable when the mediators are accounted for. RES: Resilience Evaluation Scale. PCL-5: PTSD Checklist for DSM-5. PTSD: posttraumatic stress disorder. SE: Standard Error. CI: Confidence Interval. The 95% CI that did not include zero was considered to indicate statistically significant. A full mediation was determined when the direct effect became insignificant when the mediator was included in the model.

1984), self-confidence ('trust in oneself') and self-efficacy ('positive beliefs about adaptive coping with stressful situations') are both the core sets of internal capacities determining resilient outcomes after a PTE (Folkman & Lazarus, 1984; Major et al., 1998). Indeed, in the first validation study of the RES among Western samples, van der Meer et al. (2018) reported that two original self-confidence items (item 3 'I am able to persevere' and item 5 'I am resilient') clustered on the self-efficacy factor instead, indicating that differentiating the two constructs might be ambiguous. The unidimensional structure of the RES suggests using the total score of the 9 items as the global measure of psychological resilience, as was also suggested by van der Meer et al. (2018).

Moreover, our results support the notion that how (psychological) resilience is shaped may vary across cultures (Southwick et al., 2014; Xie & Wong, 2020; Yu & Zhang, 2007). van der Meer et al. (2018) found that the RES is construct-invariant between the Dutch and English versions which could be understood by the shared Western cultural backgrounds. However, the distinct unidimensional structure of the Chinese RES may suggest that self-confidence and self-efficacy are even more integrated with the appraisal of a resilient self in Chinese culture. This may be explained by the notice that in the Chinese culture, adversities are positively interpreted as valuable opportunities to thrive which lead to enhanced

positive self-regards, character-building, optimism and hope (Kolstad & Gjesvik, 2014; Xie & Wong, 2020; Yu & Zhang, 2007). Such ideation could be seen in wide-adopted doctrines of Confucian and Mencian philosophy advocating that '... when Heaven is about to confer a great office on a man, it first exercises his mind with suffering... By all these methods it stimulates his mind, hardens his nature, and supplies his incompetency' (Chan, 2002). At the same time, all the nine items were well interpreted by the Chinese participants and showed salient item-factor loadings. This supports that, similar to Western cultures, the secondary appraisal model and the internal capacities of self-efficacy and self-confidence behind it were relevant to Chinese culture.

In general, the RES demonstrated good internal consistency and significant inter-item and item-total correlations, indicating that the Chinese RES could confidently be used to assess psychological resilience. The positive associations between the RES and measures related to positive adaptation (i.e. resilience, self-esteem, and global functioning) indicate good convergent validity of the RES. Construct validity of the RES is also supported by the negative association between the RES and PTSD symptom levels among the PTE-exposed subsample. This result concurs with previous findings that psychological resilience could protect against the development of PTSD symptoms (Major et al., 1998; van der Meer et al., 2018).

Corroborating with the stress-coping model (Folkman & Lazarus, 1984), the found interrelatedness among (negative) coping strategies, psychological resilience and PTSD symptoms further supports the conceptualisation and construct validity of the RES. Theoretically, in the face of PTE's individuals with higher levels of internal resources (e.g. psychological resilience) will tend to experience more positive emotions, accept and face the stressful reality more directly, more actively use a problem-solving approach, and reinterpret the meaning of negative events to reduce emotional responses (Folkman, 2010; Groth et al., 2019; Horn et al., 2016). Indeed, our results showed that psychological resilience was related to more frequent use of active coping strategies as well as less frequent use of avoidant strategies. Further, we found avoidant coping strategies (i.e. behavioural disengagement and self-blame) mediated the negative associations between psychological resilience and the PTSD symptoms. This indicated that individuals with higher levels of psychological resilience may employ lower levels of behavioural disengagement and self-blame in the face of a PTE, in turn present a lower level of PTSD symptoms. These findings highlight the importance of distinguishing psychological resilience from other aspects of adaptive coping (Bolton et al., 2015; van der Meer et al., 2018). Given the cross-sectional nature of the study, we

cannot infer the directionality of the demonstrated mediation effect. More prospective investigation, including other, larger trauma-exposed samples, is needed to test the reversed direction of this interrelatedness and to investigate the predictive validity of psychological resilience. Potential findings could help inform the development of preventive interventions emphasising the enhancement of psychological resilience.

The main strengths of our study include the relatively large sample size. Our study has some limitations to consider. First, our sample consists predominantly of female, young and highly educated Han-Chinese adults. Thus, generalising our findings to other Chinese-speaking sub-populations needs caution. Future research could investigate the psychometric properties of the RES in other populations, such as trauma-exposed groups or (sub)-clinical samples to shed more light on the generalizability of this new scale. Second, the use of self-report measurements of PTSD symptoms and other psychological constructs and the retrospective self-report of the PTE's might introduce response and recall biases in the results, respectively (Lalande & Bonanno, 2011; Rosenman et al., 2011). Third, we did not include a retest assessment or examine the divergent validity or the cross-cultural measurement invariance. Fourth, future studies utilising modern psychometric approaches such as item response theory could help to test the performance of each RES item to improve this novel questionnaire further.

5. Conclusions

The current study adds to the cross-cultural refinement and unifying of the resilience concept by validating its psychological dimension, i.e. psychological resilience, as a distinct construct. This is the first study to establish sound psychometric properties of the RES in Chinese, in addition to its Dutch and English versions. This suggests that the RES is potentially not culturally biased and could have the potential to be adopted worldwide under Western and Eastern cultural backgrounds. We recommend more globally collaborated research to validate RES into other (especially Eastern) languages. Increasing the cross-cultural knowledge of psychological resilience using the RES could importantly contribute to the development of culturally attuned (psychological) resilience-building prevention programs to help individuals facing PTE's.

Disclosure statement

No potential conflict of interest was reported by the author(s).

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Data availability statement

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 and ethical restrictions.

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