

## CONFIRMATORY FACTOR ANALYSIS AND RASCH ANALYSIS OF THE RUSSIAN VERSION OF THE EGO RESILIENCY SCALE REVISED

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### ABSTRACT

The concept of sustainability is closely related to the security of the individual. The Ego Resiliency Scale Revised (ER89-R) is a brief, widely used scale that examines resilience as the ability to flexibly alter reactions in response to varying contextual demands. Consistent with contemporary evidence, the measure conceptualises ego resiliency as a higher-order construct comprising two factors denoting different behavioural and temperamental attributes that promote management of emotionality, Openness to Life Experiences (low negative) and Optimal Regulation (Positive orientation toward life). The present study translated the ER89-R into Russian, and evaluated its psychometric performance using confirmatory factor analysis (CFA) and Rasch analysis ( $N = 1110$  respondents: 426 males, 686 females). CFA supported a higher-order factor structure. Rasch analysis assessing Openness to Life Experiences and Optimal Regulation scales, reported good item/person reliability and item/person fit, gender invariance, and existence of unidimensionality. However, items appeared to be slightly easy to endorse overall, and developing the measure to incorporate more varied items in terms of difficulty would be beneficial. Overall, results supported a higher-order conceptualisation of the ER89-R and suggested that the Openness to Life Experiences and Optimal Regulation scales are appropriate measures of ego resiliency in a Russian sample.

**Keywords:** personal security, Ego resiliency, Ego Resiliency Scale Revised (ER89-R), Rasch analysis, confirmatory factor analysis, dimensionality

## ПСИХОЛОГИЧЕСКАЯ УСТОЙЧИВОСТЬ ЛИЧНОСТИ: РЕЗУЛЬТАТЫ ФАКТОРНОГО АНАЛИЗА И АНАЛИЗА РАША ПСИХОМЕТРИЧЕСКИХ ПОКАЗАТЕЛЕЙ РУССКОЙ ВЕРСИИ ШКАЛЫ (ER89-R)

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### АННОТАЦИЯ

Концепция устойчивости тесно связана с безопасностью личности. В статье представлена авторская интерпретация шкалы устойчивости личности (ER89-R) как краткой, широко используемой шкалы, которая рассматривает устойчивость в качестве способности личности гибко реагировать в ответ на различные контекстуальные условия. В соответствии с

современными данными, показатель устойчивости личности концептуализируется как конструкция высшего порядка, включающая два фактора, обозначающих различные характеристики поведения и темперамента, которые способствуют, по мнению авторов, управлению эмоциональным состоянием, открытости жизненному опыту (Openness to Life Experiences / низкий уровень отрицания) и оптимальному регулированию (Optimal Regulation / позитивная ориентация на жизнь).

В рамках настоящего исследования авторами сделан перевод шкалы ER89-R на русский язык и дана оценка его психометрических показателей с использованием подтверждающего факторного анализа (CFA) и анализа Раша (N = 1110 респондентов: 426 мужчин, 686 женщин). CFA позволил реализовать факторную структуру более высокого порядка. Анализ Раша, оценивающий открытость жизненному опыту и оптимальные шкалы регулирования, показал достаточную надежность исследования предмета/личности и его соответствие задачам его изучения, исследования гендерной инвариантности и получения целостной одномерной оценки. Однако, как представляется, несмотря на то, что в ходе исследования подтверждена эффективность показателей шкалы в целом, в то же время было бы полезной разработка дополнительных измерений в целях расширения индикаторов.

В целом, результаты подтвердили концептуализацию ER89-R более высокого порядка и позволили допустить, что открытость жизненному опыту и оптимальные шкалы регулирования являются подходящими показателями устойчивости личности в российской выборке.

**Ключевые слова:** безопасность личности, устойчивость личности, пересмотренная шкала устойчивости личности (ER89-R), анализ Раша, подтверждающий факторный анализ, измеряемость

## Introduction

The Ego Resiliency Scale (ER89) [7] measures ability to flexibly adapt responses to shifting situational demands, particular within emotionally testing settings [5]. In this context, adaptability is delineated as the capacity to modify ego-control as a function of setting to maintain or enhance equilibration [29]. Specifically, via motivational control and resource modification. Within this conceptualisation the ER89 indexes an affect processing system encompassing ego-control (EC) and ego resiliency (ER) [15]. These terms originate from psychoanalytic theory where EC denotes expression or inhibition of impulses and ER refers to the facility to appropriately adjust responses to environmental demands. Thus, within the ER89, EC represents a meta-dimension of regulation, and ER species the ability to alter control in response to contextual demands [23]. Commensurate with this conceptualisation, high ego resiliency is associated with better adjustment throughout development and higher attainment [6, 16]. Consistent with the notion that resilience is a personality trait, Block and Kremen [7] regard ego resiliency as a relatively stable disposition.

The ER89 developed the investigation of theoretical connections between ego resiliency and intelligence [7]. Block and Kremen [7] asked participants to complete items from the two constructs combined into a single measure. Analysis indicated that ego resiliency was a discrete factor. Ensuing studies have supported the finding that the ER89 is unidimensional and psychometrically validated the

instrument (i.e., established reliability and validity) [10, 23, 30, 40]. Outcomes also concur with the notion that EC and ER are coherent, related constructs. Acknowledging this, Tugade & Fredrickson [40] postulate that consideration of the interaction between EC and ER will provide important academic insights into the nature of resilience.

Since development the ER89 has become a commonly used research tool. The scales popularity stems from its uniqueness [11]. Explicitly, the operationalisation of ego resiliency as personality traits or temperament related to adaptability, which are independent of situations factors such as adversity, risk, and threat [27] and associated with everyday processes as protective factors [11]. Another important feature of the ER89 is that it derives from a solid theoretical basis because it was conceptualized in the domain of personality development. The ER89 has also gained favour from researchers because it was designed for use with nonclinical populations (i.e., young adults). Additionally, the ER89 is frequently selected as it is a brief, easy to administer, psychometrically validated tool that researchers can expediently employ within test batteries [11].

Due to general adoption, the ER89 has become a recognised scale for assessing psychological resilience. To facilitate comprehension across different cultures, researchers have translated the ER89 into several languages. For instance, Italian [10], Japanese [41], and Chinese [11]. The translation process has resulted in revision. Notably, the process produced the ER89-R [2, 3, 10]. The ER89-R comprises a two-

factor higher-order model derived from 10-items; modification of the ER89 resulted in the removal of four psychometrically inadequate items [3]. The ER89-R thus presents ego resiliency as a second-order factor influencing first-order components, Openness to Life Experiences and Optimal Regulation. These factors denote different behavioural and temperamental attributes that promote low negative emotionality and positive orientation toward life respectively [3, 11].

This model is theoretically sound because it aligns with academic abstractions of ego resiliency [2]. Moreover, the ER89-R demonstrates structural stability across samples from late adolescence to young adulthood. Illustratively, Alessandri et al. [2] using multigroup confirmatory factor analysis reported partial configural, metric, and scalar invariance in a range of national samples (i.e., Italy, Spain, and the United States). Indeed, the two-factor ER89-R model has repeatedly proved stable and produced best fit across a range of samples [3, 30, 42].

Despite considerable support for the two-factor solution, Farkas and Orosz [15] advance an alternative hierarchical model with three factors derived from 11-items (ER11): Active Engagement with the World (AEW), Repertoire of Problem-Solving Strategies (RPSS), and Integrated Performance under Stress (IPS). Farkas and Orosz [15] observed that these sub-scales were differentially related to other relevant constructs (e.g., anxiety and subjective well-being). Accordingly, Farkas and Orosz [15] concluded that resiliency has two distinguishable functions, personality stability maintenance (permeability; RPSS and IPS) and adaption to dynamic environmental demands (elasticity or plasticity; RPSS and AEW).

### Present Study

Noting that researchers had not previously produced a Russian language version of the ER89-R, this paper translated the scale into Russian and psychometrically validated the outcome. A translation was necessary because only a relatively small proportion of Russians speak English as a second language [1]. This creates a language barrier that excludes them from completing the ER89 and

prevents cross-cultural comparisons of ego resiliency, which is an important psychological construct. Thus, the existence of a translated ER89-R will facilitate investigation both within Russia and between Russia and other countries. Russia is geographically the largest country in the world and one of the highest populated. Thus, it is vital that investigators can accurately assess the ability to bounce back from challenges and adversities. The absence of a Russian language version means that the applicability of the ER89-R in this context is unknown. This paper will also establish Russian sample norms for the Ego Resiliency Scale. Noting these factors, the authors concluded that a Russian translation was an academic necessity.

Within this paper, examination of the psychometric properties of the Russian ER89-R used both confirmatory factor analysis and Rasch scaling. The latter procedure extended previous work based on classical test theory (CTT). CCT derives from the assumption that tests produce true scores in the absence of measurement error, which is inevitable because instruments are inherently imperfect. Accordingly, CCT views observed scores as the product of construct variation and measurement error. From this perspective, error is random and distributed similarly across takers. Hence, CCT focuses on the establishment of reliability (internal and test-retest) and validity (conceptual coherence) [31].

Response theory (or modern test theory) criticises this notion and contends that error arises from differences in item difficulty. Thus, if item difficulty is within constrained parameter, as identified by Rasch scaling, then score variations more closely represent endorsement of the latent trait or ability observed [28]. Thus, Rasch testing identifies differential item functioning (DIF) (bias) [38], such as response dissimilarities caused by group membership (age, gender, etc.). The presence of DIF is problematic because it distorts scores. For instance, groups at the same level of ability demonstrate a different probability of item response [19]. When this occurs, scores are not representative of the measured trait or ability [22, 37]. This is particularly pertinent in the case of Ego Resiliency

Scale because a lengthy time has elapsed since the researchers generated the items. Another advantage of the Rasch approach is the purification process allows analysts to treat ordinal observations as interval scaled measurements [45]. For these reasons following confirmatory factor analysis, the emergent Russian language version of the ER89 was submitted to Rasch analysis.

## Method

### Respondents

The sample included 1110 respondents, (Mean age,  $M$ ) = 36.41 years,  $SD$  = 9.32, range 18–81. There were 424 males (38%),  $M$  = 39.36 years,  $SD$  = 10.66, range 18–81; and 686 females (62%),  $M$  = 36.24 years,  $SD$  = 9.92, range 18–79. Respondents were recruited via Anketolog, a company that specialises in participant recruitment.

The researchers requested a general adult population sample from all regions of Russia aged 18 years and over. Participant recruitment panel data is typically more varied and wider ranging than traditional student samples. These benefits do not hamper quality and are proportionate to traditional samples in terms of responses to established measures and demographics [21].

### Translation

The ER89-R was translated into Russian using back-translation. This method involves bilinguals translating the items from English to Russian. Then independent bilinguals translated the scale from the foreign language back to the original [8]. Application of this procedure identifies differences in meaning and resolves them by appropriately modifying items. For the Russian version, one of the lead researchers translated the items from English. These were then translated back into English by a colleague, and the English items were assessed by the English members of the research team.

Back translation is an established method for creating foreign language versions of measures. Indeed, investigators have used the procedure as a quality assessment technique in cross-cultural work for several decades [13, 18]. Illustratively, most language conversions employ backward translation,

and it is the primary tool within several academic disciplines [14]. Accordingly, backward translation is regarded as a robust approach that ensures that foreign language adaptations remain faithful to the original version [12].

### Measure

The Ego Resiliency Scale Revised [3] examines the ability to flexibly modify reactions to altering environmental demands, particularly in emotionally taxing conditions. Items measure resilience in indirect (e.g., “I enjoy trying new foods I have never tasted before”) and direct (e.g., “I get over my anger at someone reasonably quickly”) ways. ER89-R items are presented as statements alongside a 4-point Likert-type scale from 1 (does not apply at all) to 4 (applies very strongly). Good reliability and validity exist for the ER89-R [3], together with positive correlations with Block and Kremen’s [7] original scale.

### Procedure and Ethics

Participants accessed study materials via a web-link circulated by the Anketolog web-based survey tool. Prior to completing the survey, participants received introductory information about the project explaining its aims and adherence to ethical procedures. All participants needed to consent to take part to progress from the study introduction. Respondents subsequently provided demographic details (i.e., age and gender) before continuing to the survey. Survey instructions required participants to carefully read and answer all questions and respond honestly. The likelihood of evaluation apprehension and social desirability effects were negated via informing participants that no right or wrong answers existed. After completing the survey, participants received a debrief. The Manchester Metropolitan University Faculty of Health, Psychology and Social Care Ethics Committee granted ethical approval for the study.

### Analysis

Confirmatory factor (CFA) and Rasch analysis procedures examined the validity of the ER89-R. CFA (via AMOS27) assessed construct validity using

four models: three one-factor models, and a higher-order model. The one-factor models included a total scale model as a test of the original structure [7], a one-factor Openness to Life Experiences model, and a one-factor Optimal Regulation model. Lastly, the higher-order model was based on Alessandri et al. [3], including the two latent factors of Openness to Life Experiences and Optimal Regulation together with a higher-order construct of Ego Resiliency.

Chi-square, Comparative Fit Index (CFI), Tucker Lewis Index (TLI) and Root-Mean-Square Error of Approximation (RMSEA) fit indices appraised data-model fit.  $CFI \geq 0.95$ ,  $TLI \geq 0.95$  and  $RMSEA \leq 0.05$  represent good fit [20]. Acceptable values are  $CFI \geq 0.90$ ,  $TLI \geq 0.90$  and  $RMSEA \leq 0.08$  [9]. RMSEA involved the 90% Confidence Interval (CI). Akaike's Information Criterion (AIC) compared models with comparable item numbers, and lower values represented superior fit. For interpretation, factor loadings  $\geq .30$  are acceptable and illustrative of the factors [17].

Rasch analysis supplied measurement information at the item and person level. Rasch models can be utilised "as confirmatory tests of the extent to which scales have been successfully developed according to explicit *a priori* measurement criteria" [26]. In this study, analysis utilised the Rasch Rating Scale Model (RRSM) [4]. Estimation of the parameters for analysis using maximum likelihood estimation techniques occurred via Winsteps software [25]. Akin to existing Rasch validation studies [3, 44], ER89-R evaluation considered five criteria: rating scale effectiveness, dimensionality, reliability, differential item functioning, and item hierarchy.

## Results

### Confirmatory factor analysis

Mardia's test of multivariate kurtosis suggested significant non-normality of data (i.e.,  $18.07 > 1.96$ ). Mardia's test is, though, very sensitive to sample size, and kurtosis examination among individual variables is necessary (Stevens, 2009). Values  $> 3.00$  suggest non-normal distribution of a variable/item [43]. All items were below 3.00 (i.e., between -0.97 and -0.20).

The one-factor model for the total ER89-R scale (Table 1) suggested acceptable fit across CFI (0.93), TLI (0.92), and RMSEA (0.07, CI of 0.06 to 0.08). All factor loadings  $> 0.3$ . The higher-order model demonstrated good fit on CFI (0.96), TLI (0.96), and RMSEA (0.05, CI of 0.04-0.06). Factor loadings ranged between 0.53 and 0.76. Good CFI (0.98) and TLI (0.95) existed for the one-factor OL model. However, RMSEA reflected a marginally acceptable value (0.09, CI of 0.05 to 0.12). Acceptable fit occurred for the one-factor OR solution on CFI (0.94), TLI (0.91), and RMSEA (0.08, CI of 0.06 to 0.09). Factor loadings ranged between 0.47 and 0.72 across these models.

AIC comparison in combination with fit indices results indicated superior fit for the higher-order model vs. the one-factor models (i.e., lower AIC and improved fit overall). Figure 1 presents the higher-order model standardized factor loadings together with  $R^2$  and error. Satisfactory alpha reliability existed for all scales (total scale  $\alpha = 0.83$ ; Openness to Life Experiences  $\alpha = 0.76$ ; Optimal Regulation  $\alpha = 0.72$ ).

Table 1 – Fit indices for ER89-R factor models

Model	$\chi^2$	df	CFI	TLI	RMSEA (90% CI)	AIC
One-factor total scale	214.62**	35	0.88	0.85	0.07 (0.06-0.08)	274.62
One-factor Openness to Life Experiences	18.57**	2	0.98	0.95	0.09 (0.05-0.12)	-
One-factor Optimal Regulation	71.10**	9	0.94	0.91	0.08 (0.06-0.09)	-
Higher-order model	137.91**	35	0.96	0.96	0.05 (0.04-0.06)	197.91

Note. \*\* $\chi^2$  significant at  $p < .001$

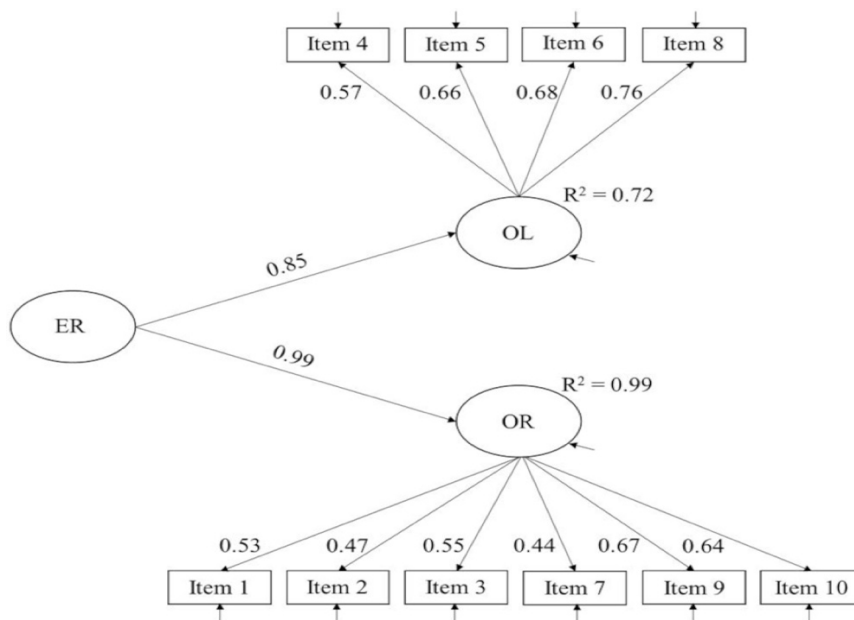


Figure 1 – ER89-R higher-order model. Note. ER = Ego Resiliency total score; OL = Openness to Life Experiences; OR = Optimal Regulation. Error was specified for all variables but is not depicted in the figure

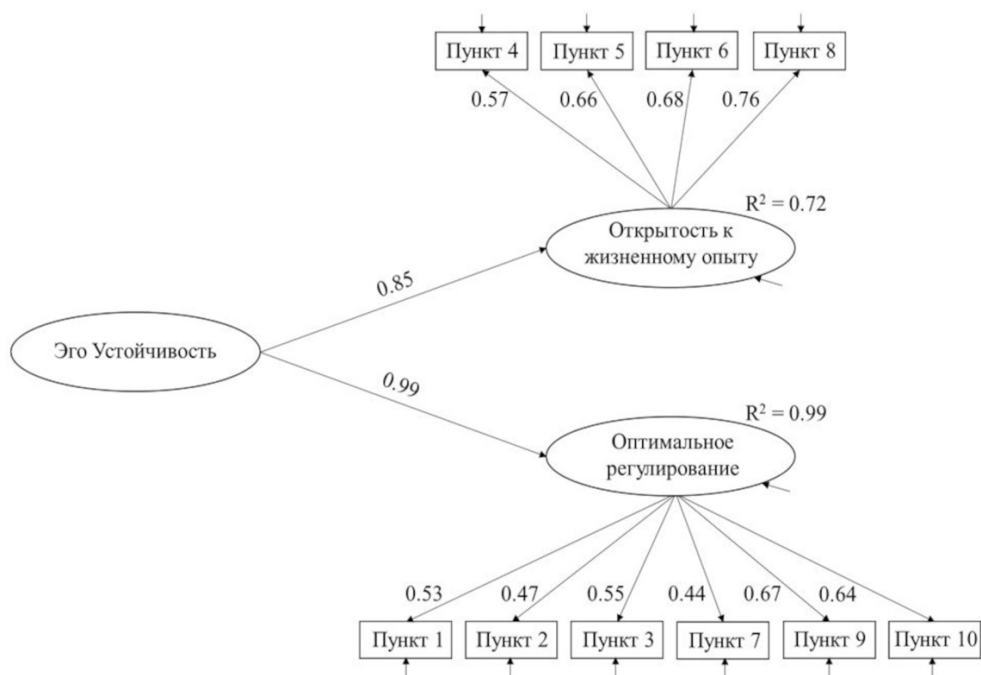


Figure 1a – ER89-R Russian translation higher-order model. Note. ER = Ego Resiliency total score; OL = Openness to Life Experiences; OR = Optimal Regulation. Error was specified for all variables but is not depicted in the figure

**Rasch analysis**

Based on the CFA and the recommendations of Alessandri et al. [3], Rasch analysis scrutinised the ER89-R as two factors (Openness to Life Experiences and Optimal Regulation). Initially, assessment of rating scale effectiveness occurred. Infit and Outfit mean square statistics were within the acceptable range of 0.86 to 1.12 for all response

categories [46] (Table 2). Participants were more inclined to agree with statements, however. Outfit MNSQ and Infit MNSQ results ranged between 0.6 and 1.4 for all items (Table 3), suggesting a lack of randomness or ‘noise’ within the measure. Item difficulty between -0.40 to 0.50 logits existed indicating a lack of spread, and low standard errors occurred (from 0.04 to 0.05).

Table 2 – Rating scale effectiveness

	Category	Total count (%age)	Infit MNSQ	Outfit MNSQ
<b>Openness to Life Experiences</b>				
	1 Does not apply at all	363 (8)	1.06	1.07
	2 Applies slightly	1037 (23)	0.94	0.95
	3 Applies somewhat	1688 (37)	0.86	0.89
	4 Applies very strongly	1512 (33)	1.10	1.08
<b>Optimal Regulation</b>				
	1 Does not apply at all	483 (7)	1.10	1.12
	2 Applies slightly	1766 (26)	0.94	0.95
	3 Applies somewhat	2998 (43)	0.89	0.90
	4 Applies very strongly	1653 (24)	1.04	1.04

Table 3 – Item fit statistics

Item description	Difficulty	Standard error	Infit MNSQ	Outfit MNSQ
<b>Openness to Life Experiences</b>				
4. I enjoy trying new foods I have never tasted before.	-0.32	0.05	1.16	1.16
5. I like to take different paths to familiar places.	0.21	0.05	1.06	1.03
6. I am more curious than most people.	0.37	0.05	0.94	0.96
8. I like to do new and different things.	-0.26	0.05	0.82	0.84
<b>Optimal Regulation</b>				
1. I am generous with my friends.	-0.38	0.05	0.98	0.98
2. I quickly get over and recover from being startled.	0.23	0.04	1.11	1.12
3. Most of the people I meet are likeable.	0.12	0.04	0.98	0.99
7. I usually think carefully about something before acting.	-0.40	0.05	1.15	1.16
9. My daily life is full of things that keep me interested.	-0.07	0.05	0.95	0.93
10. I get over my anger at someone reasonably quickly.	0.50	0.04	0.83	0.82

Note. The MNSQ acceptable limits to productive measurement were 0.6 to 1.4. Values beyond these limits are considered misfitting.

The response curves for each survey category in Figure 2 indicate level of endorsement. Explicitly, the curve for 'Applies somewhat' peaks between 0.25 and 1.62 for Optimal Regulation, and between 0.5 and 1.25 for Openness to Life Experiences (similar yet slightly narrower) suggesting that participants possessing ego resiliency scores between 0.25 and 1.62, and 0.5 and 1.25 respectively are more likely to endorse this category. The response curves infer that respondents are using all response categories. These findings suggest that all items are valuable for measurement, and the response scale is functioning suitably across both scales (Openness to Life Experiences and Optimal Regulation).

Dimensionality assessment involved a principal component analysis (PCA) of the residuals. For Openness to Life Experiences, the variance accounted for by the initial extracted component was 49%. The first contrast possessed unexplained variance of 19.4% (Eigenvalue: 1.5). The observed variance for Optimal Regulation was 38.8% for the first dimension. The first contrast explained 14.9% of variance (Eigenvalue: 1.5). According to Linacre (2012), an Eigenvalue > 2 indicates a component. Hence, a single Rasch dimension existed for each factor and signified satisfactory evidence for unidimensionality.

Reliability and separation estimates suggest the extent of reproducibility in the scores. Person

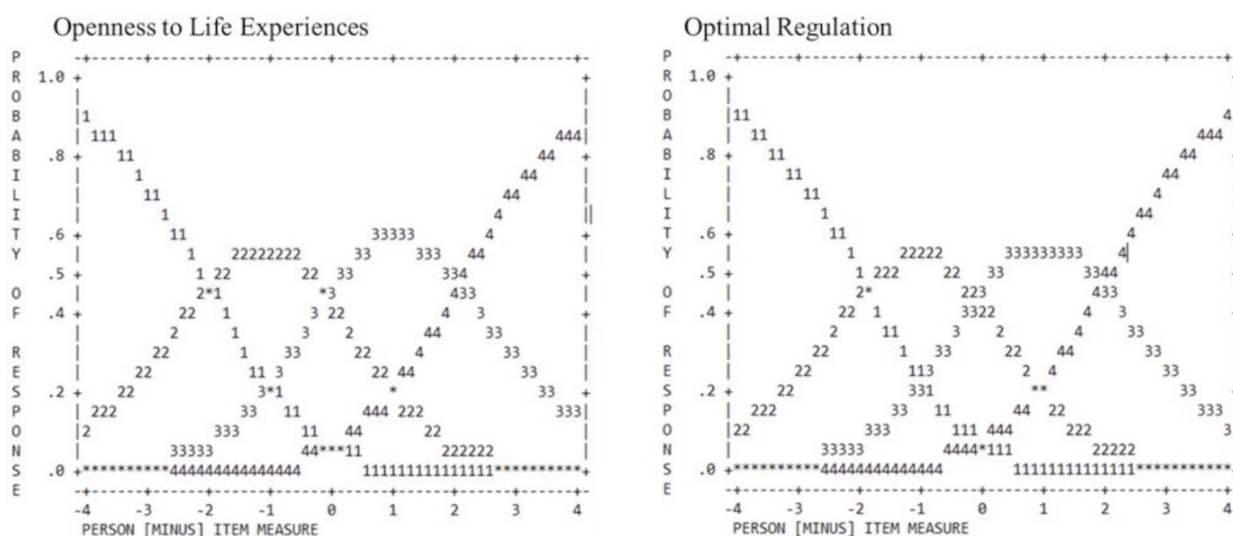


Figure 2 – Response category probability curves

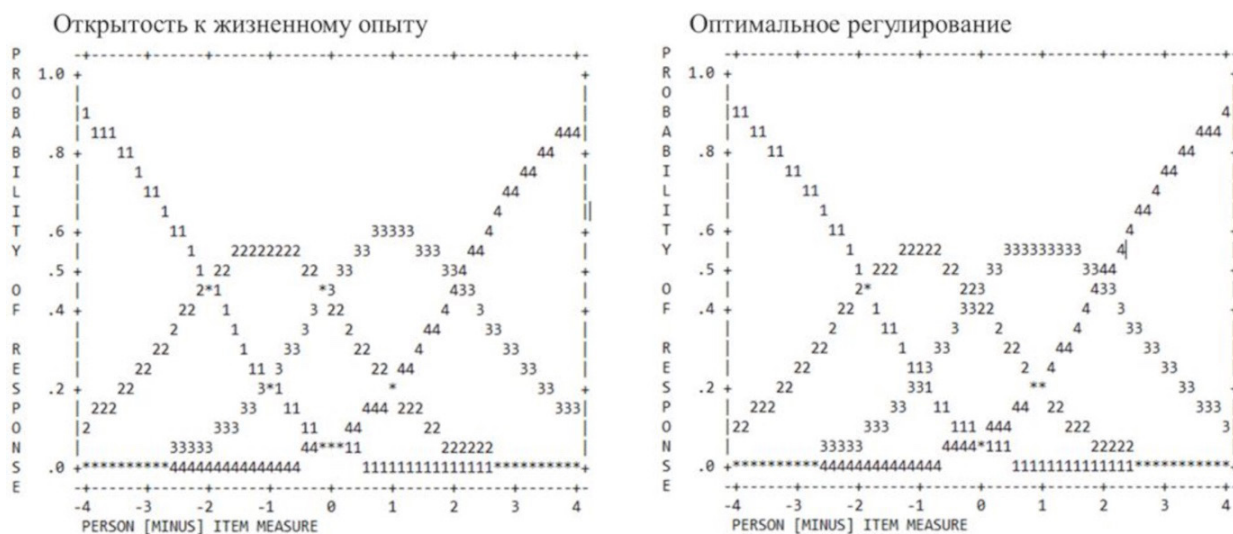


Figure 2a – Russian translation of Response category probability curves

reliability was 0.68 and 0.69 for Openness to Life Experiences and Optimal Regulation, representing satisfactory internal consistency. Item reliability was high: 0.97 and 0.98 respectively. For Openness to Life Experiences and Optimal Regulation, person separation estimates of 1.46 and 1.50 specified reasonable spread, discerning high and low ability/endorsement among the participants [34]. Moreover, good item spread existed (i.e., respective item separation scores of 5.77 and 6.91 occurred).

Differential item functioning assesses whether items differ in levels of endorsement/difficulty among subpopulations (e.g., age group, gender). All items demonstrated acceptable DIF contrasts

(i.e., below 0.5 logits: [24]) for Openness to Life Experiences (from 0.16 to 0.25) and Optimal Regulation (0.01 to 0.32).

Person-item maps (Figure 3) usefully communicate item difficulty. Items toward the bottom are the most straightforward, and participants located near these items were more likely to indicate endorsement. Items positioned near the top of the continuum are the most challenging, and participants close to these possess less inclination to endorse. Items 4 and 8 were the easiest to agree with for Openness to Life Experiences, whereas item 6 was the most difficult to endorse. Items 1 and 7 were the easiest for Optimal Regulation, and item 10 was the most challenging.



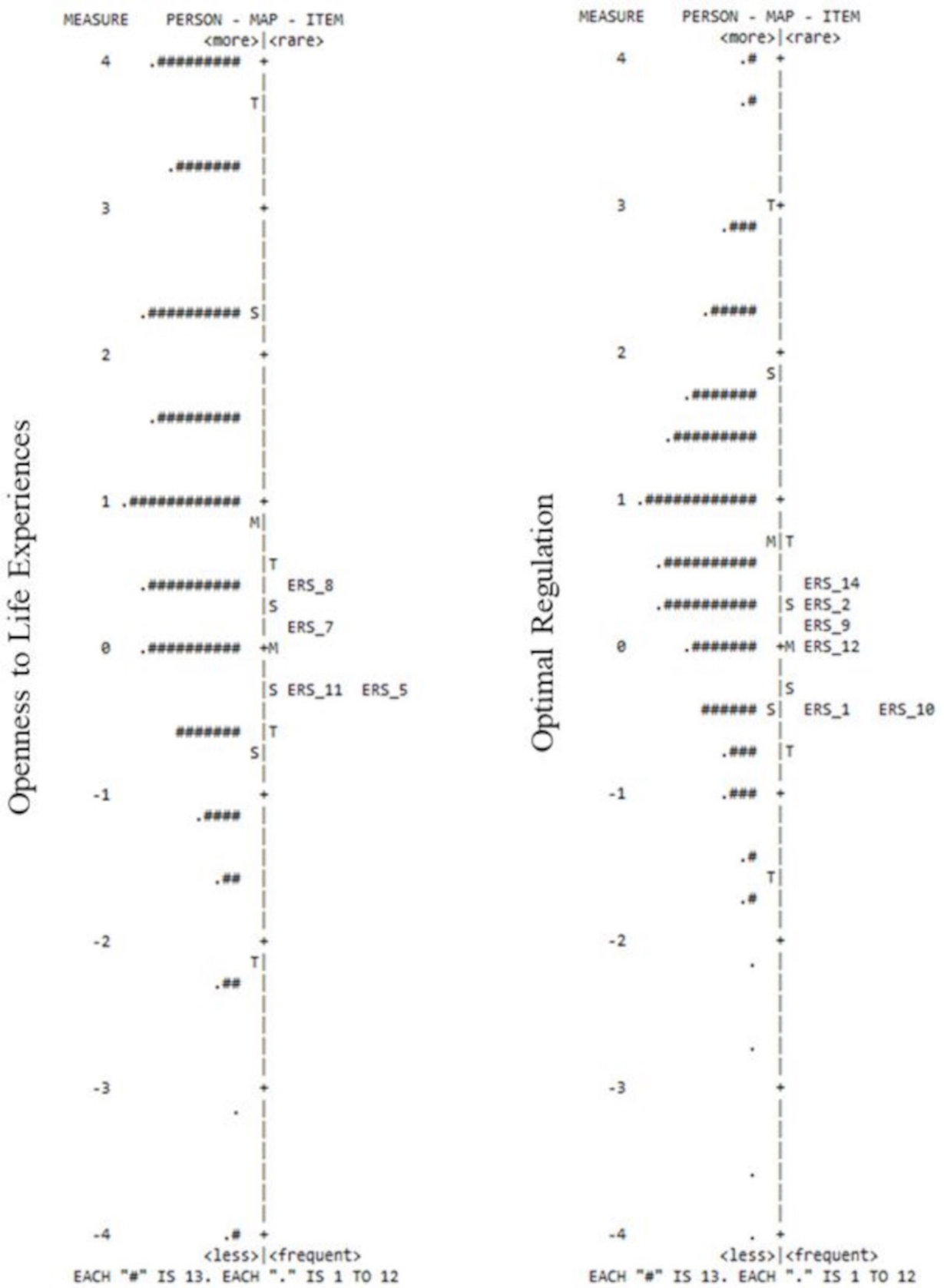


Figure 3 – Person-Item Maps of Openness to Experiences and Optimal Regulation.  
 Note. M=Mean persons' ability or mean items' difficulty; S=one standard deviation; T=two standard deviations

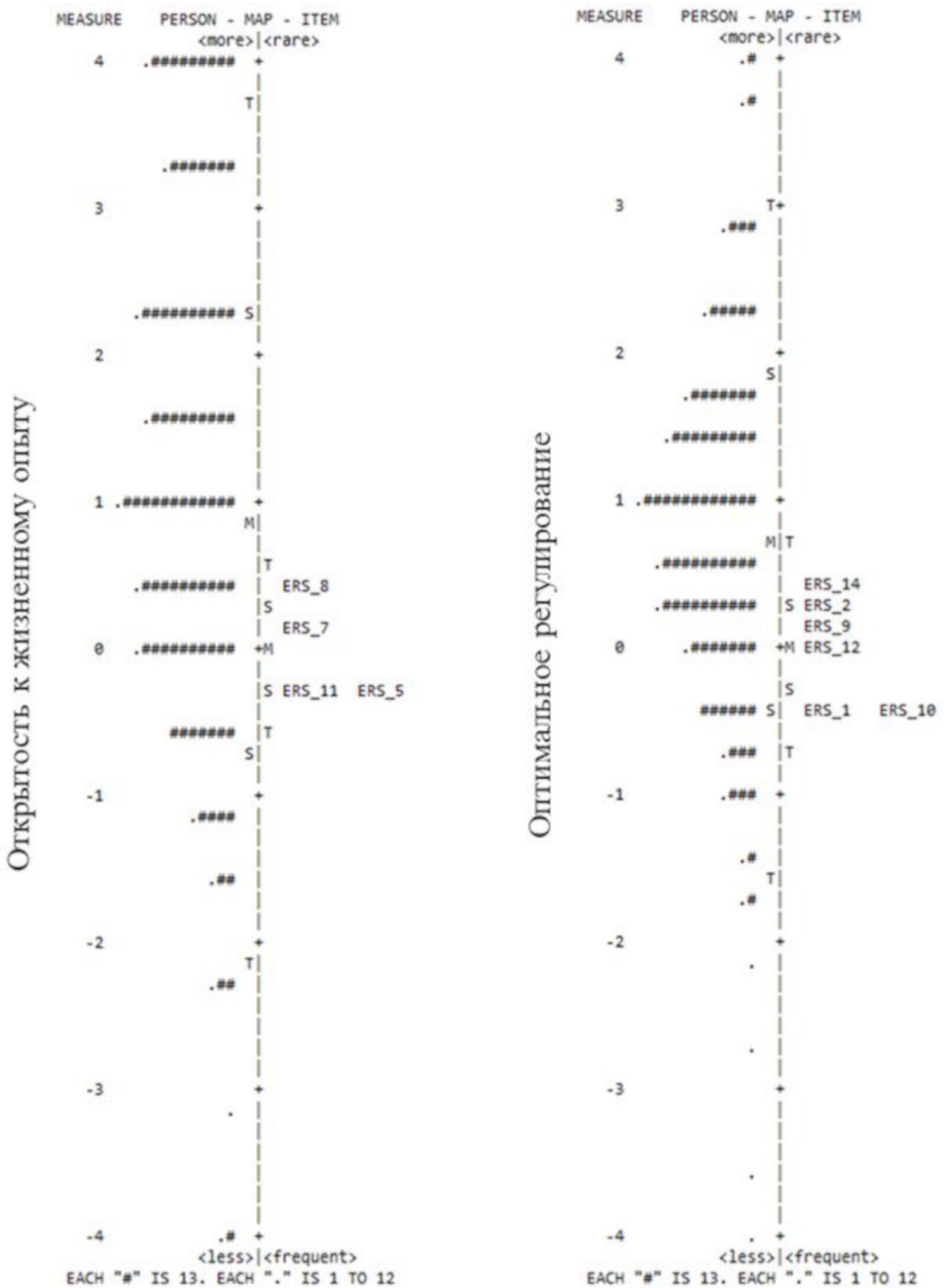


Figure 3a – Russian translation of a Person-Item Maps of Openness to Experiences and Optimal Regulation.  
 Note. M=Mean persons' ability or mean items' difficulty; S=one standard deviation; T=two standard deviations

### Discussion

CFA indicated that a higher-order model comprising Openness to Life Experiences and Optimal Regulation best fitted the Russian adaptation of the ER89-R. This concurred with studies using English, Spanish and Italian language versions (see [2]). Moreover, consistent with Alessandri et al. [3], a one-factor model was not appropriate. This contrasted with Block and Kremen's [7] initial conceptualisation of ego resiliency as unidimensional. Rasch analysis supported these findings. Additionally, the absence of misfitting items, which undermine sensitivity to the underlying construct, indicated that questions were effective for measurement.

DIF analysis revealed a lack of bias among items in relation to gender, indicating that neither sex appeared to score higher or lower on the ER89-R whilst controlling for the latent level of ego resiliency. PCA supported unidimensionality and specified satisfactory reliability. Consistent with the underlying theory of Alessandri et al. [3], Openness to Life Experiences and Optimal Regulation measured single, related constructs. The person-item maps showed that scale items were reasonably targeted, due to the mean difficulty occupying a similar position to mean endorsement [35]. However, mean item difficulty was slightly lower than mean endorsement across scales. This suggests that scale items were easy to endorse, and reflected minimal spread compared with the person distribution. This outcome may account for the person separation indexes of 1.46 and 1.50, which typically are affected by scale brevity [24]. Explicitly, include a short response range (1 to 4) and are concise (4 to 6 items). Though satisfactory person separation indexes existed, a greater value is important to facilitate greater classification of ability/level of endorsement among participants. This could be achieved by including additional items that effectively distinguish between low vs. high construct endorsement.

Overall, results suggested that the Russian version of the ER89-R possessed good psychometric properties. Accordingly, the measure is appropriate for assessing resilience in Russian-speaking populations. For example, alongside constructs

such as psychological wellbeing [40]. Moreover, the existence of a valid Russian ER89-R should facilitate investigation of ego-resiliency both within Russia and between Russia and other countries. This approach has usefully informed construct and measurement development in other domains related to personality/individual differences assessment (e.g., [32]).

### Limitations

The sample used for development of the Russian language version included a higher proportion of women compared with men (62% vs. 38%). However, this was commensurate with preceding studies. For instance, Chen, He, and Fen [11] used an equivalent sample size ( $n = 943$ ) to produce the Chinese Version of Ego-Resilience Scale (ER89-C) and reported a similar gender imbalance (female 61.3% vs. male 38.7%). These figures were also comparable with the Spanish ( $n = 452$ , female 58% vs. male 42%) and United States ( $n = 808$ , female 37% vs. male 63%) samples used in the Alessandri et al. [2] cross-cultural comparison of the ER89-R. In their study, only the Italian sample had a relatively more even gender split ( $n = 1020$ , females 55% vs. males 45%). These contrasts illustrate that the present study was equivalent with previous Ego-Resiliency Scale studies in terms of both sample size and gender representation.

These figures suggest that the gender imbalance in respondent numbers within this paper is unlikely to have influenced the outcomes. Thus, although females often report higher ER89-R scores (e.g., [3, 10]) it is unlikely that this resulted in overrepresentation of higher ego resiliency scores. Regardless, Rasch analysis ensured relatively sample-free measure standardisation [39]. Explicitly, ensured that there was less potential bias than is typically observed in procedures derived from the classical testing theory approach [39].

Subsequent studies could expand the current paper by comparing the psychometric performance of the Russian version of the ER89-R with other iterations of the Ego Resiliency Scale (e.g., ER89) and other language adaptations. This will ensure that the emergent measure is optimal for use with Russian samples. Currently, the present conclusions regarding

the translated ER89-R derive from consideration of only one version. Comparisons with other forms of the Ego Resiliency Scale are essential since they may suggest alternative latent structures or identify better performing items. It is also vital that subsequent research performs cross-cultural comparisons using the Russian adaption in tandem with other foreign language versions. This will ensure invariance across national groups. From this perspective, the authors note that the findings of this study should not be generalised beyond Russian speaking samples. To facilitate extrapolation investigators must replicate outcomes across cultural contexts and via comparison with other language forms.

### References

1. Abramova, I., Ananyina, A., & Shishmolina, E. (2013). Challenges in teaching Russian students to speak English. *American Journal of Educational Research*, 1(3), 99–103. <https://doi.org/10.12691/education-1-3-6>
2. Alessandri, G., Vecchione, M., Caprara, G., & Letzring, T. D. (2011). The ego resiliency scale revised. *European Journal of Psychological Assessment*, 28(2), 139–146. <https://doi.org/10.1027/1015-5759/a000102>
3. Alessandri, G., Vecchio, G., Steca, P., Caprara, M. G., & Caprara, G. V. (2007). A revised version of Kremen and Block's Ego-Resiliency Scale in an Italian sample. *Testing, Psychometrics, Methodology in Applied Psychology*, 14(3-4), 1–19.
4. Andrich, D. A. (1978). A rating formulation for ordered response categories. *Psychometrika*, 43(4), 561–573. <https://doi.org/10.1007/BF02293814>
5. Block, J. (2002). *Personality as an affect-processing system: Toward an integrative theory*. Psychology Press. <https://doi.org/10.4324/9781410602466>
6. Block, J. H., & Block, J. (1980). The role of ego-control and ego-resiliency in the organization of behavior. In W. A. Collins (Ed.), *Development of cognition, affect, and social relations: The Minnesota symposia on child psychology* (Vol. 13, pp. 39–101). Abingdon: CRC Press.
7. Block, J., & Kremen, A. M. (1996). IQ and ego-resiliency: conceptual and empirical connections and separateness. *Journal of Personality and Social Psychology*, 70(2), 349–361. <https://doi.org/10.1037/0022-3514.70.2.349>
8. Brislin, R. W. (1970). Back-translation for cross-cultural research. *Journal of Cross-Cultural Psychology*, 1(3), 185–216. <https://doi.org/10.1177/135910457000100301>
9. Browne, M.W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In K. A. Bollen & J. S. Long (Eds.), *Testing Structural Equation Models*, pp. 136–162. Newbury Park, CA: Sage.
10. Caprara, M., Steca, P., & De Leo, G. (2003). La misura dell'ego-resiliency [The measure of ego-resiliency]. *Ricerche di Psicologia*, 26(2), 7–23.
11. Chen, X., He, J., & Fan, X. (2020). Applicability of the Ego-Resilience Scale (ER89) in the Chinese Cultural Context: A Validation Study. *Journal of Psychoeducational Assessment*, 38(6), 675–691. <https://doi.org/10.1177/0734282919889242>
12. Denovan, A., Dagnall, N., Hill-Artamonova, E., & Musienko, T.V. (2021). Mental Toughness Questionnaire (MTQ18): A Russian version. *Strategy of the Future in National Security and Strategic Planning*, 2(35). <https://doi.org/10.37468/2307-1400-2021-3-47-59>.
13. Dept, S., Ferrari, A., & Halleux, B. (2017). Translation and cultural appropriateness of survey material in large-scale assessments. *Implementation of Large-Scale Education Assessments*, 168–192. <https://doi.org/10.1002/9781118762462.ch6>
14. Douglas, S. P., & Craig, C. S. (2007). Collaborative and iterative translation: An alternative approach to back translation. *Journal of International Marketing*, 15(1), 30–43. <https://doi.org/10.1509/jimk.15.1.030>
15. Farkas, D., & Orosz, G. (2015). Ego-resiliency reloaded: a three-component model of general resiliency. *PloS one*, 10(3), e0120883. <https://doi.org/10.1371/journal.pone.0120883>
16. Fredrickson, B. L., Tugade, M. M., Waugh, C. E., & Larkin, G. R. (2003). What good are positive emotions in crisis? A prospective study of resilience and emotions following the terrorist attacks on the United States on September 11th, 2001. *Journal of Personality and Social Psychology*, 84(2), 365–376. <https://doi.org/10.1037/0022-3514.84.2.365>

17. Gliner, J. A., Morgan, G. A., & Leech, N. L. (2016). *Research methods in applied settings: An integrated approach to design and analysis*. New York, NY: Routledge. <https://doi.org/10.4324/9781315723082>
18. Harkness, J. A., Villar, A., & Edwards, B. (2010). *Translation, adaptation, and design. Survey methods in multinational, multiregional, and multicultural contexts*, 115–140. <https://doi.org/10.1002/9780470609927.ch7>
19. Holland, P. W., & Wainer, H. (2012). *Differential item functioning*. Routledge. <https://doi.org/10.4324/9780203357811>
20. Hu, L., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, 6(1), 1–55. <https://doi.org/10.1080/10705519909540118>
21. Kees, J., Berry, C., Burton, S., & Sheehan, K. (2017). An analysis of data quality: Professional panels, student subject pools, and Amazon's Mechanical Turk. *Journal of Advertising*, 46(1), 141–155. <https://doi.org/10.1080/00913367.2016.1269304>
22. Kopf, J., Zeileis, A., & Strobl, C. (2015). Anchor selection strategies for DIF analysis: Review, assessment, and new approaches. *Educational and Psychological Measurement*, 75(1), 22–56. <https://doi.org/10.1177/0013164414529792>
23. Letzring, T. D., Block, J., & Funder, D. C. (2005). Ego-control and ego-resiliency: Generalization of self-report scales based on personality descriptions from acquaintances, clinicians, and the self. *Journal of Research in Personality*, 39(4), 395–422. <https://doi.org/10.1016/j.jrp.2004.06.003>
24. Linacre, J. M. (2012). *Dimensionality: Contrasts & variances*. Retrieved from <http://www.winsteps.com/winman/index.htm?principalcomponents.htm>.
25. Linacre, J. M. (2018). WINSTEPS (Version 3.81) [Computer Software]. Beaverton, OR: Winsteps.com.
26. Ludlow, L. H., Enterline, S. E., & Cochran-Smith, M. (2008). Learning to teach for social justice-beliefs scale: An application of Rasch measurement principles. *Measurement and Evaluation in Counseling and Development*, 40(4), 194–214. <https://doi.org/10.1080/07481756.2008.11909815>
27. Luthar, S. S., Cicchetti, D., & Becker, B. (2000). The construct of resilience: A critical evaluation and guidelines for future work. *Child Development*, 71(3), 543–562. <https://doi.org/10.1111/1467-8624.00164>
28. Magno, C. (2009). Demonstrating the difference between classical test theory and item response theory using derived test data. *The international Journal of Educational and Psychological Assessment*, 1(1), 1–11.
29. Maltby, J., Day, L., & Hall, S. (2015). Refining trait resilience: Identifying engineering, ecological, and adaptive facets from extant measures of resilience. *PloS one*, 10(7), e0131826. <https://doi.org/10.1371/journal.pone.0131826>
30. Menesini, E., & Fonzi, A. (2005). Strategie di coping e caratteristiche di resilienza in adolescenza [Coping strategies and resiliency characteristics during adolescence]. *Psicologia Clinica Dello Sviluppo*, 3, 437–456.
31. Mills, R. J., Young, C. A., Nicholas, R. S., Pallant, J. F., & Tennant, A. (2009). Rasch analysis of the Fatigue Severity Scale in multiple sclerosis. *Multiple Sclerosis Journal*, 15(1), 81–87. <https://doi.org/10.1177/1352458508096215>
32. Papageorgiou, K. A., Denovan, A., Dagnall, N., & Artamonova, E. (2021). A Cross-Cultural Investigation of the Five-Factor Narcissism Inventory Short Form: Narcissism as a Multidimensional Trait in the United Kingdom and Russia. *Journal of Personality Assessment*, 1–9. <https://doi.org/10.1080/00223891.2021.1929263>
33. Royal, K. D., & Elahi, F. (2011). Psychometric properties of the Death Anxiety Scale (DAS) among terminally ill cancer patients. *Journal of Psychosocial Oncology*, 29(4), 359–371. <https://doi.org/10.1080/07347332.2011.582639>
34. Souza, M. A. P., Coster, W. J., Mancini, M. C., Dutra, F. C. M. S., Kramer, J., & Sampaio, R. F. (2017). Rasch analysis of the participation scale (P-scale): usefulness of the P-scale to a rehabilitation services network. *BMC Public Health*, 17(1), 1–9. <https://doi.org/10.1186/s12889-017-4945-9>
35. Stelmack, J., Szlyk, J. P., Stelmack, T., Babcock-Parziale, J., Demers-Turco, P., Williams, R. T., & Massof, R. W. (2004). Use of Rasch person-item map in exploratory data analysis: a clinical perspective. *Journal of Rehabilitation Research & Development*, 41(2),

233–241. <https://doi.org/10.1682/jrrd.2004.02.0233>

36. Stevens, J. P. (2009). *Applied multivariate statistics for the social sciences* (5th ed.). New York, NY: Routledge.

37. Strobl, C., Kopf, J., & Zeileis, A. (2015). Rasch trees: A new method for detecting differential item functioning in the Rasch model. *Psychometrika*, 80(2), 289–316. <https://doi.org/10.1007/s11336-013-9388-3>

38. Tennant, A., Penta, M., Tesio, L., Grimby, G., Thonnard, J.L., Slade, A., Lawton, G., Simone, A., Carter, J., Lundgren-Nilsson, Å., & Tripolski, M. (2004). Assessing and adjusting for cross-cultural validity of impairment and activity limitation scales through differential item functioning within the framework of the Rasch model: The PRO-ESOR project. *Medical Care*, 42(1), I37–I48. <https://doi.org/10.1097/01.mlr.0000103529.63132.77>

39. Tinsley, H., & Dawis, R. V. (1975). An investigation of the Rasch simple logistic model: sample free item and test calibration. *Educational Psychological Measurement*, 35(2), 325–339. <https://doi.org/10.1177/02F001316447503500211>

40. Tugade, M. M., & Fredrickson, B. L. (2004). Resilient individuals use positive emotions to bounce back from negative emotional experiences. *Journal of Personality and Social Psychology*, 86(2), 320–333. <https://doi.org/10.1037/0022-3514.86.2.320>

41. Ushio, H., & Atsuko, O. (2013). Development and Validation of a Japanese Version of the Ego-Resiliency Scale (ER89). *Japanese Journal of Personality*, 22(1), 37–47. <https://doi.org/10.2132/personality.22.37>

42. Vecchione, M., Alessandri, G., Barbaranelli, C., & Gerbino, M. (2010). Stability and change of ego resiliency from late adolescence to young adulthood: A multiperspective study using the ER89–R Scale. *Journal of Personality Assessment*, 92(3), 212–221. <https://doi.org/10.1080/00223891003670166>

43. Westfall, P. H., & Henning, K. S. S. (2013). *Texts in statistical science: Understanding advanced statistical methods*. Boca Raton, FL: Taylor & Francis. <https://doi.org/10.1201/b14398>

44. Wolfe, E. W., & Smith, E. V. (2007). Understanding Rasch measurement: Instrument development tools and activities for measure validation using Rasch models: Part II—Validation activities. *Journal of Applied Measurement*, 8(2), 204–234.

45. Wright, B. D., & Linacre, J. M. (1989). Observations are always ordinal; measurements, however, must be interval. *Archives of Physical Medicine and Rehabilitation*, 70(12), 857–860.

46. Wright, B. D., & Linacre, J. M. (1994). Reasonable mean-square fit values. *Rasch Measurement Transactions*, 8(3), 370–371.

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