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Assessment and instruments in psychopathology

Italian Adaptation and evaluation of psychometric properties of the Relaxation Sensitivity Index

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SUMMARY

In this work, we present the adaptation of the Relaxation Sensitivity Index (RSI) in the Italian context and evaluate its psychometric properties. RSI was developed under the anxiety sensitivity framework as an instrument to assess individual sensitivity (and subsequent fear) to the sensations related to relaxation. To test the original three-dimensional factorial structure proposed by Luberto et al. (2021), we conducted a confirmatory factor analysis (CFA) on a sample of 485 participants. Results confirmed the factorial structure also in the Italian context, demonstrating good internal consistency and convergent validity. Both the index at the general level and its single dimensions were positively associated with distress-related constructs (i.e., anxiety, depression, negative affect, worry, and boredom intolerance) and negatively with life satisfaction. Furthermore, we confirmed measurement invariance across gender, demonstrating the scale's broad applicability. By adapting this index to the Italian context, this study provides a new and valuable instrument for research and clinical applications, facilitating professionals and researchers in accounting for relaxation-related fears. The Italian version of the RSI thus contributes to understanding the mechanisms underlying anxiety associated with relaxation.

Key words: relaxation sensitivity, anxiety, psychometric properties, confirmatory factor analysis, convergent validity

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Introduction

Relaxation techniques are commonly employed in today's society to reduce stress levels and help individuals cope with the pressures of their everyday lives [1]. However, literature has shown that while relaxation can reduce anxiety level (e.g., in the case of mindfulness-induced relaxation; [2], for certain people, being relaxed (in particular for chronically anxious individuals) can increase the level of anxiety [3]. This counterintuitive relation has been defined as relaxation-induced anxiety and investigated under the overarching theoretical framework of anxiety sensitivity – defined as the fear of arousal-related sensations when experiencing anxiety [4]. Theoretical and empirical work in this field has shown that the relaxation-induced anxiety taps into physical, cognitive, and social domains. In particular, it has been theorized (and shown) that individuals with high levels of relaxation-induced anxiety are particularly vigilant to the physical and sensory effects of relaxation [5], and often report physical suffering or fear of losing control when relaxing [6]. At the social level, this anxiety ap-

pears to stem from the fear of being perceived as slow and lazy in a fast-paced society [7].

Under this theoretical framework, Luberto and colleagues [7] focused not on the fear of the arousal-sensation typical of anxiety sensitivity, but on the fear of relaxation-related sensation – arising from the negative consequences of relaxing. In doing so, they developed a relaxation sensitivity index that measures this trait-like fear by taking into consideration three different dimensions derived from the anxiety-sensitivity framework: physical, cognitive, and social concerns.

Relaxation sensitivity and anxiety sensitivity are considered as distinct but complementary components of the fear of any deviation from normal functioning in people [7]. In fact, both constructs ultimately increase anxiety (that, in the case of anxiety sensitivity, may also culminate in panic attacks; 8), but in different domains. For example, an increased level of anxiety sensitivity may facilitate relaxation-induced anxiety. While clinical in nature, the authors showed that this scale functions both for healthy individuals and those suffering from anxiety [9]. Overall, the relaxation sensitivity index provides a reliable instrument for evaluating individuals' fear of the sensations associated with relaxation. In doing so, they also provided a powerful tool to understand the possible adverse outcomes of therapies based on relaxation, such as mindfulness therapy [7]. The introduction of this instrument paved the way for the development of interventions that take into account patients' specific fears on relaxation (i.e., physical, cognitive, and social) and the study of their possible influence on psychological and behavioral outcomes [7,9]. Furthermore, the scale proposed by the original authors appears to be robust in non-WEIRD countries as well. To this end, Zhang and colleagues [9] proved the psychometric validity of this index (although with some adjustments) in the Chinese context.

In this study, we aimed to adapt the Relaxation Sensitivity Index to the Italian context and evaluated its psychometric properties. In line with Luberto's work [7] and the Chinese adaptation [9], we tested a factor structure with three dimensions (i.e., Physical Concerns, Cognitive Concerns, Social Concerns). Thus, we first explored the normality assumptions of the scale to conduct a Confirmatory Factor Analysis. Then, we implemented measurement invariance analysis across gender and tested both the reliability and convergent validity to prove the robustness of the scale. Since the nature of the construct measured through this index is related to assessing a distress condition, we expected a positive correlation with different scales measuring different types of distress (i.e., negative affect, worry, anxiety, depression, boredom intolerance) and a negative correlation with scales measuring the level of satisfaction with life.

As outlined by Luberto and colleagues [7], the positive relations with distress-related variables can be explained by taking into consideration the dimensions of RSI. Specifically, due to the specific fears related to the cognitive dimension, we expect relaxation sensitivity to be related to anxiety-derived issues that comprise a cognitive component, such as worry. Furthermore, due to its relatedness to anxiety sensitivity [7], it seems logical to expect this construct to be related to variables that the literature suggests are tightly connected to anxiety. In fact, studies show that negative affect is a consequence of anxiety [10] and that the latter is a characteristic symptom of depression [11]

Participants

For this study, we utilized data previously published by Pellegrini et al. [12]. The authors granted permission to reutilize their data for this adaptation. All the data are available at the following link: https://doi.org/10.17605/OSF.IO/7F3J9. The R code used for this analysis is available at the following link:https://doi.org/10.17605/OSF.IO/8YM6V. The sample consisted of 485 participants (157 M, 328 F), with a mean age of 36.91 years (SD = 10.68), ranging from 18 to 76 years. The educational level was distributed as follows: 0.41% had a primary school diploma (ISCED-0), 4.54% had a middle school diploma (ISCED-2), 30.10% had a high school diploma (ISCED-3), 43.71% had a university degree (bachelor's or master's; ISCED-6/7), and 21.24% had a PhD or a post-graduate qualification (ISCED-8). Before conducting the confirmatory factor analysis, we conducted an a priori power analysis following Moshagen and Erdfelder's [13] guidelines, setting a minimum threshold for RMSEA of 0.05, an alpha of 0.05, and a power of 1-β = 0.90 for a model with 186 degree of freedom (calculated considering 21 items and 3 factors;). Results suggested a minimum required sample size of 140 participants, which is significantly lower than the total sample used for this study. Furthermore, we considered the rule of thumb provided by Kline [14] that suggests a sample size calculated considering 10 participants for each parameter. In our study, using this approach suggests a sample size of 45*10 = 450 participants.

Measures

Relaxation Sensitivity Index (RSI). The Italian Version of the RSI was adapted from the scale proposed by Luberto and colleagues [7]. To translate the scale into Italian, the authors who curated the dataset employed a back-translation approach, following the parallel back-translation procedure [15], where the scale was translated from English into Italian by two independent bilingual individuals. As for the original scale, the

Italian version presented 3 distinct factors (i.e., Social Concerns, Physical Concerns, and Cognitive Concerns). In line with the ISPOR/COSMIN recommendations [16,17], the translated items were then evaluated by an expert panel formed by 3 psychotherapists and 1 psychometrician. Participants were presented with a total of 21 statements and were then asked to indicate how each statement applied to them. The response scale ranged from 0 (Very Little) to 4 (Very Much). Higher scores indicate a greater relaxation sensitivity. The original items and their Italian translations are available in Supplementary Materials.

Negative Affect. The negative dimension of the Positive Affect Negative Affect Schedule (PANAS-NA) [18] was used to measure participants' subjective distress. The scale asked participants how frequently they felt negative emotions (e.g., shame) in the past week. The response scale comprises 5 possible responses ranging from 1 (Not at all) to 5 (Completely). Higher scores indicated a higher perceived distress in the past week (M = 1.86, SD = 0.76, α = 0.91, ω = 0.93)

Trait Anxiety (STAI-T) The STAI is a validated instrument, and adapted in Italian [19], to measure trait anxiety. It comprises a total of 20 items asking participants about their anxiety levels (e.g., "I am calm, quiet, and in charge of myself"). Participants were asked to report how often they felt in the way described in the item in a Likert-style scale ranging from 1 (Almost Never) to 4 (Almost Always). After reversing items 1, 3, 6, 7, 10, 13, 14, 16, and 19, an index of trait anxiety was created by averaging the responses to these items. Higher scores indicated higher trait anxiety (M = 2.19, SD = 0.53, α = 0.93, ω = 0.94)

Penn State Worry Questionnaire (PSWQ) The PSWQ [20] is used in psychological research to measure individuals' tendency to worry. It is composed of 16 self-report items asking participants about their likelihood of experiencing thoughts of worry (e.g., "Many situations make me worry"). Participants responded on a 5-point Likert scale ranging from 1 (Not at all typical of me) to 5 (Very typical of me). An index of worry was created by reversing items 1, 3, 8, 10, and 11 and averaging their scores with those of the remaining items. Higher scores indicated a higher level of worry (M = 2.90, SD = 0.78, α = 0.92, ω = 0.93).

Center for Epidemiologic Studies Depression Scale (CES-D). The Italian version of the CES-D [21] was used to measure participants' depressive mood. Participants responded to 20 questions about the frequency of depressive thoughts (e.g., "Have you felt depressed or 'down in the dumps' over the past week?") in the last week. The response scale ranged from 0 (Rarely) to 3 (Most of the day or every day). After reversing items 4, 8, 12, and 16, we created an index of Depressive mood by averaging the items' scores. Higher scores indicated a greater depressive mood (M = 0.86, SD = 0.57, α = 0.92, ω = 0.93)

Satisfaction with Life Scale (SWLS). SWLS [22] was used to assess participants' overall life satisfaction. It consists of a self-report scale with five items, using a 7-point Likert-style response scale that ranges from 1 (Completely Disagree) to 7 (Completely Agree). An example of an item recites: "My living conditions are excellent". An index of life satisfaction was created by averaging the responses to each item. Greater scores indicated a higher personal satisfaction with participants' own life (M = 4.27, SD = 1.19, α = 0.89, ω = 0.90)

Boredom Intolerance Scale (BIS). We adopted the Italian version of the BIS [12] to measure participants' levels of intolerance towards boredom. The scale comprises a total of 6 items (e.g., "I have little tolerance for boredom") with a response scale ranging from 1 ("Completely Disagree") to 5 ("Completely Agree"). An index of boredom intolerance was created by averaging the items' scores, with higher scores indicating greater boredom intolerance (M = 4.27, SD = 1.19, α = 0.89, ω = 0.90).

Analytical Approach

To confirm the factorial structure of the Italian version of the Relaxation Sensitivity Index, we conducted a Confirmatory Factor Analysis (CFA) using the R software [23] and the lavaan package [24]. The graphical representation of the scale was created using the semPlot package [25]. To evaluate the results of our analysis, we followed the guidelines reported by Marsh and colleagues [26], which, revisiting Hu and Bentler's [27] indications, suggest values of CFI > 0.950. TLI > 950, and RMSEA < 0.050 as excellent levels of fit, and CFI > 0.900, TLI > 0.900, and RMSEA < 0.080 as indicators of a good fit of the model. As a preliminary analysis, we explored the levels of Kurtosis and Skewness (using the package *psych*) [28] related to each item of the scale in order to investigate whether or not the data satisfy the requirements of normality for a CFA. As shown in the section on preliminary analyses, the items exhibited normality issues. Therefore, we adopted a robust estimator to estimate the model and avoid the issue of non-normality [29]. Furthermore, we tested the invariance of the scale across gender by conducting a set of hierarchical multigroup confirmatory factor analyses (MG-CFA). Following literature guidelines [30], we tested configural, metric, scalar, and strict invariance to investigate whether the scale was suitable for both men and women. Lastly, we tested the convergent validity of the scale by using similar measures employed by the original authors to assess this type of validity, which were available in the dataset. In particular, we examined the zero-order correlation, along with boot-

strapped confidence intervals, between the total score of the RSI (and its three dimensions) and levels of negative affect, anxiety, worry, depression, and boredom, expecting a positive correlation with the general score and each dimension. On the contrary, we expected a negative correlation with the scale measuring satisfaction with life.

Results

Preliminary analysis

As a preliminary analysis, we examined the levels of kurtosis and skewness for each item of the scale. Literature considers a threshold of for both values as a good indicator of normality [31]. Most of the items presented values above or below this threshold, both for kurtosis and skewness, suggesting a non-normal distribution of the data used (see Supplementary Materials). This may be due to the clinical nature of the scale: the measurement of this index in a non-clinical population may have influenced the scores. In fact, examining the mean and standard deviation for each item (see Supplementary Materials), we can observe that the mean scores are close to the minimum value, suggesting the possible presence of a floor effect in non-clinical samples. Due to the ordinal nature of the scale, we decided to use the WLSMV estimator.

Confirmatory factor analysis

The conducted confirmatory factor analysis on the three-factor solution proposed by the original authors [7] revealed a good factorial structure. Specifically, the model presented acceptable levels of Comparative Fit Index (CFI = 0.997), Tucker Lewis Index (TLI = 0.996), Root Mean Squared Error of Approximation (RMSEA = 0.017; 95% C.I. [0.010, 0.023]), and Standardized Root Mean Square Residual (SRMR = 0.045). Overall, the tested model confirmed the proposed structure, presenting significant standardized factor loadings ranging from 0.516 to 0.939 (Tab. I and Fig. 1). As shown in Table II, all zero-order associations between factors were positive and significant. As an additional analysis, we also performed a CFA considering a second-order factor consisting of the three dimensions described above. Results showed identical fit indexes to the previous three-factor solution (CFI = . 997; TLI = . 996, RMSEA = . 017, 95% C.I. [.010,. 023], SRMR = . 045) with the loading respectively 0.821 (Social Concerns), 0.993 (Physical Concerns), and 0.988 (Cognitive Concerns) onto the second-order factor. This paves the way for the use of the scale also to measure a general index of Relaxation Sensitivity, rather than focusing only on the single factors.

Internal Consistency validity

TABLE I. *Standardized Factor Loadings.*

Factor	Indicator	Factor Loading (β)	SE	z	p
Social Concerns	RSI_3	0.806	.057	11.80	< .001
	RSI_7	0.803	.055	12.90	< .001
	RSI_8	0.810	.050	12.07	< .001
	RSI_17	0.939	.049	12.77	< .001
Physical Concerns	RSI_1	0.642	.052	10.01	< .001
	RSI_6	0.702	.049	12.06	< .001
	RSI_9	0.516	.050	10.29	< .001
	RSI_11	0.794	.046	13.68	< .001
	RSI_13	0.645	.055	8.43	< .001
	RSI_14	0.826	.056	10.69	< .001
	RSI_15	0.729	.051	10.80	< .001
	RSI_16	0.747	.048	10.89	< .001
	RSI_18	0.769	.054	10.23	< .001
	RSI_19	0.769	.053	11.23	< .001
Cognitive Concerns	RSI_2	0.808	.049	12.66	< .001
	RSI_4	0.787	.058	10.93	< .001
	RSI_5	0.762	.053	11.85	< .001
	RSI_10	0.587	.050	10.83	< .001
	RSI_12	0.836	.050	12.32	< .001
	RSI_20	0.806	.053	11.21	< .001
	RSI_21	0.766	.054	12.12	< .001

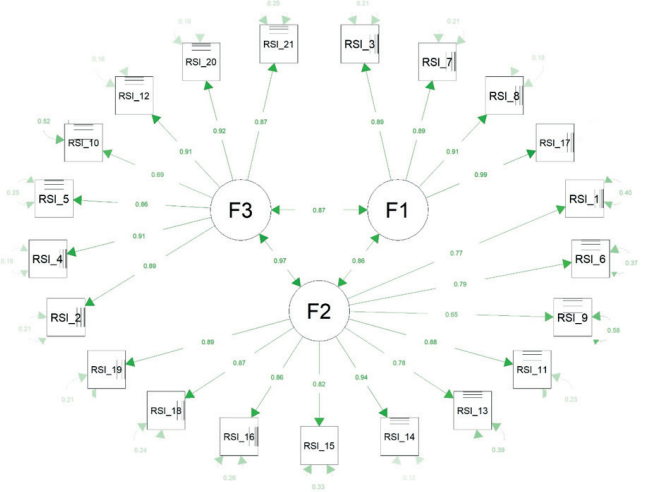

FIGURE 1. *Factorial Structure of the RSI-Italian version. Note. F1 = Physical Concerns, F2 = Cognitive Concerns, F3 = Social Concerns.*

TABLE II. *Means, standard deviations, and correlations with confidence intervals*

Variable	*M*	*SD*	1	2	3
1. Social Concerns	0.36	0.69			
2. Physical Concerns	0.39	0.60	.74**		
			[.69,. 78]		
3. Cognitive Concerns	0.39	0.64	.74**	.89**	
			[.69,. 77]	[.87,. 91]	
4. RSI General	0.39	0.59	.85**	.97**	.96**
			[.82,. 87]	[.96,. 97]	[.95,. 96]

Note. Values in square brackets indicate the 95% confidence interval for each correlation.). * indicates $p < .05$. ** indicates $p < .01$.

To test the internal consistency of the scale, both at the general level and for each dimension, we measured the Cronbach's alpha (α) and McDonald's Omega (ω). For the alpha, we calculated the confidence interval using a parallel approach [32], and for the omega, we adopted an "MLR" approach. Results showed optimal internal consistency for the overall index (α = 0.96, 95% C.I.[0.95, 0.97], ω = 0.96, 95% C.I. [0.95, 0.97]), the Social Concerns dimension (α = 0.90, 95% C.I.[0.89, 0.91], ω = 0.90, 95% C.I. [0.88, 0.92]), the Physical Concerns Dimension (α = 0.91, 95% C.I.[0.90, 0.92], ω = 0.91, 95% C.I. [0.89, 0.93]), and the Cognitive Concerns dimension (α = 0.91, 95% C.I.[0.89, 0.92], ω = 0.91, 95% C.I. [0.89, 0.93]). The average inter-item correlation ($r = 0.58$) resulted slightly above the threshold suggested by Piedmont [33], typically adopted to assert item diversity and rule out dimensionality issues.

Measurement invariance analysis

To test the solidity of the scale in the Italian context, we assessed the measurement invariance across gender in our sample. To do so, we ran a series of nested MG-CFA (Multigroup Confirmatory Factor Analysis), increasing the parameters constrained to be equal for each analysis, in order to test the configural (no parameters constrained), metric (factor loadings constrained), scalar (factor loadings and intercepts constrained), and strict scalar invariance (factor loadings, intercepts, and residuals constrained) following literature indications for invariance testing with ordinal data [34]. The invariance was assessed by computing the ΔCFI and ΔRMSEA when comparing the models. We decided not to consider the $\Delta\chi^2$ with the Satorra-Bentler adjustment [29] for model comparison due to its sensitivity to sample size [34]. Following Chen [35], we considered the models to be invariant if, when compared, they presented a ΔCFI < 0.01 and ΔRMSEA < 0.015.

As shown in Table III, the result emerged from the analysis supports the strict scalar invariance ((429) = 463.90, p = 0.118; CFI = 0.995; TLI = 0.995; RMSEA = 0.020 [90% CI = 0.000; 0.033]), suggesting that our adaptation of the Relaxation Sensitivity Index to the Italian context functions in the same way for both men and women. All standardized factor loadings were significant for

TABLE III. *Measurement Invariance Across Gender – Model Comparison*

	χ^2 (df)	χ^2/df	p	CFI	RMSEA (90% C.I.)	Model Comparison	Δdf	ΔCFI	ΔRMSEA
Model 1 Configural	406.40 (372)	1.092	.106	.997	.015 (.000,. 015)				
Model 2 Metric	422.15 (390)	1.082	.126	.996	.020 (.000,. 033)	2 vs. 1	18	-.002	.005
Model 3 Scalar	442.06 (408)	1.083	.118	.995	.020 (.000,. 033)	3 vs. 2	18	.000	.000
Model 4 Scalar Strict	463.90 (429)	1.081	.118	.995	.020 (.000,. 033)	4 vs. 3	21	.000	.000

both men and women, ranging from 0.563 to 0.962 for men and from 0.464 to 0.948 for women.

Convergent validity

To test the convergent validity of the scale, we explored the correlations between the total score of the RSI, each of the factors, and the aforementioned scales. As anticipated, in line with previous work [7,9], the general score and each factor correlated positively with the scales measuring negative affects and emotional states and negatively with the scale used to measure positive affect (Tab. IV). In particular, we found significant positive correlations of the general level of relaxation sensitivity with the negative dimension of the PANAS (r = 0.486, p < . 001, 95% C.I. [0.414, 0.486]), the trait anxiety (r = 0.427, p < . 001, 95% C.I. [0.351, 0.497]), the level of worry (r = 0.352, p < . 001, 95% C.I. [0.271, 0.428]), the depressive mood (r = 0.487, p < . 001, 95% C.I. [0.416, 0.552]), and the boredom intolerance (r = 0.216, p < . 001, 95% C.I. [0.126, 0.299]). Conversely, and still in line with our expectations, the RSI correlated negatively with the overall satisfaction with life (r = -0.258, p < . 001, 95% C.I. [-0.340, -0.173]). The correlations with each dimension of the scale followed the same direction and were all significant (Tab. IV).

Discussion

This study aimed to adapt and validate the Relaxation Sensitivity Index in the Italian context. Analyses showed measurement invariance, internal consistency of the scale and its dimensions, and the convergent validity, thus proving the solidity and the reliability of the Italian version of this scale. In particular, the result emerged from our analysis supported the three-factor solution proposed by the original authors, underlying how the relaxation sensitivity taps into three different domains: physical, cognitive, and social. The convergent validity results, in line with Luberto's work [7], demonstrated the relationship between this index and distress-related variables, suggesting that relaxation sensitivity may play a central role in further understanding individuals' cognitive and emotional challenges. The validation of the scale provides a new and comprehensive instrument for conducting research in both clinical and general populations. In fact, as noted by Luberto [7], adopting such an instrument may help Italian researchers and psychologists to implement new relaxation-based therapies and

TABLE IV. *Convergent Validity – Correlations between Variables*

Variable	*M*	*SD*	RSI	Social Concerns	Physical Concerns	Cognitive Concerns
PANAS-NA	1.86	0.76	.49** [.41,. 55]	.40** [.32,. 47]	.45** [.38,. 52]	.49** [.42,. 56]
STAI	2.19	0.53	.43** [.35,. 50]	.37** [.29,. 45]	.38** [.30,. 46]	.44** [.36,. 51]
PSWQ	2.90	0.78	.35** [.27,. 43]	.29** [.20,. 37]	.32** [.24,. 40]	.36** [.28,. 44]
CES-D	0.86	0.57	.49** [.42,. 55]	.43** [.36,. 50]	.45** [.38,. 52]	.49** [.41,. 55]
SWLS	4.27	1.19	-.26** [-.34, -.17]	-.24** [-.32, -.16]	-.23** [-.32, -.15]	-.25** [-.33, -.17]
BIS	3.10	0.82	.22** [.13,. 30]	.17** [.08,. 26]	.21** [.12,. 29]	.20** [.12,. 29]

*Note. PANAS-NA: Negative Affect Dimension of PANAS, STAI: State-Trait Anxiety Inventory, PSWQ: Penn State Worry Questionnaire, CES-D: Center for Epidemiological Studies – Depression scale, SWLS: Satisfaction With Life Scale, BIS: Boredom Intolerance Scale; M and SD are used to represent mean and standard deviation, respectively. Values in square brackets indicate the 95% confidence interval for each correlation. The confidence interval is a plausible range of population correlations that could have caused the sample correlation (Cumming, 2014). * indicates p < . 05. ** indicates p < . 01.*

interventions that take into account people's possible fear of the sensations felt when relaxing. Furthermore, this scale will help to understand how such a type of fear/anxiety may play a role in different life domains. For example, the social dimension of this index may be related to people's self-evaluation and esteem [7], which are central in various central life outcomes (e.g., Relationship Satisfaction, Job Satisfaction; see 36 for a review). More broadly, the study of relaxation sensitivity can be considered alongside the study of anxiety sensitivity, which, as aforementioned, is a closely related construct. Anxiety sensitivity has been shown to be related to different anxiety disorders (e.g., social anxiety, generalized anxiety, PTSD) [37, 38, 39]. Integrating an index that can measure a closely related construct, such as the relaxation sensitivity index, may help future research to better understand how this fear may play a role, together with anxiety sensitivity, in the mechanisms that foster these disorders.

By providing such an instrument in the Italian context, this study offers researchers a new tool that enables them to investigate anxiety-related issues within the Italian context, with a focus on the specific component of relaxation-induced fear. From a more practical standpoint, this study offers a specific instrument to clinical practitioners to assess this particular kind of sensitivity. This will be of utmost interest to create interventions targeting individuals who find themselves distressed by classical relaxation-based therapies, which are being adopted more and more in Italy [40]. This instrument may also be useful in the field of neurobiology, particularly in enhancing our understanding of the relationship between the glymphatic system and psychiatric disorders. In fact, recent studies have shown how individuals who present a dysfunction in this system are subject to various psychiatric disorders, among which depression and sleep-related disorders stand out [41,42]. The integration of RSI in this study will be useful to better understand the psycho-physiological consequences of such dysfunction, providing an instrument to measure a variable that can be both an antecedent (in fact, sleep deprivation is a cause of an altered functioning of the glymphatic system) [41,42] and a consequence of this dysfunction.

This study is not without limitations. First, the sample considered does not include a clinical population, which prevents us from inferring the psychometric validity of the Italian version in a clinical sample. Future research may try to validate the factorial structure, also considering a sample composed of individuals suffering from anxiety-related difficulties, in order to investigate the validity of this index in such a sample. On the same note, when evaluating the normality assumption of the scale, we found that the data were not normally distributed, as indicated by skewness and kurtosis values exceeding the suggested thresholds [31]. As previously discussed, we addressed this issue by employing a more robust estimator in our model estimation. Future research, particularly using a clinical sample, may help overcome this limitation. Lastly, another limitation is posed by the high level of correlation between the three dimensions of the index and by the high inter-item correlation. Although not central, this issue suggests that, even if concerning different domains of anxiety, these dimensions may be closely related to each other and converge into a unique factor, indicating that the general dimension of the index may be the most suitable for evaluating relaxation sensitivity.

Overall, in this research, we were able to confirm the factorial structure proposed by Luberto and colleagues [7] – and subsequently by Zhang et al. [9] – also in the Italian context, widening the actual pool of instruments available to Italian researchers to measure different sources of anxiety for people, specifically in the framework of relaxation-based anxiety.

Conflicts of interest statement

The authors declare no conflicts of interest.

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Authors contribution

Conceptualization: MB, VP, AG. Data Curation: VP, AG, EL, SI, MS. Formal Analysis: MB, VP. Methodology: MB, VP. Project Administration: VP. Supervision: VP, AG. Writing – Original Draft: MB. Writing – Review & Editing: MB, VP, AG.

Ethical consideration

All procedures performed in studies involving human participants were conducted in accordance with the ethical standards of the institutional and national research committee and the 1964 Declaration of Helsinki and its later amendments or comparable ethical standards. The article does not refer to any studies with animals performed by any of the authors.

The data utilized for this Study were already published by Pellegrini et al. (2025). The Study performed in the research of the authors received ethical approval from the ethics committee of the Associazione Scuola di Psicoterapia Cognitiva (APC), Viale Castro Pretorio, 116, 00185, Rome, Italy, with the following protocol number: N. Pr. 07/24.

Consent for publication

The manuscript has been seen and reviewed by all authors, and all authors agree to the submission of the manuscript in its current form.

Availability of data and material

Original data for this study are available on Open Science Framework at the following link: https://doi.org/10.17605/OSF.IO/7F3J9

The materials conducted for the Study are available at the following link: https://osf.io/8ym6v/?view_only = 76b1965f54df4525b385ff070a3114f7

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Supplementary material

TABLE I. *Original Items and Translated Items of the RSI*

Item	English Version	Italian Version
1	It scares me when I feel tension release in my muscles.	Mi spaventa sentire i miei muscoli rilassarsi
2	When I try to relax my body, I feel like I'm losing control.	Quando provo a rilassare il mio corpo, mi sembra di perdere il controllo
3	I fear that if my body is relaxed, I won't be socially appealing	Temo che se mi rilasso gli altri mi accettano meno
4	I don't like to relax because it makes me feel out of contact with others.	Non mi piace rilassarmi perché mi fa sentire scollegato dagli altri
5	It scares me when I am relaxing and begin to feel like I am losing a sense of time	Mi spaventa rilassarmi e perdere il senso del tempo trascorso
6	When my body feels as if it has been slowed down, I worry that there might be something terribly wrong with me.	Quando il mio corpo si sente rallentato, mi preoccupo che ci sia qualcosa di terribilmente sbagliato in me
7	I worry that when I let my body relax, I will look unattractive	Temo di risultare non attraente se permetto al mio corpo di rilassarsi
8	I worry that when I let my body relax, I will look silly.	Temo che se lasciassi il mio corpo rilassarsi, risulterei ridicolo/a
9	I don't like activities like meditation because of the way they make my body feel.	Non mi piacciono le attività come la meditazione per come fanno sentire il mio corpo
10	Focusing on the present moment rather than the future or the past makes me feel anxious.	Se mi concentro sul presente, piuttosto che sul futuro o sul passato, mi sento ansioso
11	It scares me when my breathing becomes deeper.	Mi spaventa quando il mio respiro diventa più profondo
12	I don't like to relax because it makes me feel out of control.	Non mi piace rilassarmi perché mi fa sentire fuori controllo
13	I hate getting massages because of the feeling it creates when my muscles relax.	Odio ricevere massaggi, perché non sopporto sentire i miei muscoli rilassarsi
14	It scares me when I am relaxing, and I feel like I'm floating.	Mi spaventa quando mi rilasso e ho la sensazione di galleggiare
15	It scares me when my limbs feel heavy.	Mi spaventa quando le mie membra si sentono pesanti
16	It frightens me when I'm relaxing and noises seem louder, muffled, or further away than they previously were.	Mi spaventa quando mi rilasso e i rumori sembrano più forti, smorzati o più lontani di quanto non fossero in precedenza
17	I worry that when I let my body relax, people will make fun of me.	Se lasciassi rilassare il mio corpo, temo che verrei presa/o in giro dagli altri
18	While I'm relaxing and images become fuzzy, I worry that something is wrong with me.	Mentre mi rilasso e le immagini diventano sfocate, mi preoccupo che qualcosa non vada in me
19	It frightens me to focus on my breathing.	Mi spaventa concentrarmi sul mio respiro
20	I'm scared of doing relaxing activities because they make me feel vulnerable	Mi spaventa fare esercizi di rilassamento perché mi fanno sentire vulnerabile
21	I don't like to relax because I don't like when my thoughts slow down	Non mi piace rilassarmi perché non mi piace quando i miei pensieri rallentano

TABLE II. *Items mean, standard deviations, kurtosis and skewness.*

Item	Mean	SD	Skewness	Kurtosis
RSI 1	0.36	0.83	2.36	5.13
RSI 2	0.35	0.77	2.32	4.81
RSI 3	0.39	0.83	2.36	5.31
RSI 4	0.33	0.79	2.70	7.07
RSI 5	0.42	0.84	2.14	4.12
RSI 6	0.44	0.85	2.11	4.16
RSI 7	0.46	0.89	2.14	4.25
RSI 8	0.34	0.75	2.37	5.24
RSI 9	0.64	0.99	1.49	1.47
RSI 10	0.64	0.93	1.51	1.80
RSI 11	0.40	0.79	2.23	4.97
RSI 12	0.33	0.74	2.37	5.21
RSI 13	0.29	0.73	2.81	7.84
RSI 14	0.28	0.74	3.05	9.71
RSI 15	0.41	0.76	2.11	4.58
RSI 16	0.33	0.72	2.60	7.27
RSI 17	0.27	0.66	2.63	6.71
RSI 18	0.32	0.73	2.66	7.30
RSI 19	0.36	0.78	2.41	7.30
RSI 20	0.31	0.74	2.63	6.79
RSI 21	0.39	0.85	2.35	5.08