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Article

Psychometric Properties of the Spanish Version of the Traumatic Grief Inventory Self Report Plus (TGI-SR+)

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ABSTRACT

Background: The grieving process caused by the loss of a loved one triggers a range of responses. While most people experience adaptive grief, some may experience intense distress and persistent symptoms. Prolonged Grief Disorder is commonly diagnosed using the ICD-11 and the DSM-5-TR. Few instruments assess criteria from both simultaneously, underscoring the importance of the Traumatic Grief Inventory Self-Report Plus (TGI-SR+). This study aimed to analyse the psychometric properties of the scores from the Spanish version of the TGI-SR+. **Method:** Data were analysed from 229 participants who were bereaved between March 2020 and March 2022. The Spanish TGI-SR+ was used alongside measures of psychopathology and prolonged grief. We performed confirmatory factor analysis, reliability tests, bivariate correlations and group comparisons. **Results:** Confirmatory factor analysis of the TGI-SR+ demonstrated a one-factor structure with high reliability (ϖ = .99). Convergent validity was shown by correlations with anxiety, depression, post-traumatic stress and prolonged grief (p < .001). Differences by sex and educational level were observed. Optimal screening cut-off points were identified for the total sample and for those meeting the criteria for prolonged grief. **Conclusions:** The Spanish version of the TGI-SR+ is a valuable instrument for assessing prolonged grief in Spanish-speaking populations.

Palabras clave:
Trastorno de duelo prolongado
Validación
DSM-5-TR
CIE-11
Evaluación

Propiedades Psicométricas de la Versión en Castellano del Traumatic Grief Inventory Self Report Plus (TGI-SR+)

RESUMEN

Antecedentes: Perder a un ser querido provoca una serie de reacciones dentro del proceso de duelo. Aunque la mayoría de individuos experimentan duelos adaptativos, algunos pueden sufrir un intenso malestar emocional persistente. El Trastorno de Duelo Prolongado se diagnostica utilizando criterios de la CIE-11 y el DSM-5-TR. Las herramientas que evalúan ambos criterios simultáneamente son limitadas, lo que incrementa la relevancia del Inventario de Duelo Traumático Autoinforme Plus (TGI-SR+). El objetivo de este estudio fue analizar las propiedades psicométricas de las puntuaciones de la versión en castellano del TGI-SR+. **Método:** Se analizaron datos de 229 dolientes. Se utilizó el TGI-SR+. medidas de psicopatología y duelo prolongado. **Resultados:** Los análisis factoriales mostraron un buen ajuste para el modelo unifactorial del TGI-SR+ y alta consistencia interna (ϖ = .99). La validez convergente fue apoyada por correlaciones significativas con ansiedad, depresión, estrés postraumático y duelo prolongado (p < .001). Se observaron diferencias en función del sexo y nivel educativo. Se identificaron puntos de corte óptimos para el cribado en la muestra total y en aquellos con criterios de duelo prolongado. **Conclusiones:** La versión en castellano de la TGI-SR+ es una prueba útil para la evaluación del duelo prolongado para poblaciones de habla hispana.

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The grieving process caused by the loss of a loved one triggers a range of emotional, behavioural and cognitive responses. Although most grief is considered adaptive, a percentage of people may develop Prolonged Grief Disorder (PGD), which can manifest as intense and protracted symptoms of longing, sadness, anger or guilt. PGD is estimated to affect around 10% of people grieving natural deaths (Lundorff et al., 2017), rising to nearly 50% for traumatic deaths (Djelantik et al., 2020). PGD is also influenced by factors such as sex (Fernández-Alcántara & Zech, 2017; Lundorff et al., 2020), educational level (Heeke et al., 2017; Lundorff et al., 2017; Wilson et al., 2022) and time elapsed since the loss (Boelen et al., 2019; Matthews et al., 2019). Previous theoretical models have defined the concept of PGD as complicated or traumatic grief. In the Dual Process Model of Coping with Bereavement (Stroebe & Schut, 2010), difficulties in oscillating between loss-oriented and restoration-oriented stressors are associated with more intense grief responses that can cause significant impairment in everyday functioning.

Two sets of diagnostic criteria are currently used to assess PGD. Both share the conceptualisation of PGD as severe and persistent feelings of yearning and cognitive preoccupation with the deceased, although they differ in the number and nature of additional grief symptoms (Stroebe et al., 2024). Firstly, the ICD-11 characterises PGD by the presence of two core symptoms (longing for or intense preoccupation with the deceased) and symptoms involving emotional distress that persist for at least six months (Killikelly & Maercker, 2017). Secondly, the DSM-5-TR approach to PGD distinguishes between symptoms associated with separation distress and other emotional problems lasting at least one year. Although tools are available to assess each diagnosis independently (the International Prolonged Grief Disorder Scale - IPGDS: Killikelly et al. (2020) for the ICD-11 and the Prolonged Grief-13-Revised - PG13-R: Prigerson et al. (2021) for the DSM-5-TR), to date only a few assessment instruments assess both criteria simultaneously. Although the two sets of criteria are more similar than in previous editions, e.g. the original DSM-5, differences remain (Eisma et al., 2022). This can produce different diagnostic conclusions and prevalence rates depending on the criteria used, highlighting the need for instruments that can assess both simultaneously. Although questionnaires which do so have recently been published (O'Connor et al., 2023), the Traumatic Grief Inventory Self-Report Plus (TGI-SR+) has the strongest evidence base to date. The psychometric properties of its scores have been tested in several language adaptations.

Boelen and Smid (2017) developed the first version of this instrument, known as the Traumatic Grief Inventory Self-Report (TGI-SR), comprising 18 items designed to capture the full range of symptoms associated with prolonged grief as outlined in the ICD-11 and DSM-5. Previous studies have shown that the instrument's scores have adequate psychometric properties both in their original form and in adaptations to other languages, such as Turkish (Baş et al., 2022), German (Comtesse & Rosner, 2017) and French (Cherblanc et al., 2023). To reflect the modifications to the DSM-5-TR, Lenferink et al. (2022) added four items to the instrument and renamed it the TGI-SR+. This iteration of the scale contains 22 items and has been adapted in Dutch, German (Lenferink et al., 2022), Swedish (Lenferink et al., 2024), French (Kokou-Kpolou et al., 2022) and Persian (Ashouri & Yousefi, 2023) samples. For the overall score of the TGISR+, studies using confirmatory factor analysis (CFA) suggest a one-factor structure for the scale scores (Lenferink et al., 2022, 2024), whereas studies using exploratory approaches indicate a possible two-factor solution for the overall scale (Ashouri & Yousefi, 2023; Kokou-Kpolou et al., 2022). Nevertheless, all previous adaptations have yielded one-dimensional structures for the ICD and DSM subscales of the TGI-SR+ (Ashouri & Yousefi, 2023; Kokou-Kpolou et al., 2022; Lenferink et al., 2022; 2024).

The TGI-SR+ has several advantages over other instruments assessing PGD: it enables comparison of both existing diagnostic criteria, is openly accessible in multiple languages (see https://osf.io/rqn5k/), has been repeatedly validated as an instrument with good psychometric properties, and versions for use in interviews and with children and adolescents are available (Van Dijk et al., 2023). Finally, this tool is of particular interest here, given the lack of validated instruments for assessing grief processes in the Spanish context that incorporate the latest changes in the DSM-5-TR (Estevan et al., 2019).

The aim of this study was therefore to analyse the psychometric properties of the scores (factor structure, reliability and validity) of the Spanish version of the TGI-SR+. Our hypotheses for the TGI-SR+ were that: (a) it will show a one-factor structure for both the overall score and the DSM-5-TR and ICD-11 subscales, although the two-factor model will also exhibit adequate fit indices; (b) reliability values for both the overall score and the DSM-5-TR and ICD-11 subscales will be adequate; (c) scores will correlate positively with symptoms of anxiety, depression, post-traumatic stress disorder and prolonged grief; (d) cut-off point values will be similar to those found in previous research using the TGI-SR+ and (e) there will be differences based on sex, educational level, type of loss and time since the loss.

Method

Participants

The sample was drawn from a larger longitudinal study examining profiles of grief intensity in the context of the pandemic and associated psychopathological variables. We used convenience and snowball sampling. Inclusion criteria were: a) being over 18 years old and b) having been bereaved between March 2020 and March 2022. Exclusion criteria were: a) non-Spanish nationality and b) failure to complete the instruments required for this protocol. We collected data from 229 participants (see Table 1), including 168 women (73.4%). Ages ranged from 18 to 76 years (M = 34.1, SD = 15.3). The sample was 94.8% Caucasian, with the remaining 5.2% representing other ethnicities. The age range of the deceased was 0-99 years (M = 70.1, SD = 20.9). The time since the death ranged from one to 28 months (M = 12.8, SD = 7.4). The power analysis yielded a value of .95, calculated using the model parameters as proposed by MacCallum et al. (1996), with the overall model fit as indicated by the RMSEA index. This analysis was performed using online software developed by Preacher and Coffman (2006) with an estimated lower bound RMSEA of .087, an upper bound of .104, degrees of freedom (df) of 209 and a sample size of 229.

Table 1
Sample Sociodemographic Characteristics (n = 229)

Variables	*n* (%)
Sex	
Men	61 (26.6%)
Women	168 (73.4%)
Civil status	
Single	112 (48.9)
With a partner	117 (51.1)
Educational level	
Primary or secondary education	51 (22.3%)
Higher education (University)	178 (77.7%)
Income level	
No income	65 (28.4%)
> €12,000	96 (41.9%)
€12,000 - €30,000	51 (22.3%)
€30,000+	37 (16.2%)
Treatment	
None	172 (75.1%)
Individual treatment	41 (17.9%)
Group treatment	26 (11.4%)
Pharmacological treatment	24 (10.5%)
Relationship to the deceased	
Son/daughter	13 (5.6%)
Partner/spouse	1 (0.4%)
Father/mother	75 (32.8%)
Brother/sister	10 (4.4%)
Grandfather/grandmother	87 (38%)
Other	43 (18.8%)
Sex of the deceased	
Men	120 (52.4%)
Women	109 (47.6%)
Cause of death	
Sudden death	132 (57.6%)
Natural death	97 (42.4%)

Instruments

Traumatic Grief Inventory Self Report Plus (TGI-SR+)

This instrument, developed by Lenferink et al. (2022) and comprising 22 items, is an update of the TGI-SR developed by Boelen and Smid (2017). Four items were added to the original version to assess the new diagnostic criteria for complicated grief in both the DSM-5-TR and ICD-11. Different language versions of the instrument are available in Open Access. Participants indicate on a Likert-type scale from 1 to 5 (1 = *never* and 5 = *always*) the extent to which they experienced each of the grief responses described in relation to the death of their loved one in the previous month. Lenferink et al. (2022) provided evidence of reliability ($\omega > .90$) and convergent validity for the original instrument by establishing associations between disturbed grief symptoms and levels of post-traumatic stress and depression.

We identified probable cases of PGD using the available diagnostic criteria, as per the guidelines of Lenferink et al. (2022). Given the absence of an alternative gold standard instrument for assessing PGD based on current diagnostic criteria, the authors used scores from different items of the TGI-SR+ to categorise participants as PGD or non-PGD. In the case of the DSM-5-TR, participants had to score high (≥ 4 according to the criteria of Boelen and Smid (2017) and Lenferink et al. (2022)) on the two Criterion B items of the TGI-SR+ related to separation distress (items 1 and 3), at least three of the eight Criterion C symptoms corresponding to grief symptoms (items 2, 6, 8, 9, 10, 11, 18, 19 and 21) and the Criterion D item related to functional impairment (item 13). As items 2 and 8 cover the same symptom in the DSM-5-TR, but are two different items, we included both. In the case of ICD-11, we used both a more liberal and a more conservative set of criteria, consistent with the original article and subsequent adaptations (Lenferink et al., 2022, 2024). In the first scenario (Liberal Criteria), Criterion B (items 1 and 3) must be fulfilled, as well as at least one of the ten Criterion C symptoms (items 2, 5, 8, 9, 10, 16, 19, 20, 21 and 22) and Criterion D on functional impairment (item 13). In the more conservative scenario, at least five of the ten Criterion C symptoms must be met.

Symptom Check List-90 – Depression and Anxiety Subscales (SCL-90-R) (Derogatis, 1975)

This comprises 90 items describing various symptoms associated with a broad spectrum of psychopathology in clinical or healthy populations. It consists of nine subscales assessing: Somatisation (SOM), Obsessive-Compulsiveness (O-C), Interpersonal Sensitivity (I-S), Depression (DEP), Anxiety (ANX), Hostility (HOS), Phobic Anxiety (PHOB), Paranoia (PAR) and Psychoticism (PSY). The Likert-type format has five response options ranging from *not at all* to *very much*. Derogatis and González (2002) conducted the Spanish adaptation. Our study used only the depression and anxiety subscales. The scores of this instrument show convergent validity with high correlations between the symptomatic dimensions and the subscales of the MMPI, the Beck Depression Inventory and the State-Trait Anxiety Inventory (Derogatis & González, 2002), with reliability indices ranging from α =.81 to .90. Cronbach's alpha in the present sample was $\alpha = .94$ for depression and $\alpha = .91$ for anxiety.

Prolonged Grief Disorder-13 (PG-13) (Prigerson et al., 2009)

This instrument detects prolonged grief in people bereaved for a period of six months or more. It comprises 13 items grouped into five criteria associated with a diagnosis of PGD: 1) having been bereaved (1 item), (2) separation distress (2 items), (3) a duration of over six months, (4) the presence of cognitive, emotional or behavioural symptoms and (5) functional impairment. Criteria 1, 3 and 5 are assessed by a dichotomous (yes/no) response, whereas Criteria 2 and 4 use a Likert-type scale with five response options indicating the frequency of symptoms. Estevan et al. (2019) conducted the Spanish adaptation and showed that the items had adequate reliability (α = .91) and convergent validity through correlations of the PG-13 with variables such as depression, anxiety, grief symptoms and perceived social support. In the current sample, Cronbach's alpha was $\alpha = .94$.

Impact of Event Scale-Revised (IES-R: Weiss & Berger, 2006).

This instrument, adapted into Spanish by Báguena et al. (2001), measures subjective distress associated with stressful or traumatic

experiences. The revised version of the scale contains 22 items divided into three subscales: symptoms of intrusion, hyperactivity and avoidance. Each item is rated on a Likert scale from 0 to 4. The adaptation yielded a reliability value of α = .95. Evidence of convergent validity was obtained between the overall score and the number of stressful life events, neuroticism, extraversion-introversion and physical symptoms (Báguena et al., 2001). We calculated an overall score to obtain a measure of post-traumatic stress symptoms. Cronbach's alpha for the overall score in the current sample was α = .95.

Procedure

This research forms part of the CO-GRIEF project (Ref: PID2020-119063RB-I00). We collected data through various channels: the project website (https://co-grief.com/), telephone calls to different associations dealing with the pandemic or with grief, email and social networks (Instagram and Twitter), and dissemination of the study by the Universities of Granada and Alicante.

Participants completed a set of online questionnaires (Elosua et al., 2023) concerning various aspects of their grieving process. The whole exercise took about 45 minutes. We collected the data electronically using the *E-Encuestas* online survey platform. At the start of the assessment, participants received information about the study and provided consent for their data to be collected via the platform. The process excluded responses from non-Spanish nationals or those whose responses to either instrument was incomplete. All data were treated confidentially in accordance with the procedures set out in the Data Protection Act. The study received approval from the University of Granada's Human Research Ethics Committee (2328/CEIH/2021).

Data Analysis

Firstly, we analysed the performance of the scale items. To this end, we examined the mean, standard deviation, skewness, kurtosis, discrimination index and item-total correlation coefficient of the items. Skewness and kurtosis values between -2 and 2 were taken as an assumption of normality of the items (Bandalos & Finney, 2010). For the discrimination index we identified the top and bottom 27% of test scores. The item-total correlation was calculated using the point-biserial correlation. Discrimination index and coefficient results above .29 are considered adequate (Reynolds et al., 2021).

Secondly, we determined the internal structure of the TGI-SR+ through confirmatory factor analyses using robust weighted least squares (WLSMV) estimation, a robust estimator for categorical variables and different sample sizes (Bovaird & Koziol, 2012; Flora & Curran, 2004). We examined the comparative fit index (CFI), the Tucker-Lewis index (TLI), the root mean square error of approximation (RMSEA) and the standardised root mean residual (SRMR). Values greater than .90 were considered adequate for the CFI and TLI statistics (Hu & Bentler, 1999). For the RMSEA index, values between .05 and .08 indicated an adequate fit (Green & Yang, 2009). For the SRMR, values < .08 indicated an adequate fit for samples exceeding 100 cases (Cho et al., 2020). This index is considered more accurate than RMSEA in identifying models that do not fit in samples of 200 cases or less (Shi et al., 2020). For the overall scale, we tested the fit of the one-factor model (including all 22 items). We also tested one-factor models for items including both the DSM-5-TR and ICD-11 criteria. Based on previous validation studies, in both cases we excluded item 13, assessing functional impairment, from the structure as it was not used to calculate the overall score for each of the factors. After the confirmatory factor analysis, four measurement invariance levels were considered: configural invariance (factor loadings or number of factors), metric invariance (item factor loadings), scalar invariance (item thresholds for categorical responses) and strict invariance. A ΔCFI of .01 or less and a ΔRMSEA of .015 or less between a more restricted model and the preceding model are indicative of invariance (Chen, 2007).

Thirdly, we examined internal consistency using a non-linear reliability estimator (coefficient omega for categorical variables) based on Structural Equation Modelling (SEM; Green & Yang, 2009; Yang & Green, 2015) as suggested for ordinal data and one-dimensional models (Viladrich et al., 2017). We performed analyses for the overall instrument score and for the DSM-5-TR and ICD-11 subscales. The alpha value is also calculated with a 95% CI.

Fourthly, to examine criterion validity, we plotted receiver operating characteristic (ROC) curves and calculated the corresponding area under the curve (AUC). We calculated the Youden index to determine the optimal cut-off point for both the overall score and the DSM-5-TR and ICD-11 subscales.

Finally, we used bivariate correlations and group comparison tests. The Kolmogorov-Smirnov normality test showed that most of the variables were not normally distributed. We therefore used Spearman's *rho* for correlations and the Mann-Whitney *U* test for between-group comparisons. Cohen's *d* serves as the effect size. The significance level used was $p < .05$. Data analysis was performed using SPSS v26.0 (IBM, 2019) and the R program (R Core Team, 2022).

Results

Cross-Cultural Adaptation of the TGI-SR+ Into Spanish (Spain)

For the translation, cultural adaptation and linguistic validation of this instrument, we followed a common protocol based on the translation-back translation method. This approach is in line with internationally recognised scientific guidelines (Muñiz et al., 2013) and complies with the checklist of criteria required by the International Test Commission guidelines for test adaptation (Hernández et al., 2020). Two linguists, bilingual translators whose native language was Spanish, translated the English version of the scale into Spanish. Once the two translations were complete, we obtained the consensus translation and made a series of morphosyntactic and lexical-semantic changes, without losing the original meaning, to adapt it to the Spanish (Spain) context. The morphosyntactic changes included adjustments to the verb tenses to better suit the temporal structure of the sentence in Spanish, with the simple past tense being replaced by the present perfect tense in almost all items. The subjunctive mood was also introduced in the second part of the sentence in two items (items 19 and 21). In addition, we included the masculine and feminine gender forms for nouns and adjectives (items 8, 10, 12, 16 and 18). We also made lexical-semantic modifications to items 2, 4, 8, 13 and 20 without altering the original meaning. A bilingual translator, fluent in Spanish and a native English speaker, unfamiliar with the original version of the scale, then back-translated the original Spanish consensus

version into English. Finally, the researchers and translators held a consensus meeting to compare the back-translated version with the English version and agree on a preliminary Spanish version. In terms of comprehension, the items were of moderate-low difficulty.

Item Analysis

The mean, standard deviation, asymmetry, kurtosis and discrimination index were calculated for each item of the TGI-SR+ (see Table 2). Asymmetry and kurtosis values were adequate for all items. All items had a discrimination index greater than .39, except item 15 with a discrimination index of .28. However, item 15 showed adequate performance on item-total correlation.

Internal Structure of the TGI-SR+

We tested a one-factor model including all items from the TGI-SR+ (as all items count towards the instrument's overall score). According to the CFA results, the data fit the proposed one-factor model (χ^2= 642.175; df = 209; p < .001; CFI = 0.970; TLI = 0.967; RMSEA = .095 [90%CI = .087- 0.104]; SRMR= .068) (Table 3). Most of the factor loadings were between .721 and .928, except for items 15 and 20, which had lower factor loadings of λ = .500 and λ = .628, respectively (Table 4).

We took a similar approach to the DSM-5-TR diagnostic criteria (see Table 3), initially testing a one-factor model comprising 11 items (excluding item 13 on functional impairment) and including items 2 and 8 (which assess the same symptom), yielding the following fit indices (χ^2 = 186.525; df = 44; p < .001; CFI = 0.979; TLI = 0.974; RMSEA = 0.119 [90%CI = 0.102- 0.137]; SRMR = .058). Finally, in relation to the ICD-11 criteria, we also assessed the fit of a 12-item one-factor model (excluding item 13), yielding the following fit indices (χ^2 = 194.218; df = 54; p < .001; CFI = 0.980; TLI = 0.975; RMSEA = 0.107 [90%CI = .091- 0.123]; SRMR= .055).

An invariance analysis for the sex, educational level and cause of death variables was performed (see Table 5). Throughout the analysis, the ΔRMSEA never increased more than .015, whereas the ΔCFI remained below .01 for all steps. These results confirm the configural, metric, scalar and strict invariance of the model.

Table 2
Descriptive Statistics and Discrimination Index of Each Scale Item of the TGI-SR+

Items	Mean	*SD*	Asymmetry	Kurtosis	Discrimination Index	Item-total Correlation
1	2.66	1.32	0.16	-1.15	.64	.74
2	2.74	1.39	0.19	-1.21	.72	.79
3	4.05	1.05	-0.93	0.20	.43	.55
4	2.50	1.47	0.45	-1.25	.68	.74
5	2.91	1.47	0.13	-1.39	.79	.81
6	2.31	1.52	0.66	-1.12	.67	.67
7	2.15	1.34	0.78	-0.72	.57	.64
8	2.40	1.41	0.53	-1.06	.74	.82
9	2.35	1.48	0.65	-1.05	.78	.84
10	2.69	1.44	0.25	-1.27	.76	.82
11	2.23	1.44	0.82	-0.75	.75	.85
12	2.55	1.47	0.39	-1.27	.80	.83
13	2.30	1.54	0.69	-1.12	.78	.81
14	2.51	1.44	0.42	-1.19	.71	.73
15	1.65	1.13	1.75	2.03	.28	.42
16	2.08	1.33	0.93	-0.44	.61	.71
17	1.65	1.26	1.73	1.61	.51	.71
18	2.48	1.45	0.44	-1.25	.71	.76
19	2.87	1.54	0.15	-1.47	.76	.70
20	1.75	1.23	1.50	.96	.42	.52
21	2.61	1.54	0.36	-1.36	.78	.78
22	2.30	1.37	0.70	-0.75	.67	.81

Table 3
Fit Indices From the CFA (N = 229)

Models	X^2 (df)	*p*	CFI	TLI	RMSEA (90% CI)	SRMR
TGI-SR+ Overall Score						
1-factor	642.175 (209)	<.001	.970	.967	.095 (.087- .104)	.068
DSM-5-TR						
1-factor	186.525 (44)	< .001	.979	.974	.119 (.102-.137)	.058
ICD-11						
1-factor	194.218 (54)	< .001	.980	.975	.107 (.091-.123)	.055

Note. CFI = Comparative Fit Index; TLI = Tucker-Lewis Index; RMSEA = Root Mean Square Error of Approximation; SRMR = Standardised root mean square residual.

Table 4
Standardised Factor Loadings for the One-Factor Models

Items	Factor loading overall score	(SE)	Factor loading DSM-5-TR	(SE)	Factor loading ICD-11	(SE)
1	.800	.026	.780	.028	.789	.028
2	.846	.022	.858	.022	.854	.022
3	.693	.037	.724	.035	.729	.035
4	.809	.027				
5	.881	.017			.898	.016
6	.721	.038	.710	.041		
7	.742	.035				
8	.865	.021	.867	.022	.869	.022
9	.919	.014	.911	.016	.904	.017
10	.881	.017	.873	.019	.876	.018
11	.928	.014	.927	.016		
12	.891	.016				
13	.885	.020				
14	.777	.028				
15	.500	.064				
16	.777	.033			.724	.041
17	.879	.028				
18	.852	.021	.825	.025		
19	.795	.028	.787	.030	.827	.025
20	.628	.054			.626	.056
21	.864	.022	.885	.020	.858	.023
22	.873	.019			.864	.021

Table 5
Configural, Metric, Scalar and Strict Invariance by Sex, Educational Level and Cause of Death

	Invariance	Chi square	df	RMSEA	TLI	CFI
Sex	Configural	720.4345	418	0.06190	0.9867	0.9880
	Metric	566.9004	439	0.06233	0.9865	0.9872
	Scalar	588.7559	460	0.06150	0.9869	0.9869
	Strict	609.1257	482	0.06166	0.9868	0.9862
Educational level	Configural	640.1299	418	0.06081	0.9884	0.9895
	Metric	573.0395	439	0.06471	0.9868	0.9875
	Scalar	597.0536	460	0.06416	0.9871	0.9871
	Strict	623.7167	482	0.06578	0.9864	0.9858
Cause of death	Configural	668.7592	418	0.05850	0.9898	0.9908
	Metric	590.4411	439	0.06606	0.9870	0.9876
	Scalar	614.2165	460	0.06517	0.9873	0.9874
	Strict	630.3586	482	0.06406	0.9878	0.9872

Note. df: degree of freedom; RMSEA: Root Mean Squared Error of Approximation; TLI: Tucker-Lewis Index; CFI: Comparative Fit Index.

Reliability

TGI-SR+ scores showed high internal consistency for the overall scale (ω = .99 and α = .96 [CI90 = .96-.97], for the DSM-5-TR (ω = .97 and α = .96 [CI95= .93 -.95]) and for the ICD-11 subscale (ω = .97 and α = .94 [CI95 = .92-.95]), based on the CFA model.

Evidence of Validity

We calculated cut-off points for the different sets of criteria for the complete sample of participants (N = 229) and for the subsample bereaved at least 12 months prior to assessment (N = 122), thus meeting the temporal criteria of both the DSM-5-TR and the ICD-11. The ROC curves revealed adequate AUC values (p < .001) in all cases. Table 6 shows the values that yielded the highest Youden index for each of the different sets of diagnostic criteria.

Finally, Pearson bivariate correlations showed positive and high correlations (p < .001 in all cases) between the overall TGI-SR+ score (and between the DSM-5-TR and ICD-11 subscales) and levels of anxiety, depression, symptoms of post-traumatic stress disorder and prolonged grief (see Table 7).

In terms of sociodemographic variables, we observed differences by sex, with women scoring higher (Overall: U = 2829.5, p < .001, d

Table 6
Comparison of Different Cut-Off Points for the Total Sample and for Those Whose Loss Occurred at Least 12 Months Previously

Score	Total sample (N = 229)					Subsample: Loss 12 or more months ago (n = 122)				
	Cut-off point	AUC (95% CI)	Sensitivity	1-Specificity	Youden Index	Cut-off point	AUC (95% CI)	Sensitivity	1-Specificity	Youden Index
Overall TGI-SR+										
DSM-5-TR	65	.973 (.955-.991)	.963	.091	.872	71	.987 (.971-1)	.963	.042	.921
ICD-11 Liberal	61	.968 (.949- .988)	.966	.129	.837	60	.985 (.968-1)	.964	.085	.879
ICD-11 Conservative	69	.984 (.972-.996)	.979	.088	.891	40	.991 (.979-1)	1	.081	.919
Overall DSM-5-TR	36	.966 (.945-.986)	.963	.114	.849	36	.981 (.960-1)	.963	.063	.900
Overall ICD-11										
Liberal	37	.955 (.931-.978)	.898	.135	.763	40	.974 (.952-.997)	.893	.064	.829
Conservative	39	.984 (.972-.996)	1	.099	.901	40	.991 (.79-1)	1	.081	.919

Table 7
Correlations Between the TGI-SR+ and Scores for Anxiety, Depression, Post-Traumatic Stress Symptoms and Symptoms of Prolonged Grief

	ANX	DEP	IES-R	PG-13
TGI-SR+	.68	.74	.89	.90
TGI-SR+ DSM 5 TR	.65	.70	.89	.91
TGI-SR+ ICD 11	.65	.71	.89	.90

Note. All correlations were statistically significant at $p < .001$. ANX = Anxiety subscale (SCL-90-R), DEP = Depression subscale (SCL-90-R), IES-R = Impact of Event Scale-Revised, PG-13 = Prolonged Grief 13.

= 0.75; DSM-5-TR: $U = 2832$, $p < .001$, $d = 0.79$; ICD-11: $U = 2972$, $p < .001$, $d = 0.76$). University-educated participants scored lower on the TGI-SR+ than those with a primary or secondary education (Overall: $U = 3294.5$, $p = .003$, $d = 0.47$; DSM-5-TR: $U = 3399.5$, $p = .005$, $d = 0.42$; ICD-11: $U = 3389$, $p = .006$, $d = 0.44$). However, no differences were found by cause of death (natural vs. sudden) (Overall: $U = 5768.5$, $p = .201$, $d = 0.21$; DSM-5-TR: $U = 5689.5$, $p = .150$, $d = 0.21$; ICD-11: $U = 5631$, $p = .119$, $d = 0.23$). We found a negative correlation between participant age and TGI-SR+ scores for both the overall score (*rho* = -.18, $p = .007$), DSM-5-TR (*rho* = -.16, $p = .018$) and ICD-11 (*rho* = -.16, $p = .018$). The same was true for the age of the deceased (*rho* = -.41, $p < .001$, for both the overall score and the two diagnostic criteria). Finally, we found no statistically significant associations with respect to the time elapsed since the death for the overall scale (*rho* = -.09, $p = .148$) or for the DSM-5-TR (*rho* = -.09, $p = .154$) or ICD-11 (*rho* = -.08, $p = .216$).

Discussion

This study aimed to analyse the psychometric properties of the scores of the Spanish version of the TGI-SR+. The results suggest that a one-factor structure is appropriate for both the overall scale and the DSM-5-TR and ICD-11 subscales. The internal consistency values of these models are also adequate. Analysis of the ROC curves reveals a number of indicative cut-off points for the classification and identification of people experiencing prolonged grief. Finally, after analysing the invariance for the sex, educational level and cause of death variables, we found statistically significant relationships with prolonged grief, levels of anxiety, depression and symptoms of post-traumatic stress.

Firstly, our results are consistent with previous adaptations of the TGI-SR+, which have found one-dimensional models to have adequate fit indices. In the study by Lenferink et al. (2022), the one-factor model was theoretically chosen as the most parsimonious option for both the overall scale and the DSM-5-TR and ICD-11 subscales. The French and Persian adaptations of the TGI-SR+, employing exploratory approaches, identified a two-factor structure for the overall score. However, the grouping of items was inconsistent between the studies (Ashouri & Yousefi, 2023; Kokou-Kpolou et al., 2022).

Secondly, internal consistency values were high for both the overall scale and the two sets of diagnostic criteria. This is also consistent with the findings of the original paper on the development of the instrument and the existing adaptations (Ashouri & Yousefi, 2023; Kokou-Kpolou et al., 2022; Lenferink et al., 2024). Reliability values exceeded .90, indicating that some items may measure similar grief symptoms or even be redundant (Streiner, 2003). However, given that the TGI-SR+ is intended to be a screening tool to assist clinicians in the detection of PGD, the instrument should have higher internal consistency values and low random error (Nunnally, 1978). Further research is needed to develop a shorter version of the scale that retains its psychometric properties.

Thirdly, the results regarding the cut-off points analysed for the different models, although slightly different, are quite similar to those found in the original version (Lenferink et al., 2022) and the Swedish adaptation (Lenferink et al., 2024). These cut-off points should be taken as a guide, as they changed significantly in cases such as the strict version of ICD-11 when considering the subsample of participants who had been bereaved 12 months or more previously.

Finally, in terms of validity evidence, the TGI-SR+ showed statistically significant and positive associations with other measures of psychopathology, including anxiety, depression, symptoms of post-traumatic stress and prolonged grief, consistent with previous research (Ashouri & Yousefi, 2023; Kokou-Kpolou et al., 2022; Lenferink et al., 2024). In terms of sociodemographic variables, we found lower scores among participants with higher educational attainment, in line with previous studies using the TGI-SR+ (Ashouri & Yousefi, 2023; Kokou-Kpolou et al., 2022; Lenferink et al., 2024). The effect of educational level on PGD has also been identified in previous reviews, highlighting the impact of education in facilitating the emotional well-being of bereaved people through better reappraisal strategies and the pursuit of goals (Heeke et al., 2017). As with the Persian adaptation, women in the current sample scored higher on the TGI-SR+. However, this contrasts with the original studies and the French adaptation, where no sex-based differences were observed (Kokou-Kpolou et al., 2022; Lenferink et al., 2022, 2024). As several studies suggest a higher intensity

of grief processes in women (Fernández-Alcántara & Zech, 2017; Lundorff et al., 2020), together with the different samples used in the psychometric studies of the TGI-SR+, further research is warranted to test the extent to which the instrument discriminates on the basis of sex. This study found no differences by cause of death or the amount of time since the deceased's passing. As regards cause of death, the distribution of participants may provide a possible explanation, as there was limited variability in kinship and an attempt was made to mirror the groupings seen in earlier research using the TGI-SR+ (Kokou-Kpolou et al., 2022). In terms of time elapsed since the death, recent research during the pandemic has typically found non-statistically significant or very low correlations between grief intensity and time elapsed (Breen et al., 2021; Breen, Lee et al., 2022; Breen, Mancini et al., 2022; Lee & Neimeyer; 2022).

This study has a number of limitations. Firstly, reliability was only calculated using internal consistency, suggesting the need for future research to establish reliability using other methods such as test-retest. Secondly, we recruited participants online, introducing the possibility of selection bias. Also, a significant proportion of the sample were women and completed the assessment less than a year after the loss. Therefore, the cut-off points identified, although statistically adequate, need to be replicated in studies with larger sample sizes and greater variability. Furthermore, given the lack of a gold standard instrument, items from the TGI-SR+ are used to establish the diagnostic criteria, in line with previous studies (Lenferink et al., 2022, 2024). The use of self-report measures may introduce some bias and future studies using other measures are needed to address this issue. Although this is one of the first adaptations of the TGI-SR+ to present invariance analysis, the results should be treated with caution. Some of the groups in the analysis consisted of fewer than 100 participants, so future studies with larger sample sizes are required to test the invariance of the Spanish version of the TGI-SR+. Finally, the TGI-SR+ should be considered as a screening instrument for assessing probable cases of PGD. Clinical interviews and clinical judgement are required to establish a consistent diagnosis of PGD, although the use of self-report measures can greatly assist this process (Stroebe et al., 2024).

The TGI-SR+ is one of the few instruments currently available that allows the simultaneous assessment of criteria for PGD from both the ICD-11 and DSM-5-TR. One of its advantages in practice is that clinicians can screen for PGD in both diagnostic classifications in a simple and straightforward manner. The cut-off points also allow clinicians to easily identify individuals at risk of PGD.

In conclusion, the Spanish adaptation of the TGI-SR+ has scores indicating adequate psychometric properties, characterised by a one-factor structure with good fit indices, adequate reliability and evidence of validity. For the use of the instrument, a preliminary set of cut-off points is also provided.

Author Contributions

Manuel Fernández-Alcántara: Conceptualisation, Project Administration, Funding Acquisition, Software, Investigation, Formal Analysis, Writing – Original Draft, Visualisation, **Andrea Redondo-Armenteros:** Funding Acquisition, Investigation, Data Curation, Writing – Review and Editing, Visualisation, **María Nieves Pérez-Marfil:** Conceptualisation, Funding Acquisition, Project Administration, Methodology, Investigation, Supervision of the Analysis, Writing – Review and Editing, **María José Cabañero-Martínez:** Formal Analysis, Methodology, Writing – Review and Editing, **Nereida Congost-Maestre:** Methodology, Writing – Review and Editing, **Francisco Cruz-Quintana:** Conceptualisation, Project Administration, Investigation, Methodology, Supervision of the Analysis, Writing – Review and Editing.

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Declaration of Interests

The authors declare that there are no conflicts of interest.

Data Availability

Due to the use of sociodemographic and clinical data that could identify the participants in this study, the research data are not available online, in accordance with the principles of data protection. Research data may be available from the corresponding author upon request.

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