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RESEARCH ARTICLE

Psychometric Evaluation of the Traumatic Grief Inventory-Self Report Plus (TGI-SR+) in Chinese Bereaved People

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Keywords: assessment | Chinese | DSM-5-TR | ICD-11 | prolonged grief | screening

ABSTRACT

Objective: The Traumatic Grief Inventory-Self Report Plus (TGI-SR+) measures the most recent prolonged grief disorder (PGD) symptom sets defined in the 11th edition of the International Statistical of Diseases and Related Health Problems (ICD-11) and the text revision of the fifth edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5-TR). However, the TGI-SR+ has not yet been translated and validated in Chinese. This study aims to evaluate the psychometric properties of the Chinese translation of the TGI-SR+.

Methods: We examined the Chinese TGI-SR+'s factor structure, internal consistency, convergent validity, discriminant validity, known-groups validity, and optimal clinical cut-off scores in 443 Chinese bereaved adults.

Results: Confirmatory factor analyses showed that the two-factor models showed the best fit for the Chinese TGI-SR+ items assessing ICD-11 and DSM-5-TR prolonged grief symptoms. Items assessing ICD-11 and DSM-5-TR prolonged grief symptoms demonstrated good internal consistency. Associations of TGI-SR+ scores with symptom levels of prolonged grief (assessed by the International Prolonged Grief Disorder Scale), posttraumatic stress, anxiety, and depression supported convergent and discriminant validity. Associations with background/loss-related variables provided evidence for known-groups validity. Cut-off points for probable ICD-11 PGD (liberal scoring rule), probable ICD-11 PGD (conservative scoring rule), and probable DSM-5-TR PGD were ≥ 67 , ≥ 75 , and ≥ 68 , respectively.

Discussion: The Chinese TGI-SR+ appears to be a reliable and valid measure to assess prolonged grief symptoms per ICD-11 and DSM-5-TR among Chinese bereaved adults.

Summary

- The TGI-SR+ assesses ICD-11 and DSM-5-TR prolonged grief severity.
- The Chinese TGI-SR+ is a reliable and valid tool for Chinese bereaved adults.
- The Chinese TGI-SR+ is a useful screening tool for prolonged grief in research and practice.

1 | Introduction

Bereavement is one of the most painful life events that people can experience and may precipitate a range of physical and mental health problems. Compared with nonbereaved individuals, bereaved individuals experience more physical health problems and illnesses, more psychological distress, are more likely to seek medical care, and are at higher risk of suicide and death (Stroebe, Schut, and Stroebe 2007). Although the majority of bereaved individuals do not experience elevated psychological distress levels (Nielsen et al. 2019; Pociunaite et al. 2023), 3%–10% develop severe, persistent, and disabling grief, termed prolonged grief (Lundorff et al. 2017; Rosner et al. 2021).

In 2018, the ICD-11 included a diagnosis characterized by such grief responses, named prolonged grief disorder (PGD) (World Health Organization 2018). PGD is a persistent and pervasive grief response characterized by a persistent longing for, and/or preoccupation with, the deceased (i.e., separation distress). ICD-11 PGD includes 10 accompanying symptoms assumed indicative of emotional pain (e.g., sadness, guilt, blame, anger, denial, difficulty accepting the death, feeling that they have lost part of themselves, and the inability to experience positive emotions). ICD-11 PGD may apply when a severe grief response persists beyond 6 months of loss, which clearly exceeds social, cultural, or religious norms and significantly impairs functioning in private and family life, and other important areas.

Recently, PGD was also added to DSM-5-TR (American Psychiatric Association 2022). The diagnostic criteria set of DSM-5-TR PGD contains two separation distress symptoms (e.g., longing for, and preoccupation with, the deceased) and eight accompanying cognitive, emotional, and behavioural symptoms (e.g., difficulty accepting the death) and requires at least 12 months to have passed since the loss for adults. Functional impairment and social, cultural, and religious criteria of DSM-5-TR PGD are similar to PGD per ICD-11.

Both diagnostic criteria sets use separation distress as a hallmark feature, but they differ in the number and content of accompanying symptoms (Boelen et al. 2020; Eisma, Janshen, and Lenferink 2022; Lenferink et al. 2021) as well as their timing criterion. Because the newly proposed criteria sets also differ from prior proposed criteria sets, and thus cannot be assessed comprehensively with prior pathological grief measures, such as the Inventory of Complicated Grief (Prigerson et al. 1995), development and validation of new instruments to screen for these new diagnoses is imperative (Eisma 2023; Lenferink et al. 2022; O'Connor et al. 2020). As the ICD-11 PGD and DSM-5-TR PGD diagnostic criteria remain different in some key respects, one

scale that can assess both criteria simultaneously is necessary. With the help of such a scale, researchers could report and compare the estimated prevalence and correlates or risk factors of PGD as per ICD-11 and DSM-5-TR within the same sample.

To date, two questionnaires have been developed to assess PGD ICD-11 symptoms—that is, International Prolonged Grief Disorder Scale (IPGDS) (Killikelly et al. 2020) and International Grief Questionnaire (Hyland et al. 2024)—and one instrument has been developed to assess PGD DSM-5-TR symptoms—Prolonged Grief 13 Revised (PG-13-R) (Prigerson et al. 2021). Two measures to date assess both symptom sets, the Traumatic Grief Inventory Self-Report Plus (TGI-SR+) (Lenferink et al. 2022) and the Aarus PGD scale (A-PGD) (O'Connor et al. 2023), with the TGI-SR+ having the advantage of being available completely open access at the open science framework and in multiple languages (see <https://osf.io/rqn5k/>).

The first validation study of the TGI-SR+ was conducted in two Dutch bereaved samples. Item sets corresponding with ICD-11 PGD symptoms and DSM-5-TR PGD symptoms in the Dutch TGI-SR+ showed acceptable fit for unidimensional factors using confirmatory factor analyses (CFAs). The Dutch TGI-SR+ demonstrated good internal consistency, temporal stability over a 6-month interval, convergent validity as supported by a moderate to high positive association with symptoms of posttraumatic stress disorder (PTSD) and depression, and known-groups validity by showing that prolonged grief symptoms differed by education level, time since loss, relationship to the deceased, and cause of death. Furthermore, optimal cut-off scores for both the probable ICD-11 PGD cases and the probable DSM-5-TR PGD cases were determined to provide an initial indication for clinical diagnosis. Similarly satisfactory psychometric properties have also been found for the French and Swedish TGI-SR+ (Kokou-Kpolou et al. 2022; Lenferink et al. 2024). Thus far, findings seem to indicate that the TGI-SR+ is a reliable and valid instrument to assess ICD-11 and DSM-5-TR prolonged grief symptoms across different countries.

Some instruments assessing these newest PGD criteria sets have been previously introduced in China and evidence for their reliability and validity was found. For example, the IPGDS was validated in a sample of Chinese young adults (Killikelly et al. 2020), and the PG-13-R was validated in a sample of patients with depression, anxiety, or other psychiatric disorders due to bereavement (Huo et al. 2022). However, the psychometric properties of the Chinese TGI-SR+, which can assess both ICD-11 and DSM-5-TR prolonged grief symptomatology, remain to be evaluated.

This study aimed to clarify the psychometric properties of the Chinese translation of the TGI-SR+ and its diagnostic utility. Specifically, we evaluated the factor structures, reliability, convergent and discriminant validity, known-groups validity, and calculated optimal cut-off points for probable PGD cases for items representing the ICD-11 and DSM-5-TR PGD criteria sets separately. Based on previous validation studies of the Dutch, French, and Swedish TGI-SR+ (Lenferink et al. 2022; Kokou-Kpolou et al. 2022; Lenferink et al. 2024), we expected to find a satisfactory fit for the one-factor structure for both ICD-11 and DSM-5-TR PGD symptoms. We expected good reliability as

reflected in the internal consistency of the full scale. Regarding convergent and discriminant validity, we expected that the summed scores of ICD-11 and DSM-5-TR items would be strongly associated with prolonged grief symptoms measured by the IPGDS, and less strongly associated with symptoms of PTSD, anxiety, and depression. Regarding known-groups validity, we predicted higher PGD scores for females (vs. males), for people who were lower educated, more recently (vs. less recently) bereaved, for people who had lost a first-degree relative (vs. non-first-degree relative or friend), and for people bereaved due to unnatural death (vs. natural death) and COVID-19 (vs. non-COVID-19) based on prior findings in among Chinese bereaved adults (Tang and Xiang 2021). Moreover, we expected similar cut-off scores of the Chinese TGI-SR+ for probable cases of ICD-11 and DSM-5-TR PGD to the Dutch and Swedish TGI-SR+ (i.e., between 71 and 75).

2 | Methods

2.1 | Participants and Procedure

Data used in this validation study were gathered in two cross-sectional online studies on mental health and its correlates in bereaved people in China (Tang and Xiang 2021; Tang et al. 2021). The first survey took place from September to October 2020 (i.e., during the COVID-19 pandemic) and the second from August to October 2023. Recruitment advertisements including the information about the aims and procedure of the study, inclusion criteria for participants (i.e., aged 18 and above, having lost a first-degree relative, other relative, friend, or others close persons), and a link to the online survey were posted on social network websites and mobile applications. Online informed consent was obtained before participants entered the first survey page and support resources available for bereavement in China were listed after they completed the survey. The first study was approved by the Ethics Committee of the Health Science Center, Shenzhen University (reference number: 2020024) and the second by the Human Research Ethics Committee for Non-Clinical Faculties, School of Psychology, Shenzhen University (reference number: SZU_PSY_2023_019).

The combined sample consisted of 753 Chinese bereaved people, with 476 from the first survey and 277 from the second survey. Data from 310 participants were removed from the dataset due to response times of less than 5 min ($n=21$), provision of inconsistent information about the deceased ($n=15$), patterned responses (e.g., responded last answer options for each question; $n=19$), and having experienced the loss less than 6 months ago ($n=255$). The final sample size was 443, with 193 participants from the first survey and 250 participants from the second survey.

2.2 | Measures

2.2.1 | TGI-SR+

The TGI-SR+ is a 22-item self-report measure designed to measure the severity of ICD-11 and DSM-5-TR prolonged grief symptoms (Lenferink et al. 2022). The TGI-SR+ is a four-item

extended version of the original TGI-SR (Boelen and Smid 2017; Boelen, Lenferink, and Smid 2019). Participants reported how often they had experienced 22 symptoms over the past month using 5-point Likert scales ranging from *never* (1) to *always* (5). The total scores for each criteria set represent ICD-11 PGD (12 items; excluding the functional impairment item) and DSM-5-TR PGD (10 items; excluding the functional impairment item) symptoms, respectively. The item mapping for ICD-11 PGD and DSM-5-TR PGD is shown in Table S1.

Items that were scored 4 (*frequently*) or 5 (*always*) were regarded as “endorsed” symptoms and used to assess the diagnostic criteria. For ICD-11 PGD, at least one Criterion B (i.e., separation distress) item, at least one Criterion C (i.e., cognitive, emotional, and behavioural) item, and the Criterion D (i.e., functional impairment) should be endorsed to be classified as a probable PGD case. Prior research has suggested that the ICD-11 PGD diagnostic criteria rule is too liberal because it results in relatively high prevalence rates and low diagnostic agreement with other pathological grief criteria sets (Lenferink et al. 2020). A more conservative diagnostic scoring rule is commonly used, which requires at least five C criteria to be present to establish probable PGD (for a review suggesting that five additional symptoms yield optimal comparability to other criteria sets; Eisma, Rosner, and Comtesse 2020). In this study, we applied both liberal and conservative diagnostic scoring rules to identify probable ICD-11 PGD cases.

For DSM-5-TR PGD, endorsement of at least one Criterion B (i.e., separation distress) item, at least three Criterion C (i.e., cognitive, emotional, and behavioural) items, and the Criterion D (i.e., functional impairment) item was required to be classified as a probable DSM-5-TR PGD case. Notably, the C4 criterion is captured by two TGI-SR+ items (i.e., items 2 and 8), and the highest scored item of the two items was selected for rating the C4 criterion.

The English version of the TGI-SR+ was translated to Chinese by an independent Chinese native speaker majoring in psychology and social work who is proficient in English and then back-translated to English by another independent researcher majoring in English and psychology. To ensure the conceptual equivalence of the original and back-translated English versions, the two versions were compared and discussed by the research team. The Chinese TGI-SR+, as well as other translations of this instrument, are freely accessible via <https://osf.io/rqn5k/>.

2.2.2 | ICD-11 Prolonged Grief Symptoms

The International Prolonged Grief Disorder Scale (IPGDS) is a 13-item self-report scale designed to assess symptoms of PGD per ICD-11 (Killikelly et al. 2020) and was used to examine convergent validity. Participants indicated how often they experienced these symptoms in the past month on 5-point Likert scales ranging from 1 (*almost never*) to 5 (*always*). The total score for all items, except the cultural screening item, represents the symptom levels of ICD-11 PGD, with higher scores indicating higher symptom levels. The IPGDS was validated in both Chinese- and German-speaking samples (Killikelly et al. 2020). In the current sample, Cronbach's alpha was 0.89.

2.2.3 | PTSD Symptoms

The PTSD Checklist for DSM-5 (PCL-5) is a 20-item self-report scale designed to assess the presence and severity of PTSD symptoms based on the DSM-5 criteria (Blevins et al. 2015) and was used to examine discriminant validity. Participants rated how often they were bothered by 20 symptoms in the past month on 5-point Likert scales ranging from 0 (*not at all*) to 4 (*extremely*). Higher total scores indicate more severe PTSD symptom levels. The Chinese PCL-5 was validated among Chinese medical personnel during the COVID-19 outbreak (Cheng et al. 2020), and the scale's Cronbach's alpha in the current sample was 0.94.

2.2.4 | Anxiety and Depressive Symptoms

The Hospital Anxiety and Depression Scale (HADS) is a 14-item self-report scale designed to assess symptoms of anxiety and depression (Zigmond and Snaith 1983) and was used to examine the discriminant validity. It includes an anxiety subscale and a depression subscale, each containing seven items. Participants used 4-point Likert scales to indicate how frequently or to what extent they had certain experiences in the past week, ranging from 0 to 4 (anchors differ). Scores for reverse-scored items were inverted. Next, all items were summed to provide a total score, with higher total scores indicating more severe symptoms. The Chinese HADS is reliable and valid (Ye and Xu 1993). In the current sample, Cronbach's alpha was 0.77 for the anxiety subscale and 0.75 for the depression subscale.

2.3 | Statistical Analyses

The CFAs were performed using Mplus version 8.4 (Muthén and Muthén 2017). Other analyses were conducted using IBM SPSS Statistics 26 (IBM Corp 2017).

2.3.1 | Factor Structure

Because the factor structures have been examined previously for the Dutch, French, and Swedish TGI-SR+ (Lenferink et al. 2022; Kokou-Kpolou et al. 2022; Lenferink et al. 2024), CFAs were adopted to examine the factor structure of the items representing ICD-11 PGD and DSM-5-TR PGD symptoms, respectively. We evaluated the same models as considered in prior work (Lenferink et al. 2022; Kokou-Kpolou et al. 2022; Lenferink et al. 2024). Specifically, for the ICD-11 PGD, we compared the fit of the one-factor model (all items loading on one factor) and the two-factor model (criterion B symptoms and criterion C symptoms loading on two separate, but related, factors). For the DSM-5-TR PGD, we compared the fit of the one-factor model (all items loading on one factor) and the two-factor model (criterion B symptoms and criterion C symptoms loading on two separate, but related, factors).

The following fit statistics were used to evaluate the factor structures (Kline 2013): Comparative fit index (CFI) and Tucker-Lewis index (TLI), with values >0.90 representing acceptable fit (and values >0.95 representing excellent fit), and

root-mean-square error of approximation (RMSEA) and standardized root mean square residual (SRMR), with values <0.10 representing acceptable fit (and values <0.05 representing excellent fit). The statistical fit of nested models was compared using chi-square difference tests. Information criteria were compared between nested models, whereby lower Akaike and Bayesian information criteria (AIC and BIC) reflected a better fit. Finally, when selecting the optimal model, simplicity was considered. In cases where the difference between the models is small or the fit indices of the models are all substandard, simpler models with fewer parameters were preferred. The maximum likelihood estimator was used for the CFAs considering that the data conformed to a univariate normal distribution.

2.3.2 | Internal Consistency

The internal consistencies of the 12 items representing ICD-11 PGD symptoms and 10 items representing DSM-5-TR PGD symptoms were tested by Cronbach's alpha, with values >0.70 indicating acceptable internal consistency (Cronbach 1951).

2.3.3 | Convergent and Discriminant Validity

Pearson correlation coefficients of the total scores for items representing ICD-11 and DSM-5-TR prolonged grief symptoms assessed by the TGI-SR+ with prolonged grief symptoms assessed by the IPGDS, PTSD, depressive, and anxiety symptoms were calculated. A strong correlation of TGI-SR+ scores with the total score of the IPGDS was interpreted as evidence for convergent validity, whereas weaker correlations with total scores of PTSD, depression, and anxiety symptoms were interpreted as providing evidence for discriminant validity. Comparisons of correlations are calculated via <https://www.psychometrica.de/correlation.html> (Lenhard and Lenhard 2014).

2.3.4 | Known-Groups Validity

We used *t*-tests to examine whether ICD-11 and DSM-5-TR prolonged grief symptoms differed as a function of dichotomized sociodemographic variables (sex, religion, and education level) and loss-related variables (i.e., cause of the death, time since loss, and relationship to the deceased). Therefore, cause of the death was recoded into "COVID-19"/"non-COVID-19" and "natural"/"unnatural," time since loss was recoded into "less than a year" and "more than one year," and relationship to the deceased was recoded into "first-degree relative" and "non-first-degree relative or friend." Religion was coded as "yes" and "no." Education level was coded as "high school and lower" and "college and higher."

2.3.5 | Probable Cases Using Diagnostic Scoring Rules

We used the diagnostic scoring rules of the two classification systems to calculate the percentage of people who met the criteria for probable caseness of ICD-11 PGD and DSM-5-TR PGD. Specifically, regarding the timing criterion, we used the entire sample to estimate probable ICD-11 PGD caseness and a

subsample bereaved more than 12 months previously to estimate probable DSM-5-TR PGD caseness.

2.3.6 | Determining Cut-Off Scores for Probable Cases of PGD

We used the Receiver Operator Characteristic (ROC) curves to calculate the best cut-off points for probable ICD-11 PGD caseness and DSM-5-TR PGD caseness on the 22-item TGI-SR+ total score. Additionally, the best cut-off points for the total score of each item set reflecting ICD-11 PGD and DSM-5 PGD (excluding the functional impairment item) were calculated. In an ROC curve, the true-positive rate (i.e., sensitivity) was plotted against the false-positive rate (i.e., 1-specificity) for each possible cut-off score. Youden's index (true-positive rate - false-positive rate) was used to differentiate the score between probable cases and probable noncases. The index below 0.7 indicates poor discrimination, 0.7–0.8 is considered acceptable, 0.8–0.9 is considered preferred, and values between 0.9 and 1 are considered excellent (Ferraris 2019). Again, analyses for ICD-11 PGD were conducted in the full sample and analyses for DSM-5-TR were conducted in the subsample with a time since loss longer than 12 months.

3 | Results

3.1 | Sample Characteristics

The characteristics of the study sample are described in Table 1. More females than males were included. Most participants were young-to-middle-aged. The majority had no religious beliefs and were highly educated. Over half the participants had lost a first-degree relative (i.e., a parent, a spouse, a sibling, or a child), and approximately half of the deaths were due to COVID-19.

3.2 | Factor Structure

Table 2 shows the fit indices for the CFAs. For ICD-11 PGD symptoms, the one-factor and two-factor models did not demonstrate an acceptable fit. The two-factor model showed a better fit than the one-factor model, $\Delta\chi^2$ (Δdf) = 69.90 (1), $p < 0.001$, indicating that items assessing separation distress and items assessing emotional pain load on distinct factors. The association between the two factors was small ($r = 0.35$). When correlating error terms of four item pairs (C1-B1, C6-C1, C8-C6, and C6-B1), the two-factor model had an acceptable fit and showed a better fit than the two-factor model without correlated errors, $\Delta\chi^2$ (Δdf) = 200.95 (4), $p < 0.001$. Factor loadings of the three ICD-11 PGD models are shown in Tables S2–S4.

For DSM-5-TR PGD symptoms, the fit indices of the one-factor and two-factor models were both not acceptable, with the two-factor model showing a better fit than the one-factor model, $\Delta\chi^2$ (Δdf) = 75.79 (1), $p < 0.001$, and the two factors were moderately correlated ($r = 0.59$). When correlating the error terms of one item pair (C4-B1), the two-factor model showed an acceptable fit and fit was better than for the two-factor model without correlated errors, $\Delta\chi^2$ (Δdf) = 105.74 (9), $p < 0.001$. Factor loadings of the three DSM-5-TR PGD models are shown in Tables S5–S7.

TABLE 1 | Participant characteristics ($N = 443$).

	<i>n</i> (%) or <i>M</i> (<i>SD</i>)
Sex, <i>n</i> (%)	
Male	176 (40)
Female	267 (60)
Age, <i>M</i> (<i>SD</i>)	39.57 (11.64)
Religion, <i>n</i> (%)	
No	417 (94)
Yes ^a	26 (6)
Education level, <i>n</i> (%)	
High school and below	93 (21)
College and above	350 (79)
Cause of death, <i>n</i> (%)	
COVID-19	200 (45)
Non-COVID-19	243 (55)
Chronic disease	125 (28)
Acute disease other than COVID-19	70 (16)
Accident	28 (6)
Senility (died from ageing)	13 (3)
Suicide	7 (2)
Natural	408 (92)
Chronic disease	125 (28)
COVID-19	200 (45)
Acute disease other than COVID-19	70 (16)
Senility (died from ageing)	13 (3)
Unnatural	35 (8)
Accident	28 (6)
Suicide	7 (2)
Time since loss in months, <i>M</i> (<i>SD</i>)	65.65 (100.60)
Time since loss by groups, <i>n</i> (%)	
Six to 12 months	214 (48)
More than 12 months	229 (52)
Relationship to the deceased, <i>n</i> (%)	
First-degree relative	271 (61)
Parent	175 (39)
Spouse	66 (15)
Sibling	17 (4)
Child	13 (3)
Non-first-degree relative and friend	172 (39)

(Continues)

TABLE 1 | (Continued)

	<i>n</i> (%) or <i>M</i> (<i>SD</i>)
Grandparent	98 (22)
Friend	44 (10)
Other relative ^b	25 (6)
Not specified	5 (1)
ICD-11 PGD symptoms, <i>M</i> (<i>SD</i>)	33.21 (10.41)
DSM-5-TR PGD symptoms, <i>M</i> (<i>SD</i>)	28.24 (8.71)

Abbreviations: DSM-5-TR, 5th edition of the Diagnostic and Statistical Manual of Mental Disorders Text Revision; ICD-11, 11th edition of the International Classification of Diseases; PGD, prolonged grief disorder.

^aReligious beliefs included Buddhism (*n* = 20), Catholicism (*n* = 3), and Christianity (*n* = 3).

^bOther relative included uncle (*n* = 17), aunt (*n* = 5), and cousin (*n* = 3).

3.3 | Internal Consistency

Cronbach's alpha of the items reflecting ICD-11 and DSM-5-TR prolonged grief symptoms were 0.92 and 0.90, respectively.

3.4 | Convergent and Discriminant Validity

Table 3 shows the associations of the total scores of the 12 items representing ICD-11 PGD symptoms and 10 items representing DSM-5-TR PGD symptoms with symptom levels of PGD measured by IPGDS, PTSD, anxiety, and depression. The correlations between the prolonged grief symptoms per ICD-11 and DSM-5-TR measured by the TGI-SR+ and the summed score of the IPGDS were very strong, providing support for convergent validity. Correlations between prolonged grief symptoms

TABLE 2 | Model fit indices (*N* = 443).

	CFI	TLI	RMSEA (90% CI)	SRMR	AIC	BIC	χ^2 (<i>df</i>)
PGD ICD-11							
One-factor model	0.85	0.82	0.13 (0.12–0.15)	0.08	14518.02	14665.39	486.53 (54)
Two-factor model	0.88	0.85	0.12 (0.11–0.14)	0.07	14459.95	14601.41	416.45 (53)
Two-factor model-correlated ^a	0.94	0.92	0.09 (0.08–0.10)	0.06	14257.28	14425.00	215.7 (49)
PGD DSM-5-TR							
One-factor model	0.87	0.83	0.14 (0.13–0.16)	0.08	12059.90	12182.70	351.46 (35)
Two-factor model	0.89	0.87	0.13 (0.11–0.14)	0.07	11987.46	12114.36	277.02 (34)
Two-factor model-correlated ^b	0.94	0.92	0.10 (0.08–0.11)	0.06	11887.06	12018.06	174.63 (33)

Abbreviations: AIC, Akaike information criterion; BIC, Bayesian information criterion; CFI, comparative fit index; CI, confidence interval; *df*, degrees of freedom; DSM-5-TR, 5th edition of the Diagnostic and Statistical Manual of Mental Disorders Text Revision; ICD-11, 11th edition of the International Classification of Diseases; PGD, prolonged grief disorder; RMSEA, root-mean-square error of approximation; TLI, Tucker–Lewis Index.

^aError terms of item pair C1-B1 C6-C1 C8-C6 C6-B1 were correlated.

^bError terms of item pair C4-B1 were correlated.

TABLE 3 | Pearson correlations between symptom levels of PGD, PTSD, anxiety, and depression (*N* = 443).

	PGD symptoms (IPGDS)	PTSD symptoms (PCL-5)	Anxiety symptoms (HADS-A)	Depressive symptoms (HADS-D)
ICD-11 PGD symptoms	0.98***	0.66***	0.62***	0.61***
DSM-5-TR PGD symptoms	0.97***	0.65***	0.62***	0.62***
Comparisons of correlations (<i>z</i>)				
ICD-11 PGD symptoms ^a	—	27.35***	27.89***	28.09***
DSM-5-TR PGD symptoms ^b	—	24.09***	24.01***	24.49***

Abbreviations: DSM-5-TR, 5th edition of the Diagnostic and Statistical Manual of Mental Disorders Text Revision; HADS-A, Hospital Anxiety and Depression Scale—Anxiety subscale; HADS-D, Hospital Anxiety and Depression Scale—Depression subscale; ICD-11, 11th edition of the International Classification of Diseases; IPGDS, International Prolonged Grief Disorder Scale; PCL-5, PTSD Checklist for DSM-5; PGD, prolonged grief disorder; PTSD, posttraumatic stress disorder.

^aComparison of the correlation between ICD-11 PGD symptoms and PGD symptoms measured by IPGDS and the correlations between ICD-11 PGD symptoms and other symptoms.

^bComparison of the correlation between DSM-5-TR PGD symptoms and PGD symptoms measured by IPGDS and the correlations between DSM-5-TR PGD symptoms and other symptoms.

p* < 0.05, *p* < 0.01, and ****p* < 0.001.

per ICD-11 and DSM-5-TR measured by the TGI-SR+ with PTSD, anxiety, and depressive symptom levels were weaker (all $z_s > 24.01$, $ps < 0.01$; see Table 3 for detailed results on comparisons of correlations), providing evidence for the discriminant validity of the TGI-SR+.

3.5 | Known-Groups Validity

Table 4 shows that men showed higher prolonged grief symptoms than women. People who had lost their loved ones 6 to 12 months ago scored higher on prolonged grief symptoms than those who experienced the loss more than 12 months ago. People bereaved due to COVID-19 had more severe prolonged grief symptoms than those bereaved due to other causes. Moreover,

people who had lost their first-degree relatives yielded higher prolonged grief symptoms than those who lost a non-first-degree relative or friend. These scores did not differ by religious belief, education level, and cause of death (natural vs. unnatural).

3.6 | Rates of Probable Cases Using Different Diagnostic Scoring Rules

Criteria for probable caseness were met by 20.1% of participants using the liberal scoring rule for ICD-11 PGD (≥ 1 additional symptom), by 15.3% of participants using the conservative scoring rule for ICD-11 PGD (≥ 5 additional symptoms), and by 6.6% of participants using the diagnostic scoring rule for DSM-5-TR PGD.

TABLE 4 | Sociodemographic and loss-related correlates of PGD symptoms ($N = 443$).

	ICD-11 PGD symptoms		DSM-5-TR PGD symptoms	
	<i>M</i> (<i>SD</i>)	<i>t</i> (441)	<i>M</i> (<i>SD</i>)	<i>t</i> (441)
Sex		2.55*		2.37*
Men	34.76 (10.11)		29.44 (8.20)	
Women	32.19 (10.49)		27.45 (8.82)	
Religion		1.23		0.74
No	33.05 (10.26)		28.16 (8.59)	
Yes ^a	35.59 (12.45)		29.44 (10.46)	
Education level		-0.46		-0.92
High school and below	33.65 (10.94)		28.98 (9.27)	
College and above	33.09 (10.27)		28.05 (8.56)	
Cause of death (COVID-19 vs. non-COVID-19)		10.73***		10.62***
COVID-19	38.42 (9.05)		32.57 (7.53)	
Non-COVID-19 ^b	28.92 (9.46)		24.68 (7.98)	
Cause of death (Natural vs. Unnatural)		0.53		0.41
Natural	33.30 (10.35)		28.34 (8.64)	
Unnatural ^c	32.12 (11.19)		27.06 (9.62)	
Time since the loss by group		-9.83***		-9.87***
Six to 12 months	37.77 (9.23)		32.07 (7.72)	
More than 12 months	28.95 (9.62)		24.66 (8.05)	
Role of the deceased		6.07***		5.51***
First-degree relative ^d	35.29 (10.20)		30.00 (8.43)	
Non-first-degree relative and friend ^e	29.93 (9.90)		25.47 (8.44)	

Abbreviations: DSM-5-TR, 5th edition of the Diagnostic and Statistical Manual of Mental Disorders Text Revision; ICD-11, 11th edition of the International Classification of Diseases; PGD, prolonged grief disorder.

^aReligious beliefs included Buddhism ($n = 20$), Catholicism ($n = 3$), and Christianity ($n = 3$).

^bNon-COVID-19 deaths included chronic disease ($n = 125$), acute disease other than COVID-19 ($n = 70$), accident ($n = 28$), senility ($n = 13$), and suicide ($n = 7$).

^cUnnatural deaths included accident ($n = 28$) and suicide ($n = 7$).

^dFirst-degree relative included parent ($n = 175$), spouse ($n = 66$), sibling ($n = 17$), and child ($n = 13$).

^eNon-first-degree relative and friend included grandparent ($n = 98$), uncle ($n = 17$), aunt ($n = 5$), and cousin ($n = 3$), friend ($n = 44$), and not specified ($n = 5$).

* $p < 0.05$, ** $p < 0.01$, and *** $p < 0.001$.

3.7 | Determining Cut-Off Scores for Probable Cases of PGD

For ICD-11 PGD using the liberal diagnostic scoring rule, the optional cut-off score when using the TGI-SR+ total score (using all 22 items) was ≥ 67 (AUC = 0.94, 95% CI = 0.92–0.96). Using this score results in 97.8% correctly identified probable ICD-11 PGD cases and 21.2% incorrectly identified probable cases (Youden's index $J = 0.77$). For ICD-11 PGD using the conservative diagnostic scoring rule, the optimal cut-off was ≥ 75 for probable ICD-11 PGD (AUC = 0.96, 95% CI = 0.95–0.98). Using this cut-off resulted in 94.1% correctly identified probable ICD-11 PGD cases and 10.9% incorrectly identified probable cases (Youden's index $J = 0.83$). For DSM-5-TR PGD, the optional cut-off score was ≥ 68 (AUC = 0.97, 95% CI = 0.94–0.99). Using this score results in 100% correctly identified probable DSM-5-TR PGD cases and 10.3% incorrectly identified probable cases (Youden's index $J = 0.90$).

In addition, we separately calculated the best cut-off scores when only summing 12 ICD-11 PGD items (possible range 12–60) and 10 DSM-5-TR PGD items (possible range 10–50). For ICD-11 PGD, the optimal cutoff score was ≥ 39 when using the liberal diagnostic scoring rule (Youden's index $J = 0.74$), and the optimal cutoff score was ≥ 41 when using the conservative diagnostic scoring rule (Youden's index $J = 0.82$). For DSM-5-TR PGD items, the optimal cutoff was ≥ 34 (Youden's index $J = 0.93$). See Tables S8 and S9 and Figures S1–S6 for details.

4 | Discussion

There are currently two different diagnostic criteria sets for PGD in the ICD-11 and the DSM-5-TR. However, there is a lack of valid instruments to assess these two diagnostic criteria sets with a single instrument in Chinese bereaved people. To fill this gap, our study introduced the Chinese version of the TGI-SR+ and evaluated its psychometric properties among Chinese adults bereaved more than 6 months ago.

Although a unidimensional factor model previously showed the best fit for the Dutch, French, and Swedish TGI-SR+ (Lenferink et al. 2022; Kokou-Kpolou et al. 2022; Lenferink et al. 2024), two-factor models for both ICD-11 and DSM-5-TR prolonged grief symptoms were selected as optimal models for the Chinese TGI-SR+. The two factors found in our study reflect the two symptom clusters in the diagnostic criteria of PGD in ICD-11 and DSM-5-TR, namely, the core symptom of separation distress (i.e., longing and preoccupation) and accompanied symptoms of intense emotional pain (e.g., sadness, guilt, anger, denial, blame, difficulty accepting the death, feeling one has lost a part of one's self, an inability to experience positive mood, emotional numbness, and difficulty in engaging with social or other activities). This finding is also consistent with the recently developed A-PGDs, which also found a two-factor structure to provide the most optimal fit in a Danish bereaved sample (O'Connor et al. 2023). Perhaps for Chinese bereaved people, the distinction between separation distress and intense emotional pain may be more pronounced than the Dutch, French, and Swedish bereaved people, aligning more closely with the theoretical conceptualization of PGD in both the DSM-5-TR and ICD-11.

Similar to the strong positive associations between the total score of the TGI-SR+ and an existing pathological grief symptoms scale (i.e., PG-13; Prigerson et al. 2009) found in the Swedish TGI-SR+ validation study (Lenferink et al. 2024), we found that the total score of the Chinese TGI-SR+ was strongly correlated with the total score of the IPGDS, a scale developed to assess the ICD-11 prolonged grief symptoms (Killikelly et al. 2020), providing evidence for convergent validity. We found strong correlations between the Chinese TGI-SR+ total score and PTSD, anxiety, and depressive symptoms, similar to the French (for PTSD and anxiety symptoms) and Dutch (for depressive symptoms) validation studies (Lenferink et al. 2022; Kokou-Kpolou et al. 2022). Additionally, we found that the correlations between TGI-SR+ scores and IPGDS scores were significantly stronger than those of TGI-SR+ scores and other symptom measures. This suggests that prolonged grief symptoms measured by the TGI-SR+ overlap, yet are distinct from, PTSD, anxiety, and depressive symptomatology, providing evidence for discriminant validity.

Regarding the known-groups validity, as expected, TGI-SR+ scores differentiated those who had experienced the loss within 1 year and those who experienced a loss more than 1 year previously, which aligns with findings in Dutch and Swedish samples (Lenferink et al. 2022, 2024). As COVID-19 deaths elicited severe grief reactions worldwide (Tang and Xiang 2021; Drucker, Levi-Belz, and Hamdan 2023; Eisma and Tamminga 2022; Gang et al. 2022; Yıldırım 2023), often higher than grief levels following non-COVID-19 causes of death (Gang et al. 2022; Eisma et al. 2021), it is no surprise that COVID-19 bereaved adults experienced more severe prolonged grief symptoms than adults bereaved due to other causes, providing further evidence for the known-groups validity of the Chinese translation of the TGI-SR+. Higher ICD-11 and DSM-5-TR prolonged grief symptoms were also reported by people who had lost a first-degree relative (vs. non-first-degree relative and friend), which is consistent with previous findings in Chinese (He et al. 2013; Yu et al. 2014), Dutch (Lenferink et al. 2022), French (Kokou-Kpolou et al. 2022), and Swedish samples (Lenferink et al. 2024). Unlike previous studies, our study found no significant difference in the total scores of the scale between people with high and low education levels, nor between people bereaved due to natural and unnatural death. This may result from the dramatically imbalanced sample sizes of the subgroups in the current Chinese sample.

Compared with the Dutch and Swedish validation studies of the TGI-SR+, we found a lower estimated prevalence of 6.6% for DSM-5-TR PGD. The estimated prevalence was 32% for Dutch adults bereaved of a family member or other close person due to various causes, 30% for Dutch adults who lost loved ones due to a traffic accident (Lenferink et al. 2022), and 29% for Swedish bereaved parents (Lenferink et al. 2024). Lower estimated prevalence for ICD-11 PGD (i.e., 20.1% for the liberal scoring rule and 15.3% for the conservative scoring rule, respectively) was also found in our sample compared with the Dutch (i.e., 30% and 34% for the liberal scoring rule, and 26% and 27% for the conservative scoring rule, respectively) and Swedish (i.e., 32% for the liberal scoring rule and 26% for the conservative scoring rule, respectively) samples (Lenferink et al. 2022, 2024). The lower estimated prevalence reported

in the Chinese bereaved sample may result from the differences in the relationship to the deceased and the cause of death. Sixty-one percent of the Chinese participants had lost a parent, spouse, child, or sibling, but these proportions in the Dutch sample were 95% and 91%, and the Swedish participants were all parents whose children died from cancer. Moreover, 85% of the Chinese participants had lost their loved ones from accident, suicide, or homicide, whereas the proportions in the Dutch samples were 26% and 100%.

Most of the optimal cut-off points estimated in our study were comparable to the Dutch and Swedish TGI-SR+ (Lenferink et al. 2022, 2024). For probable ICD-11 PGD, the optimal cut-off points for the liberal and conservative scoring rules were ≥ 67 and ≥ 75 , respectively (vs. ≥ 71 and ≥ 75 for the Dutch version, and ≥ 71 and ≥ 72 for the Swedish version). For probable DSM-5-TR PGD, the optimal cut-off score for the total items is ≥ 68 (vs. ≥ 71 in the Dutch and Swedish versions). When using only the total scores of the 12 items reflecting ICD-11 PGD (i.e., ≥ 39 for the liberal scoring rule and ≥ 41 for the conservative scoring rule, respectively), the cut-off points were again similar compared with the Dutch (i.e., ≥ 40 for the liberal scoring rule and ≥ 41 for the conservative scoring rule, respectively) and Swedish (i.e., ≥ 42 for both the liberal and conservative scoring rule) versions. Moreover, for the total score of the 10-item DSM-5-TR PGD, the optimal cut-off score in the Chinese sample (i.e., ≥ 34) was similar to that in the Dutch and Swedish samples (i.e., ≥ 33 for both). The similarities in most cutoff scores and the disparity in the cutoff score based on the ICD-11 PGD liberal scoring rule when applying the full scale of the TGI-SR+ indicate the necessity to validate the Chinese TGI-SR+ and to identify the cut-off scores in culturally diverse samples.

Some limitations should be mentioned. Notably, the determination of probable PGD cases was based on self-report, and a qualified psychiatrist was not asked to make a clinical diagnosis, so we were only able to identify probable PGD cases (Stroebe, Schut, and Eisma 2024). Additionally, the cross-sectional nature of the data used in this study precluded the establishment of temporal stability of TGI-SR+ scores and evaluating predictive validity evidence, which remain important goals for future research. Lastly, although the Dutch, French, Swedish, and Chinese versions of TGI-SR+ appear reliable and valid instruments to assess ICD-11 PGD and DSM-5-TR PGD symptoms, more studies in diverse bereaved samples across different languages, are needed to further test the psychometric properties of the TGI-SR+ as well as its cross-cultural applicability.

In summary, the Chinese TGI-SR+ scale items showed an acceptable fit for two-factor structures consistent with the diagnostic algorithms of PGD in ICD-11 and DSM-5-TR and demonstrated excellent reliability. Additionally, evidence was found for the validity of the Chinese TGI-SR+. Together with prior research, this study suggested acceptable psychometric properties of the TGI-SR+ across diverse bereaved populations and cultural contexts. We also calculated the cut-off scores for the two diagnostic criteria sets of PGD (i.e., ICD-11 and DSM-5-TR), which can be used to quickly determine who may need professional bereavement care. These findings provide Chinese grief researchers and frontline health workers with a rapid screening tool for PGD.

Author Contributions

Suqin Tang: conceptualization, methodology, investigation, resources, writing – review and editing, writing – original draft, visualization, supervision, funding acquisition. **Zhiwei Chen:** formal analysis, writing – review and editing, writing – original draft, visualization. **Paul A. Boelen:** writing – review and editing, supervision. **Maarten C. Eisma:** methodology, writing – review and editing, supervision. **Lonneka Lenferink:** methodology, writing – review and editing, supervision.

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Conflicts of Interest

The authors declare no conflicts of interest.

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Supporting Information

Additional supporting information can be found online in the Supporting Information section.