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Cross-cultural adaptation and psychometric properties of the Persian version of the revised scale of prolonged grief disorder (PG-13-R)

Holly G Prigerson[1], Moslem Rajabi[2], Mohammad Javad Bagian Koulemarzi[3], Mohammad Reza Vedadmofrad[4]
1. Professor, Department of Radiology, Weill Cornell Medicine, New York City, NY, USA Cornell Center for Research on End-of-Life Care, New York City, NY, USA. E-mail: hgp2001@med.cornell.edu
2. Ph.D Candidate in Clinical Psychology, Department of Clinical Psychology, University of Social Welfare and Rehabilitation Sciences, Tehran, Iran. E-mail: rajjabimoslem@yahoo.com
3. Assistant Professor, Department of Psychology, Faculty of Humanities, Sayyed Jamaleddin Asadabadi University, Asadabad, Iran. E-mail: MJ.Bagian@sjau.ac.ir
4. Ph.D Candidate in Psychology, Department of Psychology, Faculty of Education Sciences and Psychology, Ferdowsi University of Mashhad, Mashhad, Iran. E-mail: mohamadrezavedadmofrad@gmail.com

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ABSTRACT

Background: Grief is a natural and universal response to the loss of a loved one. The grief experience is not a state but a process. Most individuals recover adequately within a year after the loss; however, when individuals experience an extension of the standard grieving process, they are said to be experiencing prolonged grief disorder, thought to result from failure to transition from acute to integrated grief. Therefore, validating tools related to grief in different cultures can provide the ground for measuring its concept by the culture to understand the cultural differences of this structure.
Aims: This study aimed to investigate the psychometric properties, reliability, and validity of PG-13-R.
Methods: Data were collected from two independent samples of 285 (exploratory factor analysis) and 241 (confirmatory factor analysis) mourning adults to determine whether the findings explored in one sample can be verified in another. Face and content validity were measured quantitatively and qualitatively. Concurrent validity was measured using correlation coefficient calculation with the Posttraumatic Stress Disorder Checklist (PCL-5), the Generalized Anxiety Disorder scale (GAD-7), and the Beck Depression Inventory-II (BDI-II). The collected data were analyzed using SPSS.27 and AMOS.26 software. Exploratory factor analysis was performed using principal components and the Varimax method. Confirmatory factor analysis was performed using AMOS.26 software.
Results: The exploratory and confirmatory factor analyses supported the two-factor structure with emergent distress, detachment, and meaninglessness factors. These factors had acceptable internal consistency. PG-13-R factors had good convergence validity with depression, anxiety, post-traumatic stress disorder**,** and bereavement experience ($P< 0.05$). Cronbach's alpha coefficient (α) was 0.78 for Distress and 0.79 for Detachment and Meaning factor, and 0.87 for the whole scale, indicating good internal consistency
Conclusion: PG-13-R is a useful and reliable tool for measuring PGD symptoms **in**the Iranian population. It is suggested that future studies examine this scale in people who have been bereaved for various reasons, including (death by suicide, sudden death, and death by accident).

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✉ **Corresponding Author:** Mohammad Javad Bagian Koulemarzi, Assistant Professor, Department of Psychology, Faculty of Humanities, Sayyed Jamaleddin Asadabadi University, Asadabad, Iran.
E-mail: MJ.Bagian@sjau.ac.ir, Tel: (+98) 9169602600

Extended Abstract

Introduction

Almost everyone experiences the loss of a loved one throughout his or her lifetime. Specific physical, emotional, cognitive, and social reactions to the loss occur regularly and are, to some extent, expected and predictable. (Lenferink et al, 2020; Nielsen, Carlsen et al, 2019).Most mourners have enough internal resources and external support to cope fairly resiliently with grief, and can slowly adapt to life without the deceased (Prigerson et al., 2013). But for a significant minority of bereaved people, the intense yearning for the deceased and emotional pain may last for months or even years when these symptoms of extreme sadness are not only uncomfortable and debilitating for individuals but are incompatible with their cultural and religious norms, a condition called prolonged grief disorder (Prigerson et al, 2009; Prigerson et al, 2021).

PGD is a psychopathological syndrome newly introduced into the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition, Text Revision (DSM-5-TR) (APA, 2022) A diagnosis of PGD can be set if a person experiences separation distress, plus several accompanying symptoms (e.g., anger, difficulties accepting the loss, and moving on) to a distressing and disabling agree, ≥12 months post-loss (≥6 months in children) (APA, 2022). Diagnostic criteria for grief disorder in the DSM-5-TR include:

A. Event and time criteria. The death, at least 12 months ago, of a person who was close to the bereaved (for children and adolescents, at least 6 months ago). **B.** Separation distress; Since the death, the development of a persistent grief response characterized by one or both of the following symptoms, which have been present most days to a clinically significant degree. In addition, the symptom(s) have occurred nearly every day for at least the last month: 1. Intense yearning/longing for the deceased person. 2. Preoccupation with thoughts or memories of the deceased person (in children and adolescents, preoccupation may focus on the circumstances of the death). **C.** Cognitive, emotional, and behavioral symptoms. Since the death, at least three of the following symptoms have been present most days to a clinically significant degree. In addition, the symptoms have occurred nearly every day for at least the last month: 1. Identity disruption (e.g. feeling that a part of oneself has died) since the death, 2. A marked sense of disbelief about the death, 3. Avoidance of reminders that the person is dead (in children and adolescents, may be characterized by efforts to avoid reminders), 4. Intense emotional pain (e.g. anger, bitterness, sorrow) related to the death, 5. Difficulty reintegrating into one's relationships and activities after the death (e.g. problems engaging with friends, pursuing interests, or planning for the future), 6. Emotional numbness (absence or marked reduction of emotional experience) as a result of the death, 7. Feeling that life is meaningless as a result of death, 8. Intense loneliness as a result of the death. **D.** Functional impairment criterion, the disturbance causes clinically significant distress or impairment in social, occupational or other important areas of functioning. **E.** Cultural criterion. The duration and severity of the bereavement reaction exceed expected social, cultural, or religious norms for the individual's culture and context (Eisma, 2023).

This distinguishes the symptoms of prolonged grief disorder from the following: Normal grief, the main manifestation of which is the feeling of absence of the deceased person (Boelen & van den Bout, 2008); Major depressive disorder with persistent depressed mood and inability to predict pleasure, feelings of worthlessness and self-loathing (Boelen, van den Bout, & de Keijser, 2003); Generalized anxiety disorder with feelings of excessive fear and worry; Post-traumatic stress disorder with intrusive thoughts, continuous avoidance of internal and external reminders of traumatic event experience and physiological reactions (Boelen et al, 2010; Prigerson et al., 2021).

A meta-analysis of 14 eligible studies revealed a prevalence of PGD in about 10% of bereaved adult persons in the United States (Lundorff et al., 2017) Pohlkamp et al. (2018) found a prevalence of 16% for PGD in a sample of bereaved parents in Sweden (Pohlkamp et al, 2018). Yuan et al. (2022) in a meta-analysis found that the pooled prevalence of Prolonged grief disorder and Prolonged grief disorder symptoms was 20.9% and 75.0%, respectively.

studies have consistently indicated that bereaved individuals with PGD display a heightened risk of suicidality (Latham & Prigerson, 2004; Prigerson et al., 2021) and that PGD predicts major depressive disorder, and suicidal acts and thoughts (Latham & Prigerson, 2004; Maciejewski et al, 2016) Overall, PGD is associated with poor mental health, such as an increase in depression and anxiety, PTSD-related symptomatology, insomnia, and demoralization (Boelen & Prigerson, 2007; Pohlkamp et al, 2019; Prigerson et al., 2021; Thomas et al., 2014)

Studies have shown that treating people with prolonged grief disorder reduces their disturbing symptoms and can prevent the prolongation of the disorder (Bryant et al., 2014; Rosner et al, 2014; Shear et al., 2014). Therefore, researchers need reliable and valid tools to identify people with prolonged grief disorder. Considering the different conceptualizations and modifications and changing diagnostic criteria over time (Treml et al, 2020), various tools have been made to measure prolonged grief disorder including Inventory of Complicated Grief (ICG) (Prigerson et al., 1995).

Complicated Grief - Revised (ICG-R) (Prigerson & Jacobs, 2001), Traumatic Grief Inventory Self-Report Version (TGI-SR) (Boelen & Smid, 2017) and Prolonged Grief Scale-13 (PG-13) (Prigerson et al., 2009). PG-13 (Prigerson et al., 2009) is a short and simple self-report scale that includes most features of long-term bereavement disorder, such as yearning for the deceased and other related .This scale was revised by Prigerson et al. (2021) to confirm DSM-5-TR criteria for PGD (Prigerson et al., 2021).

The PG-13 scale by Prigerson et al (2021) was introduced in developing PGD diagnostic criteria proposed for inclusion in the DSM-5 and ICD-11 (Prigerson et al., 2009). The scale contains 13 items that can be used for the dual purposes of assessing grief intensity continuously on a dimensional scale and diagnosing PGD according to the proposed criteria. Items in the PG-13 are a subset of those in the Inventory of Complicated Grief - Revised (Prigerson et al., 2021), which is a revision of the Inventory of Complicated Grief (Prigerson et al., 1999). Included items were those that we found to be informative and unbiased concerning gender, relationship to the decedent, and time from loss in item response theory-based item analysis, and which mapped onto our criteria for PGD proposed in 2009

PG-13-R consists of 11 Likert-type questions and two "yes/no" questions that assess symptoms of separation distress and other specific cognitive-emotional behaviors of PGD. "Yes/No" questions (3 items and 13) examine the timing criteria (whether at least 12 months have elapsed after the loss) and social-occupational functional impairment, respectively. The 11 symptoms can be summed up and used as an assessment tool to measure the severity of PGD symptoms (Prigerson et al., 2021). It is a widely used tool that has been evaluated in terms of credibility in Turkey (Işıklı et al, 2020), Sweden (Pohlkamp et al., 2018), and South Korea(Kang, 2017), translated the original and has shown a single-factor structure. However, in the Swedish version of PG13-R (Sveen et al., 2020) in people who were mourned due to various traumas, there are three factors (social/identity disorder, separation distress, and traumatic distress). Only one study (Prigerson et al., 2021) examined the validity and reliability of the PG-13-Revised (PG-13-R) scale, the results showed that the PG-13-R grief symptoms showed a one-dimensional structure with a high degree of internal compatibility

Because bereavement is a cultural and social phenomenon, and people react differently to the death of the deceased in different cultures, we need a diagnostic tool to measure and diagnose. The PG-13-R questionnaire has not been translated into Iranian society so far, and its psychometric properties have not been studied. Also, this study can be helpful in several dimensions due to the existence of Iranian subcultures in the direction of cultural differences in grief disorder. First, grief varies from person to person and from culture to culture, second, what is important in long-term grief disorder is the relationship between the deceased person and the survivor, the meaning of loss, rumination of grief, and feelings of guilt, and third, it is also important to measure the amount, duration, and intensity of long-term grief for psychological interventions. Considering these dimensions and the collectivist nature of the Iranian culture and the fact that most

Iranian cultures usually mourn for the deceased for 40 days, awareness of the type of symptoms experienced, the severity and duration of long-term grief disorder in individuals, and the design of psychological interventions to reduce the emotional-emotional and psychological dimensions can be effective.

In order to make it available to Iranian researchers and physicians, we need to adapt it culturally. Therefore, the aim of this study was to investigate the psychometric properties of the PG-13-R questionnaire in Iranian culture and language.

Method

In the first study (exploratory factors analysis) participants in the study were 285 people of the general population of Lorestan city who had lost a relative in the past year 2023 (131 men with an average age of 39.84 (SD= 10.71) and 154 women with an average age of 41.90 and (SD= 10.79) with ages between 20 and 67 years. Inclusion criteria included: diagnosis of prolonged grief disorder using the PG-13-R questionnaire, loss of a close relative (brother, sister, parent), age range of 18 to 70 years, having a minimum education level of eighth grade, not having major depressive disorder according to the diagnostic criteria (DSM-V-TR) and clinical interview, and exclusion criteria were having any physical problem that requires medical intervention or having suicidal ideation at the time of the study. In terms of education, 22.9% (30 persons) had a middle school education, 26.7% (35) had a high school education, 13.7% (18) had Associate degree education, 26% (34) had bachelor's degree and 10.7% (14) had master's degree. In addition, among women, 20.8% (32) had a middle school education, 24.7% (38) had a high school, 22.1% (34) had an Associate degree, 23.4% (36) had a bachelor's degree, 7.8% (12) had a master's degree and 0.6% (1) had a Doctor of Philosophy. 285 volunteers completed the questionnaires; none of the participants' data was removed because the D2 Mahalanobis values were less than 4. In the second study (confirmative factors analysis) 241 people of the general population of Lorestan city who had lost one of their relatives in the past year (60 men with an average age of 42.73 (SD= 11.08) and 181 women with an average age of 39.25 (SD= 10.20).

Socio-demographic questionnaire. This questionnaire includes questions about age, gender, marital status, education, relationship to the decedent, and cause of death.

The Prolonged Grief Scale-13- Revised (PG-13-R) PG-13-R is a 13-item self-report scale. This scale is used to diagnose PGD based on DSM-5-TR diagnostic criteria. (Prigerson et al., 2021) The first and last question is answered with yes and no. The second question asks to determine the duration of the death of a loved one. Questions 3 to 12 are scored on a 5-point Likert scale.

The results of the study by Prigerson et al. (2021) showed that the PG-13-R grief symptoms represent a unidimensional construct, with high degrees of internal consistency (Cronbach's alpha= 0.83, 0.90, and 0.93, for Yale, Utrecht, and Oxford, respectively). The DSM PGD diagnosis was distinct from post-traumatic stress disorder (phi= 0.12), major depressive disorder (phi= 0.25), and generalized anxiety disorder (phi= 0.26) at baseline. Temporal stability was remarkable for this diagnosis (r= 0.86, p< 0.001). Kappa's agreement between a PG-13-R threshold symptom summary score of 30 and the DSM symptom criterion for PGD was 0.70-0.89 across the datasets. Both the DSM PGD diagnosis and the PG-13-R symptom summary score at baseline were significantly associated (p< 0.05)

The Posttraumatic Stress Disorder Checklist for DSM-5 (PCL-5): The PCL-5 is a 20-item self-report Checklist, which was developed to measure and evaluate PTSD symptoms. Items rate on a 5-point Likert-type scale [1 (not at all), 2 (a little bit), 3 (moderately), 4 (quite a bit), and 5(extremely]. The PCL-5 includes four subscales. Intrusion /re-experiencing, avoidance, negative alterations in cognition and mood, and arousal and reactivity. The range of change of its scores is from 0 to 80. Cronbach's alpha for the PCL-5 in other studies ranged from.76 to.97 (Armour et al., 2015; Hoge et al., 2014; Keane et al., 2014). In Study Blevins et al. (2015) (N= 278), PCL-5 scores exhibited strong internal consistency (α= 0.94), test-retest reliability (r= 0.82), and convergent (rs= 0.74 to 0.85) and

discriminant (rs= 0.31 to 0.60) validity. In addition, confirmatory factor analyses indicated adequate fit with the DSM-5 4-factor model, $\chi2(164)= 455.83$, $p< 0.001$, standardized root mean square residual (SRMR)= 0.07, root mean squared error of approximation (RMSEA)= 0.08, comparative fit index (CFI)=.86, and Tucker-Lewis index (TLI)= 0.84, and superior fit with recently proposed 6-factor, $\chi2(164)= 318.37$, $p< 0.001$, SRMR= 0.05, RMSEA= 0.06, CFI= 0.92, and TLI= 0.90, and 7-factor, $\chi2(164)= 291.32$, $p< 0.001$, SRMR= 0.05, RMSEA= 0.06, CFI= 0.93, and TLI= 0.91, models. Its validity and reliability have been studied in the Iranian population. (Sadeghi et al., 2016)

The Generalized Anxiety Disorder Scale (GAD-7): The GAD-7 is used to assess symptoms of generalized anxiety disorder. It consists of 7 items, rated on a 4-point scale with response categories from "not at all" to "nearly every day. The range of change of its score is from 0 to 21. Scores of 5, 10, and 15 are taken as the cut-off points for mild, moderate, and severe anxiety, respectively. Using the threshold score of 10, the GAD-7 has a sensitivity of 89% and a specificity of 82% for GAD. It is moderately good at screening three other common anxiety disorders - panic disorder (sensitivity 74%, specificity 81%), social anxiety disorder (sensitivity 72%, specificity 80%), and post-traumatic stress disorder (sensitivity 66%, specificity 81%)The GAD-7 has shown good reliability and construct validity (Kroenke et al., 2007; Löwe et al., 2008). GAD-7 validity and validity have been studied in the Iranian population (Naeinian et al, 2009).

The Beck Depression Inventory-II (BDI-II): The Depression Inventory (BDI-II) was developed by Beck in 1972 to measure depressive symptoms. This questionnaire is a short form of 13 self-report questions. There are several groups of questions in this questionnaire and each question expresses a situation in the individual. The questionnaire consists of a four-item scale with a score ranging from zero to three. The validity and reliability of this tool have been confirmed in various studies. The internal consistency was described as around 0.9 and the retest reliability ranged from 0.73 to 0.96. The correlation between BDI-II and the Beck Depression Inventory (BDI-I) was high and substantial overlap with measures of depression and anxiety was reported. The criterion-based validity showed good sensitivity and specificity for detecting depression in comparison to the adopted gold standard (Wang, & Gorenstein, 2013). Rajabi (Rajabi, 2004) reported Cronbach's alpha coefficient and halving for the whole questionnaire as 0.89 and 0.82 and the correlation coefficient between the short form and the 21-question form of the Beck Depression Inventory as 0.67.

The Grief Experience Questionnaire (GEQ): The Grief Experience Questionnaire (GEQ) was designed and developed to measure grief reactions (Barrett & Scott, 1989). This questionnaire has 31 questions that are scored on the Likert scale(Barrett & Scott, 1989). Its validity and validity have been studied in the Iranian population(Shairi et al., 2011).

Construct Validity

To analyze data and calculate descriptive indicators of SPSS software. 26 and AMOS-24 software was used. To determine whether Persian PG-13-R supports the single-factor structure similar to Prigerson et al. (2021), the confirmatory factor analysis method was used. Based on Kline's (2016) view, factor loads with negative values of less than 0.40 and more than 1 are excluded. Also, the extracted mean variance (AVE) was used to assess the convergent validity of the scale. AVE values greater than 0.4 were considered acceptable in this study (Hensler et al., 2015). The internal consistency of the scale was investigated using construct reliability (CR) and Cronbach's alpha method (α). Reliability values higher than 0.7 are acceptable for this scale (Elion et al., 2018)

Concurrent validity

To determine the simultaneous validity of Prigerson et al. (2021) PG-13-R scales using the correlation coefficient of PG-13-R scales with the Posttraumatic Disorder Stress Checklist (PCL-5), the Generalized Anxiety Disorder (GAD-7), The Beck Depression Inventory-II (BDI-II), and The Grief Experience Questionnaire (GEQ) were used.

Procedure

All participants participating in the study were unpaid. After signing the informed consent form,

participants were asked to answer online questionnaire questions designed in Google Forms. In this survey, demographic characteristics such as age, gender, marital status, education level, and relationship with the deceased were collected. It took 30 minutes for each participant to complete the online questionnaires on average. In addition, the Ethics Committee of Lorestan University of Medical Sciences approved the research process. All stages of the study were carried out by the guidelines and regulations of the test implementation.

Concurrent with the prolonged grief disorder scale (PG-13-R), other scales that had previously been translated into Persian and their validity and reliability were confirmed in the studies.

The back-translation technique was used to translate the English version of PG-13-R Prigerson et al. (2021) into Persian. At first, two English-Persian translators whose main language was Persian translated the PG-13-R scale. Two individuals translated the PG-13-R scale from English to Persian. Two translations were examined after a joint meeting and the existing contradictions were resolved. In the next step, a Persian literature expert edited the modified translation. The edited translation was provided to two fluent English translators to ensure the authenticity of the translation. In the next step, an English language specialist (reinstated to English by a highly qualified native English teacher in Persian without the knowledge of the English version of the PG-13-R scale) returned the text of the questionnaire to English. In the last step, the original version, along with the translated and re-translated version, was given to the third translator, who was fluent in both English and Persian. Finally, at this stage, the Persian version of PG-13-R was confirmed. After confirming the final version and resolving the ambiguities in a preliminary study, 30 people who had lost loved ones during the past 10 months were implemented, and minor problems in understanding the content of the questions were resolved.

Statistical analysis

In the first study and the exploratory factor analysis; The item performance of the PG-13-R symptom items (Q3-Q12) was evaluated within each dataset. This included inspection of item means and variances, and item-total correlations. Cronbach's alpha of the PG-13-R symptom items was used to evaluate the internal consistency (reliability) of the scale. All statistical analyses in the first study were performed using SPSS.27 software. In the second study, and confirmatory factor analysis, data were analyzed using AMOS.26 software. The concurrent validity of the questionnaire was examined using Pearson's correlation coefficient.

Results

In the face validity stage by qualitative method, all 15 respondents stated that 13 items measured the PG-13-R scale. In the quantitative stage, the impact factor for each of the PG-13-RP questions was 1.5, so all 13 questions of the questionnaire were preserved.

Table 1. Sample characteristics for the three bereavement studies

Age, years (mean±SD)	Study (N=285)	
	Male	Female
Time from loss, months (mean±SD)	13.18±1.50	13.38±1.42
Highest education, N (%)		
middle school	30 (22.9)	32 (20/8)
high school	35 (26.7)	38 (24.7)
Associate Degree	18 (13.7)	34 (22.1)
Bachelors Degree	34 (26)	36 (23.4)
MA	14 (10.7)	12 (7.8)
PhD	-	1 (0.6)
Relationship to the deceased, N (%)		
Partner/spouse	80 (61.0)	105 (68.18)
Other	51 (38.0)	49 (31.82)
Cause of death, N (%)		
Natural	100 (76.33)	110 (71.42)
Unnatural	31 (23.7)	44 (28.58)
Gender, N (%)	131 (46.0)	154 (54.0)

Face Validity

Before analyzing the data, the preliminary validity test was performed on the Persian translation of PG-13-R. At first, the scale was evaluated for face validity. In other words, the degree of agreement of the final experts is that IPS scale questions appropriately reflect the target structure (PG-13-R). Face validity was evaluated in two ways. At first, by following the method recommended by Boateng et al. (2018), it was evaluated qualitatively. Therefore, telephone interviews were conducted with 15 non-specialized Persian-speaking colleagues, each of whom was asked if they agreed that the PG-13-R scale questions showed aspects of prolonged grief disorder. In the second method, face validity was

evaluated quantitatively. Face validity was quantitatively assessed by a survey of 15 participants to determine the "impact score" for each question. After completing the questionnaires by the target group, the face validity was calculated by the quantitative method using the formula of the question effect method (Impact Score= Frequency (%), ×Importance).

In this context, "importance" means the level at which respondents agree that a question reflects the structure and the "frequency" of the number of answers.

Content Validity

Content validity was evaluated using two quantitative and qualitative stages. During the qualitative phase, 15 colleagues with experience in using qualitative techniques and familiarity with bereavement literature evaluated all 13 PG-13-R questions. To quantitatively assess content validity, the question content validity index (I-CVI) and content validity ratio (I-CVR) were calculated (Cook & Beekman, 2006). The value of the content validity index of the questions is calculated by dividing the number of experts who have chosen the option "3" and "4" by selecting one of the values of (1) "not at all" and 4 "is completely related". The content validity ratio of questions estimates the necessity of questions from theexperts' point of view. To determine the content validity ratio of scale questions, experts were asked about the necessity of each question using the "1" option "unnecessary" and the "3" option "necessary", which amounts to the total number of experts The question is considered necessary, minus the number of experts who have commented on the question, divided by the total number of experts, calculated according to Pollitt et al., (2007) I-CVI greater than 0.7 indicates acceptable content validity. For 15 experts, the I-CVR value greater than 0.49 indicates an acceptable content validity ratio (Lavasheh, 1975). In this way, the Content Validity Index (S-CVI) was calculated by counting the number of questions on a scale that received a "highly relevant" rating. S-CVI can be calculated using two methods: the Global Agreement (UA) between specialists and the average CVI (Scale/Average Content Validity Index), the second method being a more conservative method. S-CVI/UA is calculated by adding all I-CVI items equal to 1 and dividing by the total number of items, while S-CVI/Ave is calculated by summing up the content validity indicators of items and dividing by the total number of items. S-CVI/Ave equal to or greater than 0.9 indicates excellent content validity (Sebastião, & St Peter, 2018).

Table 2. Impact scores for the items of PG-13-RP scale

Item		Difficulty	Relevancy	Ambiguity
PG1	have you lost someone significant to you?	2.22	1.65	2.10
PG2	how many months has it been since your significant other died?	2.87	2.28	1.70
PG3	do you feel yourself longing or yearning for the person who died?	3.12	2.22	3.78
PG4	do you have trouble doing the things you normally do because you are thinking so much about the person who died?	4.80	4.80	4.50
PG5	do you feel confused about your role in life or feel like you don't know who you are any more (i.e., feeling like that a part of you has died)?	4.80	4.80	4.50
PG6	do you have trouble believing that the person who died is really gone?	3.69	3.28	2.1
PG7	do you avoid reminders that the person who died is really gone?	4.80	4.80	4.50
PG8	do you feel emotional pain (e.g., anger, bitterness, sorrow) related to the death?	3.28	3.87	4.40
PG9	do you feel that you have trouble re-engaging in life (e.g., problems engaging with friends, pursuing interests, planning for the future)?	4.90	5	5
PG10	do you feel emotionally numb or detached from others?	3.28	3.87	4.40
PG11	do you feel that life is meaningless without the person who died?	4.90	5	5
PG12	do you feel alone or lonely without the deceased?	3.28	3.87	4.40
PG13	have the symptoms above caused significant impairment in social, occupational, or other important areas of functioning?	2.22	1.65	2.10

All PG-13-RP questions with CVI were more than 0.7, indicating the acceptable content validity of the questionnaire (Table 1). In this study, because the Skewness values were in the range (-2 and -2), i.e. the variable is normal in terms of Skewness and its distribution is symmetric, also, the variable Kurtosis value was in this amplitude, these results show that the variable distribution has normal elongation.

Table 3. Factor loadings of both the exploratory and confirmatory factor analysis of the PG-13-RP scale

Item	CVI			CVR	M	SD	r	α	EFA	CFA	
	Difficulty	Relevancy	Ambiguity							β	CR
PG1	0.73	0.80	0.93	0.60	-	-	-	-	-	-	-
the PG2	1	0.80	0.87	0.60	-	-	-	-	-	-	
PG3	0.80	0.73	0.93	0.73	3.71	0.92	0.58	0.85	0.67	0.599	-
PG4	1	1	1	0.86	3.40	0.92	0.51	0.86	0.61	0.560	7.785
PG5	1	0.80	1	0.73	3.32	1.05	0.51	0.86	0.60	0.516	7.276
PG6	0.87	0.87	1	0.60	3.51	1.06	0.63	0.85	0.72	0.682	10.216
PG7	1	1	1	0.73	3.56	1.15	0.62	0.85	0.72	0.696	9.123
PG8	1	1	1	0.86	3.38	1.05	0.58	0.85	0.68	0.639	8.589
PG9	0.73	0.93	0.87	0.60	3.36	1.05	0.70	0.84	0.79	0.781	9.821
PG10	0.80	0.73	0.93	0.86	3.30	1.05	0.58	0.85	0.67	0.597	8.161
PG11	0.93	1	1	0.86	3.38	1.05	0.47	0.86	0.56	0.506	7.176
PG12	1	1	1	0.86	3.41	1.10	0.65	0.85	0.73	0.699	9.145
PG13	0.73	0.80	0.93	0.60	-	-	-	-	-	-	-

As seen in Table 3, the CVR and CVI index are more than what was observed, which indicates acceptable content validity. Also, thecorrelation coefficient and Cronbach's alpha were acceptable for each question.

Exploratory Factor Analysis

There were 285 cases used in EFA. The data demonstrated was adequate in carrying out this analysis (KMO= 0.892 and Bartlett's test with p< 0.001). The parallel analysis suggested the extraction of only one factor, and only one factor had an eigenvalue greater than 1 (factor 1= 4.642). This factor explained 46.416% of the total variance. The data demonstrated was adequate in carrying out this analysis (KMO= 0.892 and Bartlett's test with 1007.281, df= 45, p< 0.001). The parallel analysis suggested the extraction of only two factors, and only two factors had an eigenvalue greater than 1 (factor 1= 2.841 and factor 2= 2.704). This factor explained 55.444% of the total variance.

Confirmatory factor analysis

The acceptable cut-off scores for measurement fit indices are CMIN/DF (Chi-Square/Degree of Freedom) < 5; CFI (Comparative Fit Index) > 0.90; RMSEA (Root Mean Square Error of Approximation) < 0.08; TLI (Tucker-Lewis index) > 0.90; and GFI (Goodness of Fit Index) > 0.90 (Byrne, 2013). The findings revealed the model one Factor had appropriate measurement fit indices (CMIN/DF= 2.015, CFI= 0.95, RMSEA= 0.06, TLI= 0.94, GFI= 0.95, IFI= 0.95, NFI= 0.91, RFI= 0.89) and tow Factors (CMIN/DF= 1.950, CFI= 0.96, RMSEA= 0.06, TLI= 0.94, GFI= 0.95, IFI= 0.96, NFI= 0.92, RFI= 0.89).

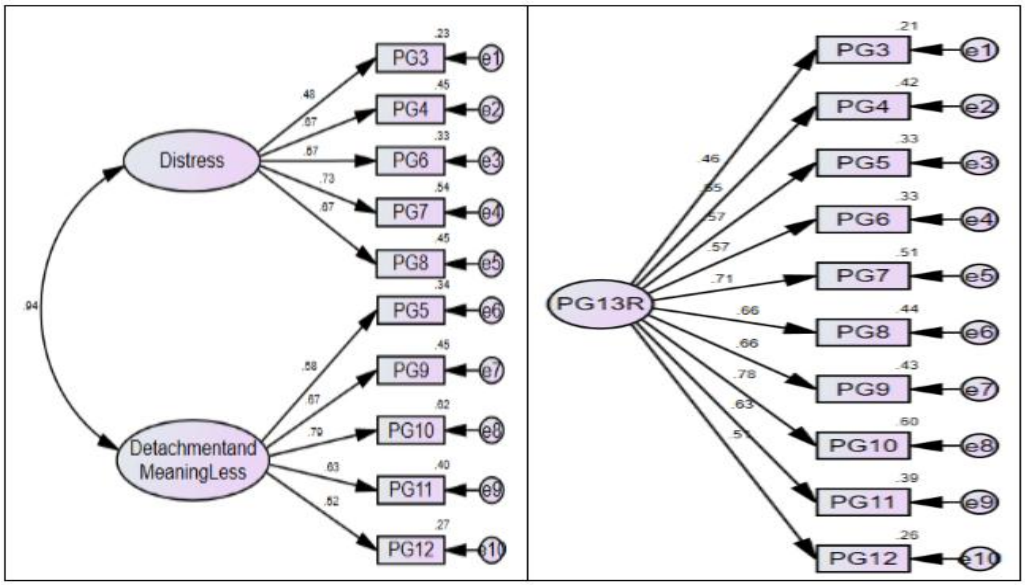

Figure 1. Confirmatory Factor Analysis estimates. Note factor 1: (χ2= 70.519; df= 35; p-value= 0.06) and factor 2: χ2= 66.312; df= 34; p-value= 0.06.

The factor loads of each question were higher than 0.50 by confirmatory factor analysis (CFA) method, in exceptional question 3, which met the criteria specified by Klein (2015) (Fig. 1). Therefore, the CFA for PG-13-RP among Iranian participants reflects the single-factor structure of the English PG-13-RP scale (Prigerson et al, 2021), indicating acceptable construct validity for the PG-13-RP scale. All goodness of fit indicators in this study had a good fit, which means that the brief, two-factor single-factor model satisfactorily represents the data. In addition, as stated in Table 1, all items have displayed good factor loading on the unseen factor (in a range from 0.46 to 0.78 for the single-factor model and 0.48 to 0.79 in the two-factor model and at the level of P≤ 0.001 are statistically significant) and it gives more support to the power of distributing items across the variable spectrum.

Construct Validity

The mean extracted variance (AVE) showed acceptable convergence validity (AVE=0.40), while the structural reliability (CR) value was 0.72 higher than the 0.70 cut proposed by Tabachnik and Fidel (2007) (CR>AVE), indicating acceptable internal consistency for the PG-13-RP scale questions. Finally, Cronbach's alpha coefficient (α) was 0.78 for Distress78 and 0.79 for Detachment and Meaning factor, and Cronbach's alpha coefficient (α) was 0.865 for men, 0.875 for women, and 0.87 for the whole scale, indicating good internal consistency. Also, in two two-factor models, the average extracted variance (AVE) for the distress factor (AVE= 0.40) and the factor (Detachment and Meaning Less) (AVE= 0.41), and the value of construct reliability The CR was 0.76 for the first factor (Distress) and 0.77 for Detachment and Meaning Less and 0.72 for the total PG-13-RP scale.

Table 4. Correlations among the measures

	M	SD	1	2	3	4	5
1. GAD	12.61	3.32	-				
2. PCL	53.28	10.55	0.62**	-			
3. BDI	22.02	4.58	0.55**	0.48**	-		
4. GEQ	54.32	9.82	0.81**	0.66**	0.82**	-	
5. PG-13-RP	45.78	11.59	0.35**	0.39**	0.23**	0.35**	-

p< 0.05* p< 0.001**

GAD= Generalized Anxiety Disorder, PCL= Posttraumatic Stress Disorder Checklist, BDI-II= Beck Depression Inventory, GEQ= Grief Experience Questionnaire and PG-13-RP= Prolonged Grief-13- Revised Persion

The results of the correlation coefficient showed that between generalized anxiety with PG-13-RP (r= 0.35, p< 0.001), post-traumatic stress disorder with PG-13-RP (r= 0.39, p< 0.001), depression with PG-13-RP (r= 0.23, p< 0.001) and bereavement experiences with PG-13-RP (r= 0.35, p< 0.001) there was a positive and significant relationship. Therefore, this study shows that PG-13-R translation for the general population is a reliable and valid measurement tool for bereavement measurement.

Conclusion

The results of this study showed that PG-13-R is a reliable and valid measurement tool that can be used to measure bereavement in mourning adults in Iranian culture. In the first study, the results of exploratory factor analysis by parallel analysis method showed that the Persian version of PG-13-R has a two-factor structure under the revised form. The two factors identified in the exploratory factor analysis included distress and detachment and lack of meaning, which explained 46.416% of the variance of the long-term grief scale. These results were in contrast to other studies that supported the single-factor structure of this scale. According to these results, it can be said that what defines prolonged grief disorder in Iranian culture is initially distress and then a lack of meaning and emotional detachment, which can be acceptable given the experience of grief in individuals. Because after losing loved ones, people usually experience severe distress, do not accept death, and are in a state of shock and denial. After time passes, this lack of meaning and retrieval of emotional memories with the deceased person provides the basis for avoiding and distancing from others and experiencing long-term grief.

In addition, in the second study, using the confirmatory factor analysis method, the results showed that the model fitting indicators for single-factor and two-factor structures have an acceptable fit. These findings support the results of studies examined regarding the single-factor structure of PG-13-R for example (Hwang et al., 2022; Keser et al., 2020; Kokou-Kpolou et al., 2022; Pohlkamp et al., 2018; Prigerson et al., 2021; Prigerson et al., 2009). The results of confirmatory factor analysis were consistent with exploratory factor analysis and confirmed the two identified factors. The model fit indices in single-factor and two-factor analysis were favorable. According to these results, the two-factor structure of grief can be supported by Iranian culture. The factor loadings in both single-factor and two-factor structures were not less than 40, which indicates the favorable factor loadings of this scale. The weakest performing item across all the datasets was "Do you feel yourself longing or yearning for the person who died?". It may be the case that yearning is more a function of Guilt, with roots in psychological trauma than a function of grief, with roots in an attachment disturbance. Alternately, there may be a need to revise the item to focus on what aspect of the loss is avoided (Guilt is closely related to the concept of remorse, regret, as well as shame. It is a self-conscious emotion that people generally feel after attempting something wrong either intentionally or accidentally). Future studies are needed to confirm whether the yearning item should be retained, revised, or discarded.

In addition, In the third study, The results of concurrent validity showed a positive relationship between PG-13-R with anxiety, post-traumatic stress disorder checklist of depression, and experience of bereavement. The results of studies by Prigerson et al., (2021) have shown that there is a moderate positive relationship between PG-13-R with post-traumatic stress disorder, major depression, generalized anxiety disorder, beck depression, short form of medical outcomes, and a weak negative relationship between meaning reconstruction and long-term sadness symptoms (Boelen et al., 2010; Gillies et al., 2015; Keser et al., 2020; Tsai et al., 2018). These studies have shown that emotions, thoughts, and physical symptoms, especially sadness, are common in long-term depression and bereavement (Friedman, 2012; Prigerson et al., 2021; Prigerson et al., 1995). Similarly, anxiety, and especially separation anxiety, is one of the basic components of long-term bereavement (Prigerson et al., 2021; Prigerson et al., 2009; Prigerson et al., 1995). The positive relationship between PG-13-R and depression and anxiety can be considered as a comorbidity between common structures of depression and bereavement. On the other hand, depression and other anxiety disorders, have a high comorbidity with long-term bereavement disorder (Boelen & Prigerson, 2007).

In explaining these results, it can be said, We speculate that separation distress during early bereavement might sensitize a person to loss reminders from the forthcoming anniversary, bringing on characteristic PGD symptoms: yearning for the eternally separated deceased, frequent preoccupying thoughts and memories of the deceased person, a feeling of disbelief or inability to accept the loss, and difficulty imagining a meaningful future without the deceased. The absence of social support may also prompt PGD symptoms, given the fragility of interpersonal relationships among those with profound depression (Wen et al., 2022). With reluctance to accept outside support, isolation and loneliness may evolve into characteristic PGD symptoms like difficulty trusting people and feeling distant from others.

One of the possible manifestations of the relationship between depression, anxiety, and post-traumatic stress disorder is that symptoms of depression and anxiety are associated with long-term bereavement symptoms. In addition, post-traumatic stress disorder can be both a consequence of bereavement and can be an outcome. So it is understandable that people who suffer from both bereavement and PTSD-related symptoms, to manage both conditions, they may experience the same coping strategies such as depression, anxiety, and physical symptoms. In addition, it seems that people have more negative beliefs about sharing or expressing their bereavement in front of others or social situations when faced with two types of unpleasant symptoms caused by PTSD

and PG. In other words, the common cognitive factor between bereavement and PTSD is social disconnection. Therefore, a lack of mourning in turn causes them to avoid social situations or tolerate them with distress (Smith & Ehlers, 2021)

EFA and CFA showed that PG-13-R, unlike the main one-dimensional PG-13 operating model, has a two-factor structure of distress and less detachment and meaning. The reported factor structures in other studies show intercultural consistency (Hwang et al., 2022; Keser et al., 2020; Pohlkamp et al., 2018). Although our CFA results showed that RMSEA and SRMR had a good fit in this study, this suitability showed an acceptable model for a two-factor structure.

In Kang and Lee's study (2017) with 706 mourning adults, the two-factor structure of PG-13-K was confirmed by traumatic distress and separation distress. In addition, in the Hwang et al (2022) study for PG-13-K, two factors of Traumatic distress and Separation distress were confirmed. Studies have shown that PGD may be distinguishable by two factors: Sveen et al (2020) on the other hand showed Separation distress and identity/social disorder as PG-13 factors. Therefore, the factor structure of PG-13-R in different fields may be different from the original study which considers a one-dimensional structure, especially with cultural characteristics and reported samples. Previous studies have conducted psychometric properties of PG-13 in Western and Eastern countries, including South Korea and China. In addition, the factor structure of PG-13-R is investigated for the first time in Iran, which has a very different cultural structure with East Asian cultures and European countries. In Iranian culture, men and women usually show their mourning at a cognitive or behavioral level, control their emotions very much, and try to start a new life very soon. On the other hand, accepting the death of loved ones and coping with their absence may lead to years due to the subcultures in which they exist. While in other cultures it is likely to talk about losing them with others, experience their bereavement effectively and emotionally, and seek outside support that the use of these strategies can accompany them to accept the death of loved ones. Also, In Iranian culture, due to its collectivism, when people lose loved ones, everyone participates in mourning ceremonies and sympathizes with the survivors rather than empathizing. The main feature of mourning in Iranian culture is the prolonged denial of the loss (lack of empathy); in other words, when they lose a loved one, those around them and society prevent them from experiencing sadness, sadness, and anxiety and do not allow them to mourn their loved ones; which leads to the suppression of emotions and feelings. On the other hand, the lack of emotional expression (sadness, crying, sadness) in some Iranian cultures indicates that the survivors are strong, which prevents them from mourning at the appropriate time and a few months later, the person suffers from delayed grief. Delayed grief causes mental problems including depressive disorders, anxiety disorders, bipolar disorder, obsessions, sleep disorders, eating disorders, feelings of anger, guilt, suicide, a tendency to use drugs, and so on (Javadi, & Sajadian, 2020).

In other explanations, it can be said that in Iranian culture, in addition to emotional and behavioral mechanisms, cognitive mechanisms cause the continuation of bereavement in them.

These cognitive mechanisms, which are mostly due to conflict with the deceased person, include the splitting and mythologization of the deceased person, and rumination, self-concept, guilt, and non-acceptance of the reality of death in survivors, which is why this cognitive mechanism, along with the emotional mechanism, including lack of affective support from relatives, lack of empathy, inability to express emotions and evacuate them at home, and emotional inhibition. It can be one of the other cultural factors involved in the continuation of mourning in Iranian culture.

The results also showed that PG-13-R has the necessary reliability like other studies conducted in other cultures(Hwang et al., 2022; Işıklı rt al., 2022; Pohlkamp et al., 2018; Prigerson et al., 2021; Prigerson et al., 2009; Tsai et al., 2018)

The results of this study showed that PG-13-R and its subscales had a desirable Cronbach's alpha coefficient and structural reliability coefficient. Therefore, considering the construct validity and acceptable reliability, PG-13-R is a suitable

measuring tool for evaluating PGD symptoms in Iranian adults.

Strengths and limitations

The strong point of this study was that the data were obtained from two samples that represented Iranian culture. To date, no cross-cultural study of PG-13-R has evaluated psychometric properties based on data from two appropriate samples. Despite having strengths, the present study has several limitations, including the limitations of this study, and the type of research project that was cross-sectional. This does not allow us to investigate causality in the relationships between variables and the reliability of PG-13-R. In addition, in this study, the reliability of test-retest has not been investigated. Bias in accountability is one of the limitations of self-report questionnaires, including PG-13-R. One of the limitations of this study was to implement a questionnaire and assess the psychometric properties of adults aged 20 to 67 years. Therefore, further validation studies should be conducted with different age groups and according to subcultures, including Iranian adolescents and adults. Finally, in this study, the differential validity of PG-13-R has not been investigated.

Implications

In short, this study supports PG-13-R as a suitable tool for measuring PGD symptoms in mourning adults. Instead of a single-dimensional structure, PG-13-R confirmed two factors with reliability, convergent validity, and construct validity. Due to its validity and reliability and for research and clinical purposes, accurate implementation of PG-13-R for mourners is a matter worth considering. Therefore, the use and application of psychological tests regardless of socio-cultural, socioeconomic-racial, and racial considerations is not free of problems. On the other hand, a review of the scales in Iran indicates the shortage of standardized tests in the field of bereavement. However, Iran has always been exposed to various natural and abnormal disasters in the past. Therefore, the existence of valid bereavement measurement tools helps clinical professionals to use them in the diagnosis and planning of treatment programs, which can lead to an increase in psychological knowledge in the field of bereavement. Therefore, since PG-13-R is a self-report scale, it can measure the symptoms of bereavement in mourning families and those who have lost relatives or have suffered traumatic events or natural disasters.

Ethical Considerations

Compliance with ethical guidelines: To maintain the observance of ethical principles in this study, an attempt was made to collect information after obtaining the consent of the participants. Participants were also reassured about the confidentiality of the protection of personal information and the presentation of results without mentioning the names and details of the identity of individuals

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Authors' contribution: Conceptualization, the idea of the first author, the analysis and supervision of the second author, and the implementation and analysis of the data were performed by the third author.

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