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Research paper

Testing the distinctiveness of prolonged grief disorder from posttraumatic stress disorder and depression in large bereaved community samples

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ABSTRACT

Background: This study sought to test the distinctiveness of symptoms of prolonged grief disorder (PGD) from posttraumatic stress disorder (PTSD) and depression.
Methods: Confirmatory factor analysis (CFA) and target exploratory factor analysis (EFA), were used to test the distinctiveness of PGD from PTSD and depression symptoms in a large sample of adults bereaved for at least six months ($N = 1917$). Identified factors were explored in relation to demographic (i.e., age, gender) and loss-related (i.e., time since bereavement, nature of death, relationship to deceased, age of deceased, and frequency of contact with deceased) correlates.
Results: The CFA model provided a good fit to the data, while the target EFA provided a slightly improved fit. All items loading strongly and significantly onto their respectively factors, and the IGQ items had few significant cross-factor loadings. All demographic and loss-related variables (except for death of a sibling and death from other causes) were associated with each of the factors, however, these associations were strongest for the PGD factor.
Limitations: Participants were recruited using a non-probability sampling method and were from a relatively affluent Western nation.
Conclusion: Findings from the current study demonstrate that PGD reflects an empirically distinguishable albeit related disorder to PTSD and depression in a sample of bereaved adults. The identification of correlates common to PGD, PTSD, and depression, as well as those unique to PGD, affords a comprehensive understanding of the risk factors associated with bereavement-related psychopathology.

1. Introduction

Prolonged Grief Disorder (PGD) is included in the 11th edition of the International Classification of Diseases (ICD-11; World Health Organization [WHO], 2022). In the ICD-11, the two core symptoms of PGD are longing or yearning for and/or preoccupation with the deceased, and they must be accompanied by one or more associated symptoms including sadness, guilt, anger, and difficulty accepting the death. Additionally, the PGD symptoms must cause significant functional impairment, persist for at least six months following the loss and exceed what is considered typical according to one's cultural, social, and religious norms (WHO, 2022). There is a growing body of evidence supporting the construct validity of ICD-11 PGD (e.g., Boelen et al., 2019; Boelen et al., 2018a, 2018b; Hyland et al., 2023), while international estimates indicate that 13 % of the bereaved adult population are affected by the disorder (Comtesse et al., 2024).

Beyond PGD, other psychological disorders including depression and posttraumatic stress disorder (PTSD) can also develop following the death of a loved one (Jordan and Litz, 2014). Research has shown a high degree of co-occurrence among these disorders; over 70 % of PGD cases also have clinically relevant levels of depressive and PTSD symptoms (for review see Komischke-Konnerup et al., 2021). At the symptom level, there are significant overlaps among the disorders, such as similarities in symptom description (e.g., "*Feeling sad or emotionally numb*" for PGD and "*felt down or depressed*" for depression) or phenomenological similarities (e.g., "*Thinking too much about the deceased*" in PGD and "*having powerful*

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images or memories" in PTSD). Nevertheless, there are also many clear distinctions. For instance, while both PGD and PTSD exhibit similarities in intrusion symptoms, PTSD symptoms are associated with fear, whereas PGD symptoms can often be bittersweet (Maercker and Lalor, 2012). Moreover, avoidance is a characteristic of both PGD and PTSD; however, in PGD, it is linked to reminders of the loss and its permanence, whereas in PTSD, it is linked to safety concerns or limiting potential harm (Szuhany et al., 2021). In terms of how they differ from depression, PGD symptoms are focused on the death of a loved one, whereas depressive symptoms are more generalised and less related to the loss itself (Kristensen et al., 2017). Moreover, certain PGD symptoms, like trouble accepting the loss, are not relevant to depression, while certain depression symptoms, such as feelings of worthlessness, are not relevant to PGD (Jordan and Litz, 2014).

Studies using confirmatory factor analysis (CFA) (Boelen et al., 2010; Boelen and van den Bout, 2005; Lenferink et al., 2021) have demonstrated how PGD represents a distinct, albeit related, construct to PTSD and depression. While these studies provide promising support for the conceptual distinctiveness of PGD, most were conducted prior to the inclusion of PGD in the ICD-11, or used measures which were not designed to accurately capture the symptom content of PGD as outlined in the ICD-11. Furthermore, a "simple structure" method like CFA, where each symptom is specified to load onto just one factor, is potentially problematic given the high degree of symptom overlap among PGD, depression, and PTSD (e.g., Komischke-Konnerup et al., 2021). It is very likely, therefore, that cross-factor loadings will be non-zero, and a CFA approach cannot incorporate these elements. Failure to recognise cross-factor loadings, even small effects, has the consequence of inflating correlations between factors (Asparouhov and Muthén, 2009). The upshot of this is that the traditional CFA approach may lead to erroneous interpretations of the strength of the associations between the disorders.

Exploratory factor analytic (EFA) approaches might offer a superior approach to tackling this issue due to its capacity to incorporate cross-factor loadings. However, EFA is normally executed using a rotation method that permits every item to load on every factor extracted. Where the assumption of CFA that all items have no relation to their non-target factor is likely to be overly strict, the assumption of traditional EFA that all items relate to all factors may be overly lenient. A middle ground is needed. One potentially useful approach can be found in target rotation-based EFA (hereafter referred to as target EFA), which incorporates the exploratory nature of EFA (Asparouhov and Muthén, 2009) while maintaining the theory-driven specification of CFA used in earlier studies (e.g., Boelen et al., 2010; Boelen and van den Bout, 2005; Lenferink et al., 2021). Target EFA allows researchers to specify a priori which items should load on to which factor (akin to CFA), while allowing for items to also load on to other factors where these effects may also be significant. By using target EFA, it is possible to provide a more fine-grained assessment of the distinctiveness of PGD, PTSD, and depression symptoms than has hitherto been conducted. Moreover, this approach may identify cross-cutting symptoms, and by allowing for cross-factor loadings, provide a more accurate assessment of the true association between these constructs.

This primary aim of this study was to test the distinctiveness of symptoms of PGD to those of depression and PTSD. Given that prior studies have supported a three-factor model when employing CFA methods (e.g., Boelen et al., 2010; Boelen and van den Bout, 2005; Golden and Dalgleish, 2010), it was anticipated that three separate factors corresponding to PGD, PTSD, and depression would be identified. However, it was expected that a simple structure model (i.e., one estimated using CFA) would not yield close fit to the data (due to the unmodelled presence of cross-factor loadings), and therefore that a three-factor target EFA solution would fit the data more closely. A secondary aim of this study was to identify unique predictors of PGD symptoms in the context of both PTSD and depression symptoms. Based on prior research, it was anticipated that unique predictors of PGD would include bereavement timeframe, age of the deceased, relationship to deceased (i.e., death of a partner or child), and nature of the death (i.e., unexpected, or violent/unnatural) (Buur et al., 2023; Djelantik et al., 2020; Shevlin et al., 2023a, 2023b).

2. Methods

2.1. Participants and procedures

This study used data collected from a sample of bereaved adults from the United Kingdom (UK: $N = 1012$) and the Republic of Ireland (Ireland: $N = 1011$). Quota sampling was employed by the survey company Qualtrics, who recruited participants in each nation based on the sex, age, and geographic distributions of the populations in the UK and Ireland, respectively. Eligible participants were aged 18 years or older, were residing in the UK or Ireland, could complete the survey in English, and had experienced a bereavement in their lifetime. The UK data were collected between 19 April and 13 August 2022, and the Irish data were collected from 21 April 2022 and 12 September 2022. Ethical approval for the collection of all data was provided by the research ethics committee at Ulster University. Due to the ICD-11 PGD criteria requiring symptoms to be present at least six months post-loss, those bereaved six months or less were excluded from the analysis ($n = 267$). The final analytic sample comprised 1917 participants. The gender ratio of the sample was equal, with 52 % of the sample being female ($n = 997$) and 47.6 % of the sample ($n = 912$) being male. The average participant age was 45.45 years (SD = 15.62, range: 18–88 years) and more than two thirds of the sample (66.7 %; $n = 968$) were employed.

2.2. Materials

ICD-11 PGD: Symptoms of PGD were measured using the five-item International Grief Questionnaire (IGQ; Hyland et al., 2023). Respondents were asked to indicate how often they have been bothered by each of the symptoms in the last week using a five-point Likert scale ranging from 0 (*not at all*) to 4 (*extremely*). An additional item assessed the degree to which symptoms are perceived to exceed social, cultural, or religious norms using three response options "no," "yes," and "I don't know". Functional impairment is assessed by a single question with "yes" or "no" response options. The IGQ can be used to measure symptom severity by summing responses to the five questions, producing possible scores ranging from 0 to 20. The internal reliability of the IGQ was excellent in the total sample: Cronbach's $\alpha = 0.94$.

ICD-11 Depressive Disorder: Symptoms of depression were measured using the nine-item International Depression Questionnaire (IDQ; Shevlin et al., 2023). Respondents were asked to indicate how often they had been bothered by each of the symptoms using a five-point Likert scale ranging from 0 (*never*) to 4 (Every day). There is an additional question measuring functional impairment ('*Have these experiences caused problems in personal, family, social, educational, occupational, or other important areas of your life?*') that is answered on a 'Yes' or 'No' basis. The IDQ can be used to measure symptom severity by summing responses to the nine questions, producing possible scores ranging from 0 to 36. The internal reliability of the IDQ was excellent in the total sample: Cronbach's $\alpha = 0.95$.

ICD-11 PTSD: Symptoms of grief-related PTSD were assessed using the International Trauma Questionnaire (ITQ; Cloitre et al., 2018). The ITQ includes six items measuring all symptoms of ICD-11 PTSD. Respondents were asked to indicate how bothered they have been about each PTSD symptom over the past month using a five-point Likert scale ranging from 0 (*not at all*) to 4 (*extremely*). The ITQ can be used to measure symptom severity by summing responses to the six questions, producing possible scores ranging from 0 to 24. The internal reliability of the IDQ was excellent in the total sample: Cronbach's $\alpha = 0.93$.

Demographic and loss-related factors: Demographic factors included age (measured in years), sex (0 = male, 1 = female), and country of

residence (0 = Ireland, 1 = UK). Loss-related factors included time since bereavement (continuous) and age of deceased (in years). Frequency of contact with deceased was assessed by providing participants with the following instructions "*In the year before their death, on average how often were you in contact with them? This would include meeting in person as well as telephone calls, video calls, text messages, emails, cards, letters, and contact via social networking sites*". Six response options were provided (1 = every day, 2 = almost every day, 3 = several times a week, 4 = several times a month, 5 = a few times in the year, 6 = not at all during that year). For the purposes of the present study, this was treated as a continuous variable. Experiences of bereavement were assessed by the statement "People often experience multiple bereavements during their lifetime. Please indicate who you have lost…", and this was followed by a list where multiple bereavements could be identified (Yes/No): Child, Partner or spouse, Parent, Brother or sister, Grandparent, Uncle/aunt, Cousin, Niece/nephew, Close personal friend, Colleague, Acquaintance. A follow-up question asked to identify "Which of these affected you most?" and one option had to be selected. Some of the 11 original options were combined to produce 6 categories: (1) Death of a child, (2) death of a partner/spouse, (3) death of a parent, (4) death of sibling, (5) death of extended family (i.e., grandparents, auntie/uncle, cousins, niece/nephew) and (6) death of friend (i.e., close friend, colleague or acquaintance). Participants were also asked to indicate the nature of the death (1 = anticipated natural, 2 = unexpected natural, 3 = sudden unnatural, 4 = suicide, and 5 = other). For the purposes of the present study, this variable was dummy coded with anticipated natural death as the reference category.

2.3. Analytic plan

First, descriptive statistics were calculated for the individual IGQ, IDQ, and ITQ items. Next, a series of CFA and EFA models were estimated. Two CFA models were evaluated: a one-factor model where all PGD, depression, and PTSD items loaded onto a single latent variable and a three-factor model where all PGD items loaded onto a 'grief' latent variable, all depression items loaded onto a 'depression' latent variable, and all PTSD items loaded onto a 'PTSD' latent variable. A three-factor EFA with target rotation[1] was also tested. In these models all cross-factor loadings, or target loadings, were specified to be zero. The estimation of the model aimed to find a rotated solution that is closest to this pre-specified loading matrix (Asparouhov and Muthén, 2009).

After the best model was identified, the latent variables were regressed on a set of predictor variables. There were demographic variables (age, sex), bereavement variables (time since loss, age of deceased, contact with the deceased), nature of death (unexpected natural, sudden unnatural, suicide, other), and variables representing relationship to the deceased (child, partner, parent, sibling, extended family, friends/acquaintances). The predictor variables were specified as being correlated as were the residuals for the latent variables. A binary variable representing country (UK/Ireland) was included in the model to control for any potential country-level differences. All models were specified and estimated using Mplus (Version 8.9; Muthén and Muthén, 2017) and robust maximum likelihood estimation (MLR; Yuan and Bentler, 2000).

Numerous fit statistics were used to evaluate the goodness of fit for each model (both CFAs and EFAs): the chi-square statistic where a non-significant value indicates acceptable model fit; comparative fit index (CFI; Bentler, 1990) and Tucker–Lewis Index (TLI; Tucker and Lewis, 1973) where values of 0.90 or above and 0.95 or above indicate acceptable and excellent model fit, respectively; the root mean square error of approximation (RMSEA; Browne and Cudeck, 1992) where values of 0.08 or lower and 0.05 or lower indicate "reasonable approximation" and "close" model fit, respectively; and the standardized root mean square residual (SRMR; Jöreskog and Sörbom, 1981) where values of 0.08 or lower indicate a good fit. Additionally, three parsimony-corrected fit indices were inspected: the Bayesian information criterion (BIC; Sclove, 1987), sample size–adjusted BIC (ssaBIC; Sclove, 1987), and Akaike information criterion (AIC; Akaike, 1987); smaller values on each of these fit indices indicate better model fit. The model with the lowest BIC was the best model, with differences ≥10 being considered strong evidence for the selection of the lower BIC model (Raftery, 1995). Moreover the Satorra-Bentler scaled chi-square difference test (Satorra and Bentler, 2001) was used to compare models. A statistically significant *p*-value (<0.05) indicated that the freely estimated model provided superior fit over the constrained model.

Finally, chi-square tests of association were used to investigate the relationship between the proportion of participants who met diagnostic requirements for probable ICD-11 PGD, PTSD, and depressive disorder. The strength of the associations were quantified using Cramer's V (<0.2 = weak, 0.2–0.6 = moderate, >0.6 = strong).

3. Results

3.1. Descriptive statistics

Of the total sample, almost two thirds reported the death of a parent (56.8 %; $n = 1088$), 12.7 % ($n = 244$) reported the death of a child, and 10.9 % ($n = 208$) reported the death of a partner or spouse. Almost all participants reported the death of extended family (95.9 %; $n = 1838$) and a close friend, colleague, or acquaintance (82.9 %; $n = 1590$). Almost half of bereavements were from anticipated natural deaths (48.9 %; $n = 938$), while a third were from unexpected natural deaths (34.2 %; $n = 656$), 8.2 % ($n = 157$) were from sudden unnatural deaths, 5.0 % ($n = 96$) were from suicide, and 3.7 % ($n = 70$) were deaths from other causes. Mean items and scale scores for the IGQ (PGD), IDQ (depression), and ITQ (PTSD) are presented in Table 1. The mean score for the IGQ was 5.57 (SD = 5.60, Range = 0–20), for the IDQ was 10.11 (SD = 5.60, Range = 0–20), and for the ITQ was 5.19 (SD = 6.18, Range = 0–24).

3.2. CFA and EFA results

The fit statistics for the CFA and target EFA models are reported in Table 2. The one-factor CFA provided a poor fit to the data, while the three-factor CFA model provided reasonably close fit to data. The target EFA with three factors was also a close fit to the data and appeared to be a slightly closer fit to the data than the three-factor CFA model based on the CFI and SRMR results. Furthermore, the AIC, BIC, and ssaBIC values were all substantially lower for the three-factor target EFA model compared to the three factor CFA model. Moreover, a Satorra–Bentler scaled chi-square difference test ($\chi^2 = 241.90$, ▲df = 34, $p < .001$) indicated that the target EFA provided a significant improvement in fit and was therefore, selected as the best model.

The factor loadings for the three-factor CFA model and the three-factor target EFA model are shown in Table 3. In the target EFA model, factor 1 was clearly defined by the five PGD items, factor 2 was clearly defined by the six PTSD items, and the factor 3 was clearly defined by the nine depression items. Notably, the loadings of the grief, PTSD, and depression items on their target factor were very similar for the CFA and target EFA models.

There was evidence of some significant cross-factor loadings, although all of these were small. For factor 1 (PGD), two depression items and three PTSD items loaded significantly and positively onto this factor. For factor 2 (PTSD), two depression items and one PGD item loaded significantly and positively on this factor, while one PGD item loaded negatively and significantly on this factor. For factor 3 (depression), one PGD item and four PTSD items loaded positively and

[1] As a point of comparison, one to three factor EFAs with the conventional Geomin rotation were also examined. The fit statistics and solution for these models are available in Supplementary Materials.

Table 1
Descriptive statistics for the International Grief Questionnaire (IGQ), International Depression Questionnaire (IDQ), and International Trauma Questionnaire (ITQ).

	M	95 % CI	*SD*	*Mdn*	Range	Skew	Skew *SD*
IGQ items							
1. Yearning for the deceased almost every day.	1.17	[1.11, 1.22]	1.21	1.00	0–4	0.78	0.06
2. Thinking too much about the deceased almost every day.	1.07	[1.01, 1.12]	1.21	1.00	0–4	0.88	0.06
3: Feeling guilty or angry about my loss.	0.98	[0.92, 1.03]	1.22	0.00	0–4	1.03	0.06
4: Having trouble accepting the death of my loved one.	1.12	[1.06, 1.18]	1.29	1.00	0–4	0.87	0.06
5: Feeling sad or emotionally numb	1.24	[1.18, 1.30]	1.27	1.00	0–4	0.74	0.06
Total IGQ score	5.57	[5.32, 5.82]	5.60	4.00	0–20	0.83	0.06
IDQ items							
1. Felt down or depressed *for most of the day*?	1.14	[1.09, 1.19]	1.16	1.00	0–4	0.86	0.06
2. Experienced less interest or pleasure from normal activities *for most of the day*?	1.14	[1.09, 1.20]	1.14	1.00	0–4	0.83	0.06
3. Have had difficulty concentrating?	1.31	[1.25, 1.36]	1.25	1.00	0–4	0.65	0.06
4. Had feelings of worthlessness or guilt?	1.07	[1.02, 1.13]	1.27	1.00	0–4	0.93	0.06
5. Felt hopeless?	1.09	[1.03, 1.15]	1.28	1.00	0–4	0.92	0.06
6. Had recurrent thoughts of death or suicide?	0.64	[0.59, 0.69]	1.08	0.00	0–4	1.71	0.06
7. Have had changes in appetite or sleep?	1.09	[1.03, 1.14]	1.22	1.00	0–4	0.91	0.06
8. Moved slower or felt more restless?	1.16	[1.10, 1.21]	1.23	1.00	0–4	1.16	1.23
9. Experienced reduced energy or fatigue?	1.47	[1.41, 1.53]	1.31	1.00	0–4	1.47	1.31
Total IDQ score	10.11	[9.70, 10.52]	5.60	8.00	0–20	0.83	0.06
ITQ items							
1. Having upsetting dreams that replay part of the experience or are clearly related to the experience?	0.95	[0.90, 1.00]	1.18	0.00	0–4	1.07	0.06
2. Having powerful images or memories that sometimes come into your mind in which you feel the experience is happening again in the here and now?	1.03	[0.98, 1.08]	1.17	1.00	0–4	0.92	0.06
3. Avoiding internal reminders of the experience (for example, thoughts, feelings, or physical sensations)?	0.96	[0.90, 1.01]	1.17	1.00	0–4	1.01	0.06
4. Avoiding external reminders of the experience (for example, people, places, conversations, objects, activities, or situations)?	0.91	[0.86, 0.96]	1.15	0.00	0–4	1.01	0.06
5. Being "super-alert", watchful, or on guard?	1.04	[0.98, 1.09]	1.26	1.00	0–4	1.08	0.06
6. Feeling jumpy or easily startled?	1.04	[0.99, 1.10]	1.29	0.00	0–4	0.94	0.06
Total ITQ	5.93	[5.65, 6.21]	6.18	4.00	0–24	0.88	0.06

significantly on this factor.

Factor correlations for the CFA and EFA with target rotation models are provided in Table 4. In the CFA the factors were positively and strongly correlated ranging from 0.70 to 0.79, and slightly lower for the target EFA (0.68 to 0.78). Furthermore, bivariate correlations between all items are provided in Supplementary Table 1.

3.3. Predictors of the EFA with target rotation factors

The standardized regression coefficients for each predictor variable and the PGD, PTSD, and depression latent factors derived via the target EFA are provided in Table 5. A significant proportion of variance was explained in each of the latent variables whereby 25.4 % of the variance in the PGD latent variable was explained, 23.3 % in the PTSD variable was explained, and 20.6 % in the depression factor was explained. Age, time since bereavement, and frequency of contact with the deceased were negatively associated with all three factors. The effects for time since bereavement and frequency of contact with the deceased were strongest for the PGD factor. Living in the UK compared to Ireland, experiencing the death of a child, and the death of a partner were significantly associated with all three factors. Again, these effects were strongest for the PGD factor. Finally, sudden unnatural death (compared to expected natural death) and the death of a parent were positively associated with the PGD and PTSD factors, and these effects were only marginally stronger for the PGD factor. Both death from other causes (as compared to expected natural death) and the death of a sibling were uniquely associated with the PGD factor.

Table 2
Fit statistics for the CFA and EFA models.

Model	Chi-square (df)	AIC	BIC	ssaBIC	CFI	TLI	RMSEA (95 % C.I.)	SRMR
CFA								
One factor model	5718.843 (170), p < .001	96,724.743	97,058.254	96,867.633	0.743	0.713	0.130 (0.128, 0.133)	0.084
Three factor model	1340.935 (167), p < .001	89,437.078	89,787.265	89,587.113	0.946	0.938	0.061 (0.058, 0.064)	0.032
EFA with target								
Three factor model	1095.102 (133), p < .001	89,156.653	89,695.829	89,387.659	0.955	0.936	0.061 (0.058, 0.065)	0.020

Table 3
Factor loadings for the three factor CFA and target models.

	PGD		PTSD		Depression	
	CFA	Target	CFA	Target	CFA	Target
IDQ1: Felt down or depressed *for most of the day*?		**0.068**[a]		0.027	**0.850**	**0.820**
IDQ2: Experienced less interest or pleasure from normal activities *for most of the day*?		0.009		0.014	**0.859**	**0.862**
IDQ3: Have had difficulty concentrating?		0.034		0.012	**0.835**	**0.852**
IDQ4: Had feelings of worthlessness or guilt?		0.034		0.035	**0.864**	**0.867**
IDQ5: Felt hopeless?		0.036		0.027	**0.872**	**0.867**
IDQ6: Had recurrent thoughts of death or suicide?		0.068		**0.115**	**0.702**	**0.566**
IDQ7: Have had changes in appetite or sleep?		0.002		**0.075**	**0.823**	**0.768**
IDQ8: Moved slower or felt more restless?		0.021		0.017	**0.861**	**0.866**
IDQ9: Experienced reduced energy or fatigue?		**0.085**		0.031	**0.821**	**0.907**
IGQ1: Yearning for the deceased almost every day.	**0.850**	**0.905**		0.034		0.027
IGQ2: Thinking too much about the deceased almost every day.	**0.877**	**0.939**		**−0.058**		0.010
IGQ3: Feeling guilty or angry about my loss.	**0.866**	**0.831**		0.033		0.008
IGQ4: Having trouble accepting the death of my loved one.	**0.898**	**0.872**		0.048		0.024
IGQ5: Feeling sad or emotionally numb	**0.880**	**0.730**		**0.077**		**0.116**
ITQ1: Having upsetting dreams		0.064	**0.795**	**0.750**		0.020
ITQ2: Having powerful images or memories		**0.162**	**0.812**	**0.677**		0.007
ITQ3: Avoiding internal reminders of the experience		**0.062**	**0.859**	**0.977**		**0.069**
ITQ4: Avoiding external reminders of the experience		**0.061**	**0.854**	**0.969**		**0.066**
ITQ5: Being "super-alert", watchful, or on guard?		0.007	**0.812**	**0.757**		**0.065**
ITQ6: Feeling jumpy or easily startled?		0.014	**0.824**	**0.697**		**0.171**

[a] **Note:** Items that are highlighted are the primary loadings.

Table 4
Correlations between PGD, PTSD, and depression factors for the CFA and EFA with target.

	PGD	PTSD	Depression
PGD		0.789	0.700
PTSD	0.776		0.733
Depression	0.683	0.726	

Note: upper diagonal are the factor correlations for the CFA, below are for the EFA with target.
All correlations are significant at p < .001.

3.4. Association between probable PGD, depression, and PTSD caseness

Of the total sample, 18.4 % ($n = 353$, 95 % CI. = 16.7 %, 20.2 %) met diagnostic requirements for probable ICD-11 PGD. There was a positive association between meeting diagnostic requirements for probable ICD-11 PGD and ICD-11 PTSD (χ^2 (1) = 84.83, $p < .001$, OR = 5.03), and this effect was moderate (V = 0.21). Specifically, of those who met diagnostic requirements for probable ICD-11 PGD, 20.7 % ($n = 73$) also met diagnostic requirements for probable ICD-11 PTSD. Moreover, there was also a positive association between meeting diagnostic requirements for ICD-11 PGD and depression (χ^2 (1) = 376.743, p < .001, OR = 13.55), and this effect was also moderate (V = 0.44). Specifically, of those who met diagnostic requirements for probable ICD-11 PGD, 42.2 % ($n = 149$) also met diagnostic requirements for probable ICD-11 depressive disorder. Finally, there was a positive association between meeting diagnostic requirements for probable ICD-11 PGD and either ICD-11 PTSD or ICD-11 depressive disorder (χ^2 (1) = 422.64, p < .001, OR = 13.04), and this effect was moderate (V = 0.47). Specifically, of those who met diagnostic requirements for probable ICD-11 PGD, 51.6 % ($n = 182$) also met diagnostic requirements for probable ICD-11 PTSD or depression.

4. Discussion

The primary aim of this study was to test the distinctiveness of symptoms of PGD to those of depression and PTSD in a sample of bereaved adults from the UK and Ireland using a relatively novel statistical approach, namely target-rotation based EFA. This study also sought to examine demographic and loss-related predictors of PGD, PTSD, and depression.

Overall, the results provided reasonably strong support for the distinctiveness of ICD-11 PGD from PTSD and depression at both the item and construct levels. The correlated three-factor CFA model was a reasonable representation of the sample data, while the three factor EFA model with target rotation provided a *slightly* better fit to the data. The CFA model's strong fit was somewhat unexpected, especially considering that earlier CFA research (Boelen et al., 2010) required the inclusion of several correlated error terms in order to reach an acceptable fit, suggesting the presence of unmodelled significant cross-factor loadings. The slightly better fit of the three-factor EFA with target rotation is likely due to the presence of several statistically significant cross-factor loadings, but none of these were of a substantial magnitude (hence the only slight improvement in model fit for the target EFA solution). Unmodelled cross-factor loadings have the effect of artificially

Table 5
Predictors of PGD, PTSD, and depression latent variables from target EFA.

	PGD		PTSD		Depression	
	B	SE	B	SE	B	SE
Age	**-.25*****	.03	**-.34*****	.03	**-.35*****	.03
Sex	.01	.02	-.03	.02	**.05***	.02
Country	**.08*****	.02	**.09** ***	.02	**.09*****	.02
Time since bereavement	**-.22*****	.02	**-.16*****	.02	**-.12*****	.02
Age of deceased	-.04	.03	**-.06***	.03	**-.04***	.03
Contact with the deceased	**-.25*****	.02	**-.16*****	.02	**-.13*****	.02
Nature of death						
Unexpected natural death	.02	.02	.00	.02	.-.01	.02
Sudden unnatural death	**.06****	.03	**.07** **	.03	.04	.02
Suicide	.02	.02	.03	.03	.02	.03
Other	**.07***	.03	.02	.02	.04	.03
Relationship to the deceased						
Child	**.10** ***	.03	**.09*****	.02	**.07****	.03
Partner	**.10*****	.02	**.09*****	.02	**.08*****	.02
Parent	**.08****	.03	**.06***	.03	.03	.03
Sibling	**.07****	.02	.03	.03	.03	.02
Extended family	-.00	.02	-.01	.02	-.01	.02
Friends and acquaintances	-.01	.02	-.03	.02	.03	.02
R-squared	25.4%		23.3%		20.6%	

*** p <.001, ** p <.01, * p <.05.

inflating factor correlations (Asparouhov and Muthén, 2009), thus we expected that the target EFA approach might yield factor correlations between PGD, PTSD, and depression markedly lower than those observed using CFA. Because there were only a small number of cross-factor loadings, all of a very small size, the differences in the factor correlations between the two approaches was minor. What this suggests is that irrespective of whether traditional CFA or target EFA is used, the measures of ICD-11 PGD, PTSD, and depression used in this study, namely the IGQ, ITQ, and IDQ, are doing an extremely good job at isolating the primary symptoms of each disorder but that these are highly correlated constructs.

While few unique correlates of PGD were identified, all loss-related correlates were most strongly associated with the PGD factor. Since all three disorders are considered to be subsumed under the umbrella category of 'complicated grief reactions' (Komischke-Konnerup et al., 2021), it would be expected that grief-related correlates would not only be associated with PGD but also with other conditions which can occur post loss. Interestingly, the death of a sibling and the death of a loved one from other causes were uniquely associated with PGD. To further unpack the association between death of a sibling and PGD, a post-hoc crosstabulation analysis (see Supplementary Materials) was conducted between cause of death and death of a sibling. Findings demonstrated a significant association between death of a sibling and sudden unnatural death, with prior research showing how deaths due to substance overdose, homicide/suicide, and accidents are associated with greater PGD prevalence (Thieleman et al., 2023). Although we are unable to ascertain the nature of the death that individuals in the "other" group were reporting, it is possible that it may have been capturing these types of deaths which are highly associated with PGD.

Finally, the current study sought to examine the association between meeting diagnostic requirements for probable ICD-11 PGD and either ICD-11 PTSD or ICD-11 depressive disorder. Despite PGD being more strongly associated with PTSD than depression, findings demonstrated that at the disorder level more participants also met diagnostic requirements for depression than PTSD. Several factors might explain this, such as the lower prevalence of PTSD in the current sample and the notable correlations observed between PGD and depression items. Indeed, prior research has shown how depressive symptoms co-occur more frequently with PGD (63 %) than PTSD (49 %) (Komischke-Konnerup et al., 2021). Thus, while PGD does represent an empirically distinguishability disorder from both PTSD and depression, it appears that depression is its primary co-occurring disorder.

This study has several limitations. First, participants were recruited using non-probability sampling method and thus, it is not entirely clear as to what extent the samples are representative of the UK and Irish bereaved populations. Nevertheless, the composition of the samples reflected that of their respective nations in terms of sex, age, and regional distributions. Second, the samples used in the current study were drawn from affluent, English-speaking Western European nations. Thus, replication of this study in non-Western contexts is crucial. Third, the PTSD symptoms were anchored to the death of a loved one whereas the depression symptoms were not. While this is not necessarily problematic given that the depression symptoms are answered by bereaved individuals, it is possible that this may have influenced the nature of the cross-factor loadings. Fourth, given the cross-sectional nature of the data, it is not possible to infer causality for any of the risk factors of the PGD, PTSD, and depression factors. Finally, the IGQ is a newly developed measure of PGD and was previously validated using CFA in the same sample used for the current study. It is possible that the latent structure of the IGQ may differ across different samples, and thus, future research is required to ensure the findings from the present study generalize to other samples.

In conclusion, this study shows that ICD-11 PGD, PTSD, and depression are strongly correlated constructs, but it is possible to measure these constructs with a high degree of distinctiveness. Findings showed that target EFA was not necessary and that a traditional CFA approach was sufficient to effectively measure the related constructs of ICD-11 PGD, PTSD, and depression, which may be due to the measures of these constructs being extremely effective at capturing the target symptoms of interest. However, we do believe that target EFA offers a novel and effective method by which to assess the distinctiveness of related constructs in some circumstances. For example, PGD measures that include a large number of items are likely to increase the risk of cross-factor loadings. In this case, target EFA is the only way to gain insight into the items that are not specific to PGD. Finally, the identification of risk factors shared across PGD, PTSD, and depression as well as those unique to PGD affords a comprehensive understanding of the risk factors associated with bereavement-related psychopathology. Future studies may wish to replicate the approach utilised in the present study when examining the distinctiveness of PGD from other disorders which can occur post loss.

CRediT authorship contribution statement

Mark Shevlin: Writing – review & editing, Supervision, Software, Resources, Project administration, Methodology, Formal analysis, Conceptualization. **Enya Redican:** Writing – review & editing, Writing – original draft, Project administration, Methodology, Formal analysis, Conceptualization. **Thanos Karatzias:** Writing – review & editing, Project administration, Conceptualization. **Philip Hyland:** Writing –

review & editing, Project administration, Methodology, Conceptualization.

Declaration of competing interest

Authors have no conflicts to declare.

Data availability

Neither the data nor the materials have been made available on a permanent third-party archive.

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Appendix A. Supplementary data

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