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RESEARCH ARTICLE

Testing the latent structure of *ICD-11* prolonged grief disorder symptoms in the U.K. adult population: An exploratory structural equation modeling approach

Mark Shevlin[1] | **Enya Redican**[1] | **Jamie Murphy**[1] | **Philip Hyland**[2] | **Thanos Karatzias**[3]

[1]School of Psychology, Ulster University, Coleraine, Northern Ireland

[2]Department of Psychology, Maynooth University, Maynooth, Ireland

[3]School of Health and Social Care, Edinburgh Napier University, Edinburgh, United Kingdom

Correspondence
Mark Shevlin, School of Psychology, Ulster University, Cromore Road, Coleraine, BT52 1SA, Northern Ireland.
Email: m.shevlin@ulster.ac.uk

Abstract

The latent structure of *ICD-11* prolonged grief disorder (PGD), as measured using the International Prolonged Grief Disorder Scale (IPGDS), was assessed in a large general population sample of bereaved adults from the United Kingdom. Data were derived from Wave 5 of the COVID-19 Psychological Research Consortium Study (C19PRC-UK). Exploratory structural equation modeling (ESEM) was used to assess the latent structure of the IPGDS. Identified factors were explored in relation to known correlates (i.e., gender, age of the bereaved, income, bereavement timeframe, age of the deceased) and functional impairment. Three factors—Loss, Emotional Numbing, and Emotional Reactivity—emerged in the best-fitting ESEM model, $\chi^2(92, N = 1{,}763) = 273.70$, $p < .001$, CFI = .97, TLI = .96, RMSEA = .048, SRMR = .020. All factors were significantly associated with bereavement timeframe, βs = -.15–-.20, and age of the deceased, βs = -.22–-.31. Lower income predicted both Loss and Emotional Numbing; younger age of the bereaved predicted both Loss and Emotional Reactivity; and female gender was a unique predictor of Loss. Functional impairment was associated only with Emotional Numbing, $\beta = .89$. The findings highlight the multidimensional structure of PGD. However, the patterns of factor/cross-factor loadings observed in the present study indicate that a "simple" structure was not attainable. Associations between factors and covariates attest to the discriminant validity of the factors, and the association between Emotional Numbing and functional impairment may afford clinicians an opportunity to better understand and target the most disruptive features of grief.

Although acute grief symptoms are natural and common following the death of a loved one, for some people, these symptoms can persist for a prolonged period, be all-consuming, and interfere with their ability to function in everyday life (Lundorff et al., 2017). This type of persistent and impairing grief response has been conceptualized in numerous ways (e.g., "pathological grief," "traumatic grief," "complicated grief," "prolonged grief disorder"; see Simon et al., 2020) but has only recently been formally recognized within the nosology of mental disorders. In

the 11th edition of the *International Classification of Diseases* (*ICD-11*; World Health Organization [WHO], 2019), prolonged grief disorder was included as a grief-specific disorder, described as a persistent and pervasive longing for or preoccupation with the deceased that is accompanied by intense emotional pain, including sadness, guilt, anger, and difficulties in accepting the death. Symptoms must also cause significant impairment in functioning and persist for an atypically long time (i.e., at least 6 months) relative to cultural norms (WHO, 2019).

The International Prolonged Grief Disorder Scale (IPGDS; Killikelly et al., 2020) was developed as a self-report measure for the assessment of *ICD-11* PGD symptoms. The IPGDS is one of the few available measures developed to capture the symptom profile of PGD as described in the *ICD-11*. The selection of items to include in the IPGDS was based on preexisting measures of disturbed grief, including the Prolonged Grief Disorder–13 scale (PG-13; Prigerson et al., 2009), the rater version of the Inventory of Complicated Grief–Revised (ICG-R; Prigerson et al., 2009), and the Structural Clinical Interview for Complicated Grief (SCI-CG; Bui et al., 2015). The IPGDS is composed of 14 items: Two items measuring core symptoms (i.e., "longing or yearning" and "preoccupied with thoughts") and 10 additional items measuring associated emotional symptoms, one item measuring functional impairment, and one item measuring the degree to which symptoms deviate from what are considered "normal" grief responses for one's cultural context. Although the present study focuses on the IPGDS, which was the only validated measure of PGD available at the time of data collection, it should be noted that the Traumatic Grief Inventory–Self Report Plus (TGI-SR+; Lenferink et al., 2022) is also available as a self-report measure of *ICD-11* PGD. To date, there have been few investigations of the latent structure of PGD as assessed using the IPGDS. Establishing the latent structure of any diagnostic construct affords an opportunity to (a) more accurately estimate prevalence, (b) understand etiology, (c) understand course, and (d) assess reliability and validity (Shevlin & Adamson, 2005, Shevlin et al., 2017). This is especially pertinent to *ICD-11* PGD because there is currently no theoretical framework in place to explain its onset, development, course, and outcomes. Going forward, this will have significant implications for the creation of interventions that are more targeted and can help ensure better treatment outcomes. Moreover, determining the appropriate latent structure of the IPGDS will have important implications for the resulting diagnostic algorithm used to determine disorder prevalence, which is particularly important given the significant heterogeneity in prevalence rates observed across studies (Shevlin et al., 2023).

To date, the only study that has examined the latent structure of the IPGDS was the original validation study conducted by Killikelly et al. (2020). The authors used exploratory factor analysis (EFA) on data from samples of German-speaking and Chinese participants who self-selected into the study following recruitment through online public platforms. For both samples, the choice regarding the optimal number of factors to retain was unclear. For the German-speaking sample, there were three factors with eigenvalues (i.e., how much of the common variance of the observed variables a factor explains) greater than 1.0, but a parallel test suggested the retention of only one factor. Similarly, for the Chinese sample, there were two factors with eigenvalues greater than 1.0, but a parallel test suggested the retention of only one factor. The one-factor models identified in both samples suggest that *ICD-11* PGD represents a unidimensional construct, a finding that contradicts the *ICD-11* conceptualization of PGD as being composed of two symptom clusters—the "core" symptoms (i.e., longing or yearning and preoccupation with thoughts) and emotional pain. This may indicate problems with the *ICD-11* conceptualization of prolonged grief; the validity of the IPGDS as a measure for the assessment of PGD; or, alternatively, may be related to the main problem associated with EFA (i.e., determining the optimal number of factors).

Although it is a challenge in all structural analyses to determine the optimal number of factors for a proposed factor solution, it is less of a problem when using confirmatory factor analysis (CFA) as compared to EFA given that CFA is a theoretically driven statistical technique whereby the number of latent variables and their structure are specified a priori. Often, a "simple structure" approach is taken in which each item, or symptom, is specified to load onto only one latent variable. This approach has been commonly used to test the latent structure of prior conceptualizations of PGD (e.g., Sveen et al., 2020; Lenferink et al., 2021). Thus far, no study has sought to apply CFA to determine whether the one-factor model identified in the IPGDS validation study (Killkelly et al., 2020) is an acceptable representation of the latent structure of the IPGDS. Indeed, as the *ICD-11* description of PGD describes two clusters (i.e., core symptoms and emotional pain), a two-factor model may also constitute a plausible structure. However, it is unlikely that a simple structure would hold and more likely that the indicators of the core (i.e., longing and preoccupation) symptoms would also load onto emotional pain, and the emotional pain indicators would also load onto the core symptoms latent variable; that is, it is likely that there would be significant cross-loadings. Thus, in this context, EFA may be too flexible and CFA too restrictive.

One framework that retains the exploratory component adopted in prior research (Killikelly et al., 2020) while also integrating the powerful confirmatory aspect of CFA is exploratory structural equation modeling (ESEM), an integrative framework that combines the best features of EFA (e.g., permitting cross-loadings between factors), CFA (e.g., model falsification), and SEM (e.g., the inclusion of exogenous and/or endogenous variables) (Asparouhov et al., 2015). The ESEM model conducts EFA, CFA, and SEM simultaneously within a single approach and, hence, is considered a more robust, rigorous, and flexible approach than any of these approaches applied in isolation (Asparouhov & Muthén, 2009). The ability to incorporate exogenous and/or endogenous variables into the estimation of the model is particularly advantageous, with research illustrating that the ESEM framework provides less-biased estimates of regression coefficients compared to standard SEM (Mai et al., 2018). The utility of ESEM approaches has been evidenced in numerous studies, including a recent investigation by Vang et al. (2020) that sought to determine whether secondary traumatization represents a distinct construct from burnout. By adhering to an ESEM framework, the authors were able to demonstrate how, despite there being some overlap in the types of experiences that constitute secondary traumatization and burnout, the former represents a distinct construct with its own unique predictors.

The current study sought to utilize ESEM to examine the latent structure of the IPGDS among a large representative sample of bereaved adults from the United Kingdom during the COVID-19 pandemic. The only previous study to investigate the latent structure of the IPGDS provided evidence for one-, two-, and three-factor solutions. We hypothesized, therefore, that both unidimensional and multidimensional models would fit the data well given that the previous study identified various solutions. It should be noted that ESEM is largely an exploratory technique that was utilized due to the expectation of there being significant cross-loadings; therefore, no a priori hypotheses regarding the latent structure of the IPGDS were formed. We also sought to examine demographic and loss-related predictors of the identified latent variables and investigate the associations between the latent variables and functional impairment. Because prior research has shown female gender, lower income, age of the bereaved, age of the deceased, and the recency of bereavement play important roles in the development of PGD (Burke et al., 2013), we anticipated that these predictors would be associated with PGD dimensions. No study, to the best of our knowledge, has examined the associations between demographic and loss-related predictors and individual symptoms of PGD. As such, it is difficult to hypothesize which latent dimensions may be more closely associated with various predictors. That being said, some predictions can be made based on findings from the extant evidence base. Given that women and girls are often more expressive of their emotions than men and boys (Stroebe et al., 2001), we expected that the endorsement of core symptoms would be more pronounced among female participants. Because research has shown that a shorter time since bereavement and younger age of the deceased result in higher levels of PGD symptom severity (e.g., Shevlin et al., 2023), we expected that these factors would be associated with increased scores across all identified latent dimensions. Moreover, given that the clinical expression of PGD is accompanied by functional impairment, we predicted that PGD dimensions would be correlated with a measure of functional impairment.

METHOD

Participants and procedure

Data for the current study were derived from Wave 5 of the COVID-19 Psychological Research Consortium Study (C19PRC-UK), a longitudinal cohort study established to understand the social, economic, political, and psychological impacts of the COVID-19 pandemic (McBride et al., 2022). Full details regarding data collection and sampling procedures have been discussed in detail elsewhere (McBride et al., 2020). Briefly, 2,025 adults aged 18 years or older were recruited in Wave 1 of the surveys via Qualtrics using quota sampling methods to ensure the representativity of the sample regarding age, gender, and household income. Data collection for Wave 5 of the C19PRC-UK study was conducted between March and April 2021, approximately 1 year following the completion of the baseline survey (McBride et al., 2022). Data collection was conducted in two phases: in Phase 1 (March 24, 2021, to April 20, 2021) adults who participated in Wave 4 of the survey (n = 3,867) were contacted by Qualtrics either by email, short messaging service (i.e., text message), or in-app notifications and invited to participate further in the survey. In Phase 2 (April 8, 2021, to April 20, 2021), participants who had completed any other wave (i.e., Waves 1–3) were recontacted and invited to participate in Wave 5. Phase 1 of this fieldwork resulted in a total of 2,377 participants from Wave 4 completing the Wave 5 survey (61.5% recontact rate), whereas Phase 2 resulted in an additional 143 participants from Waves 1–3 reentering the survey (McBride et al., 2022). The entire sample included 2,520 participants, of whom 1,944 responded "yes" to the question, "At any time in your life, has someone close to you died (e.g., a partner, parent, child, friend)?" A very small percentage of participants (n = 14;

0.78%) did not provide information on one or more of the loss-related or sociodemographic predictors, and participants who had been bereaved less than 6 months ($n = 167$) were excluded from the current study due to the specification in the *ICD-11* model of PGD that symptoms must be present for 6 months or more. The final analytic sample included 1,763 participants. The gender ratio of the sample was equal, with half of the sample composed of men ($n = 882$) and the remaining half comprising women ($n = 881$). The average participant age was 54.61 years ($SD = 14.24$, range: 19–92 years). More than half of the sample reported being in a committed relationship ($n = 1,552$, 58.4%), and almost half of the sample reported being employed ($n = 877$, 49.7%). Ethical approval for the study was granted by the University of Sheffield (Ethical Approval Ref No. 033759).

Measures

ICD-11 PGD

The IPGDS (Killikelly et al., 2020) is a self-report instrument used to assess *ICD-11* PGD symptoms. The measure consists of 14 items, including two items to assess core symptoms (i.e., longing and preoccupation), 10 items to assess symptoms of emotional distress, one item to assess functional impairment, and one item to assess the degree to which symptoms transcend sociocultural norms. Respondents were asked to rate the frequency of each symptom on a 5-point Likert scale ranging from 1 (*not at all*) to 5 (*always*). Two diagnostic algorithms can be used to determine caseness, and these are referred to as the "strict" and "moderate" algorithms. Both diagnostic algorithms require the endorsement of (a) at least one core symptom, (b) at least one emotional symptom, (c) significant functional impairment, and (d) a grief response persisting beyond cultural or community norms. To meet the criteria for a probable PGD diagnosis using the strict algorithm, endorsed items must be rated with a score of 4 or higher (i.e., *often* or *always*). To meet the criteria for a probable PGD diagnosis using the moderate algorithm, items must be rated with a score of 3 or higher (i.e., *sometimes*, *often*, or *always*). In the present sample, the reliability of the 12 symptom items (i.e., excluding functional impairment and cultural criterion) was excellent, Cronbach's $\alpha = .94$.

Predictor variables

Loss-related predictors

Bereavement timeframe was assessed using an item from the IPGDS requiring participants to stipulate how long ago their loss occurred, with response options of "less than 6 months ago," "6–12 months ago," "1–5 years ago," "5–10 years ago," "10–20 years ago," and "more than 20 years ago." Participants who were bereaved less than six months ($n = 167$) were excluded from the current study due to the specification in the *ICD-11* model of PGD that symptoms must be present for at least 6 months. Bereavement timeframe was calculated as a continuous score ranging from 1 ("6–12 months ago") to 5 ("more than 20 years ago"). Another loss-related predictor included in the current study was the age, in years, of the deceased.

Sociodemographic predictors

Participants indicated their gender (0 = male, 1 = female), age in years, and self-estimated gross annual income for 2019 (continuous score ranging from £0 [GBP] to £57,931 or more).

Data analysis

In the first stage of the analyses, descriptive statistics for the IPGDS items and the IPGDS total (i.e., PGD) scores were calculated. Following this, differences in total PGD scores were examined according to gender and relationship status using independent samples *t* tests, whereas the bivariate associations between total PGD score and age, income, bereavement timeframe, and age of the deceased were examined using Pearson correlation tests. Cohen's *d* values were estimated to quantify the magnitude of effects in the independent samples *t* tests and interpreted using recommended values tests such that values less than .30 indicate a small effect, .30–.50 indicate a medium effect, and greater than .50 indicate a large effect (Cohen, 1988). All analyses in this stage were conducted using SPSS (Version 27).

In the second stage of the analyses, a series of CFAs and, if necessary, exploratory ESEMs were estimated to examine the dimensionality of the IPGDS. If any of the CFA models fit the data adequately, there was no need to perform an ESEM. All models were specified and estimated using *M*plus (Version 8.2; Muthén & Muthén, 2017) and robust maximum likelihood estimation (MLR; Yuan & Bentler, 2000), as this is more accurate than other estimators, such as weighted least square with mean and variance adjustment (RMSEA), when there are five or more ordered categories (Beauducel, & Herzberg, 2006). Two CFA models were tested. Model 1 was a one-factor model where all PGD symptoms (IPGDS Items 1–12) loaded onto a first-order PGD factor called Prolonged Grief; Model 2 was a two-factor model where the core PGC symptoms (i.e., longing and preoccupation; IPGDS Items 1 and 2) loaded onto a Longing and Preoccupation (LP) factor and

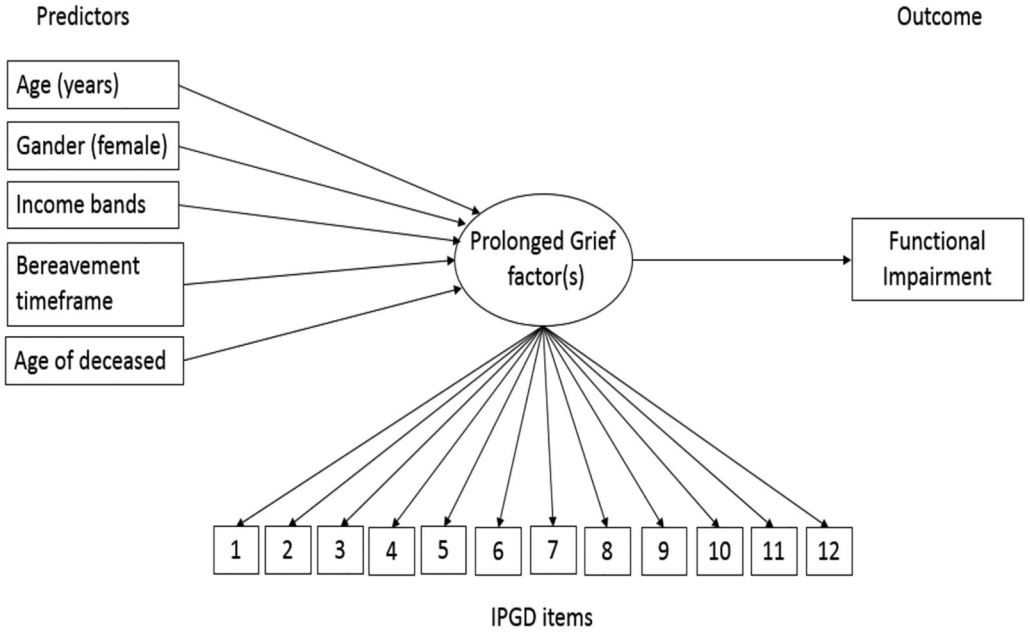

FIGURE 1 Exploratory structural equation model of prolonged grief.
Note: IPGDS = International Prolonged Grief Disorder scale.

the remaining ten items (Items 3–12) loaded onto an Emotional Symptoms factor. Although previous research using EFA has also identified a three-factor solution (Killikelly et al., 2020), the items comprising these three factors were not provided; hence, the three-factor solution could not be specified. Following this, four ESEM models were tested. The data were first randomly split into "test" and "replication" datasets. The former was used to test the different ESEMs, and the latter was used to determine if the selected solution replicated in the independent replication dataset. Given that earlier EFA research indicated a three-factor model of PGD, four ESEM models were defined as the maximum number of models to test, and we tested an extra factor to ensure that a further potentially significant factor was not being ignored. Multifactor solutions employed the Goemin rotation method, and all extracted factors were permitted to correlate. As is typical in an ESEM framework, these models were estimated with exogenous variables (i.e., gender, age, income, relationship status, bereavement timeframe, and age of the deceased), all of which were treated as observed variables, whereas functional impairment' (Item 13) was treated as an endogenous outcome variable and regressed on the factors specified in each ESEM model. The general ESEM model is shown in Figure 1.

The fit of each model (i.e., CFA and ESEM) was assessed using several goodness-of-fit statistics, including the chi-square statistic, comparative fit index (CFI; Bentler, 1990), Tucker–Lewis Index (TLI; Tucker et al., 1973), root mean square error of approximation (RMSEA; Browne & Cudeck, 1992), and standardized root mean square residual (SRMR; Jöreskog et al., 1981). Using standard cutoff criteria (Hu & Bentler, 1999), a nonsignificant chi-square test indicates acceptable model fit; CFI and TLI values of .90 or above and .95 or above indicate acceptable and excellent model fit, respectively; RMSEA values of .08 or lower and .05 or lower indicate "reasonable approximation" and "close" model fit, respectively; and SRMR values of .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. It should be noted that it was not possible to compare the fit of the CFA models with the fit of the ESEM models due to the inclusion of covariates in the latter model but not the former.

The selection of the best-fitting model was also guided by parsimony and the interpretability of the solution. A simpler model was preferred over more complex models, but the solution also had to be easily interpretable. Interpretability was indicated by (a) items loading strongly and distinctly onto only one factor (i.e., simple structure), (b) a minimum of three items loading onto all factors, (c) the coherency of items within factors and distinctiveness between factors necessary to facilitate clear and meaningful labeling of the factors, and (d) expected associations with the exogenous and endogenous variables.

TABLE 1 Descriptive statistics for International Prolonged Grief Disorder Scale (IPGDS) items

IPGDS item	*M*	95% CI	*SD*	*Mdn*	Range	Skew	Skew *SD*
1: I am longing or yearning for the deceased.	2.33	[2.28, 2.39]	1.12	2.00	1–5	0.40	.06
2: I am preoccupied with thoughts about the deceased or circumstances of the death.	2.95	[1.90, 2.00]	1.95	2.00	1–5	0.90	.06
3: I have intense feelings of sorrow, related to the deceased.	2.27	[2.22, 2.33]	1.28	2.00	1–5	0.55	.06
4: I feel guilty about the death or circumstances surrounding the death.	1.72	[1.67, 1.77]	1.72	1.00	1–5	1.33	.06
5: I am angry over the loss.	1.90	[1.85, 1.95]	1.90	1.00	1–5	1.13	.06
6: I try to avoid reminders of the deceased or the death as much as possible (e.g., pictures, memories)	1.69	[1.65, 1.74]	1.69	1.00	1–5	1.40	.06
7: I blame others or the circumstances for the death (e.g., a higher power).	1.43	[1.39, 1.47]	1.43	1.00	1–5	2.14	.06
8: I have trouble or just don't want to accept the loss.	1.73	[1.68, 1.1.78]	1.73	1.00	1–5	1.40	.06
9: I feel that I lost a part of myself	2.23	[2.17, 2.29]	1.23	2.00	1–5	0.70	.06
10: I have trouble or have no desire to experience joy or satisfaction.	1.63	[1.58, 1.68]	1.63	1.00	1–5	1.53	.06
11: I feel emotionally numb.	1.69	[1.65, 1.74]	1.69	1.00	1–5	1.33	.06
12: I have difficulties engaging in activities I enjoyed prior to the death	1.54	[1.49, 1.58]	1.54	1.00	1–5	1.73	.06
Total IPGDS (PGD) score	22.11	[21.65, 22.58]	9.99	19.00	12–60	1.03	.06

Note: PGD = prolonged grief disorder; CI = confidence interval.

RESULTS

Descriptive statistics

As shown in Table 1, all items were positively skewed, and the overall mean PGD total score was 22.11 (SD = 9.99, range: 12–60) with a positively skewed distribution (skewness = 1.03, SD = .058). To determine whether the average PGD total score varied by gender, an independent samples t test was conducted. Average total PGD scores differed significantly for men (M = 21.08, SD = 9.61) compared to women (M = 23.15, SD = 10.25), $t(1753.59) = -4.39$, $p < .001$, $d = 0.21$. Findings from the Pearson's correlation tests indicated a significant negative association between total PGD score and both age, r = -.18, p < .001, and age of the deceased, r = -.20, p < .001. In the total sample, 2.3%, 95% CI confidence interval (CI) [1.6%, 3.0%] (n = 41), of participants met the criteria for probable PGD using the strict diagnostic algorithm, and 10.1%, 95% CI [8.7%, 11.5%] (n = 178) met the criteria for probable PGD using the moderate diagnostic algorithm.

CFA and ESEM results

The fit statistics for the CFA and ESEM models are reported in Table 2. The fit statistics showed that both the one- and two-factor CFA models provided a poor fit to the data, whereas the ESEM models fit the data much better. The one-factor ESEM model was rejected, as the fit statistics were unsatisfactory; however, the remaining models all provided an acceptable fit to the data. Models with more factors showed better fit, with the AIC, BIC, and ssaBIC all decreasing with an increasing number of factors. However, the decreases in the BIC between the one- and two-factor models, ΔBIC = 982.44, and the two- and three-factor models, ΔBIC = 158.88, were large relative to the difference between the three- and four-factor

TABLE 2 Model fit statistics for the confirmatory factor analysis (CFA) and exploratory structural equation models (ESEMs)

Model	$\chi^2(df, N)$	AIC	BIC	ssaBIC	CFI	TLI	RMSEA	95% CI	SRMR
CFA models									
1 factor	1,497.06(54, $N = 1{,}944$)***	55,477.54	55,678.15	55,563.78	.85	.815	.117	[.112, .122]	.057
2 factors	1,385.87(53, $N = 1{,}944$)***	55,278.68	55,484.86	55,367.31	.86	.826	.114	[.109, .119]	.055
ESEM models (test)									
1 factor	1,156.18(125, $N = 1{,}763$)***	26,482.95	26,694.74	26,555.00	.83	.808	.095	[.090, .100]	.052
2 factors	410.73(108, $N = 1{,}763$)***	25,418.68	25,712.30	25,518.57	.95	.935	.056	[.050, .061]	.028
3 factors	230.20(92, $N = 1{,}763$)***	25,182.78	25,553.42	25,308.88	.98	.96	.041	[.034, .047]	.018
4 factors	158.91(77, $N = 1{,}763$)***	25,090.33	25,533.17	25,240.99	.99	.98	.034	[.027, .042]	.014
ESEM models (replication)									
3 factors	273.70(92)***	24,186.74	24,552.40	24,307.87	.97	.96	0.048	[0.042, 0.055]	.020

Note: *df* = degrees of freedom; AIC = Akaike information criterion; BIC = Bayesian information criterion; ssaBIC = sample size–adjusted BIC; CFI = comparative fit index; TLI = Tucker–Lewis index; RMSEA = root mean square error of approximation; CI = confidence interval; SRMR = standardized root mean squared residual.

***$p < .001$.

models, ΔBIC = 20.251. A similar pattern of differences was observed for the AIC and ssaBIC. On the basis of "diminishing gains," we determined there was little benefit in adding the fourth factor. The CFI, TLI, RMSEA, and SRMR were all satisfactory for the two-factor model but better for the three-factor model, with CFI TLI values both greater than .95 and the RMSEA less than .05, indicating a close model fit. All fit statistics improved for the four-factor model; thus, the solutions were examined in detail to help with optimal model selection.

Each solution was thoroughly examined (see Supplementary Materials) to determine the best solution. For the two-factor model, the first factor was clearly defined by four items (Items 1, 2, 3, and 9), whereas Factor 2 was clearly defined by five items (Items 6, 7, 10, 11, and 12). Items 4 (.41/.33), 5 (.44/.37), and 8 (.40/.47) all loaded on both factors. For the three-factor model, the first factor remained similar to that identified in the two-factor solution; however, Factor 2 became more clearly defined by four items (Items 6, 10, 11, and 12), whereas the third factor was defined by Items 4, 5 and 7, although the loadings for Item 4 were similar for Factors 1 and 2. For the four-factor model, no items loaded highest onto the fourth factor. Consequently, the three-factor ESEM model was selected as the best-fitting model largely due to having a superior fit than the two-factor model as well as the pattern and strength of the loadings.

Table 3 displays the factor-loadings and cross-loadings for IPGDS items. The core PGD items (Items 1 and 2), representing longing and preoccupation, and Item 3 ("sorrow") loaded very strongly on Factor 1, whereas Items 8 ("don't want to accept the loss") and 9 ("lost a part of myself") showed weaker loadings. Factor 1 was labeled Loss. Factor 2 was defined by high loadings on Items 10 ("no desire to experience joy"), 11 ("emotionally numb"), and 12 ("loss of interest"), with a weaker loading on Item 6 ("avoid reminders"). This factor was labeled Emotional Numbing. Factor 3 was defined by high loadings on Items 5 ("angry") and 7 ("blame others"), with a weaker loading on Item 4 ("guilt"). This factor was labeled Emotional Reactivity. There was a strong significant correlation between the Loss and Emotional Numbing factors, $r = .69$, $p < .001$, whereas the Emotional Reactivity factor was moderately correlated with both Loss, $r = .37$, $p < .001$, and Emotional Numbing, $r = .53$, $p < .001$.

Regression results

The standardized regression coefficients between each covariate and the Loss, Emotional Numbing, and Emotional Reactivity factors are reported in Table 4. Bereavement timeframe and age of the deceased were negatively associated with all factors. The effects for bereavement timeframe were larger for the Loss factor, whereas age of the deceased was highest for the Emotional Reactivity factor. Age was negatively associated with the Loss and Emotional Reactivity factors, and the effects were of similar magnitude. Female gender was positively associated with the Loss factor only, and not being in a committed relationship was positively associated with both the Loss and Emotional Numbing factors. Finally, income was negatively associated with the Loss and Emotional Numbing factors.

The standardized regression coefficients between the Loss, Emotional Numbing, and Emotional Reactivity factors and functional impairment are shown in Table 4. The results indicated that only the Emotional Numbing factor was positively and significantly associated with functional impairment.

TABLE 3 Standardized factor loadings and standard errors for the three-factor exploratory structural equation model

Item	Factor		
	Loss	Emotional Numbing	Emotional Reactivity
1. I am longing or yearning for the deceased.	**.86**		
2. I am preoccupied with thoughts about the deceased or circumstances of the death.	**.73**		
3. I have intense feelings of sorrow, related to the deceased.	**.93**		
4. I feel guilty about the death or circumstances surrounding the death."	**.33**	.22	**.34**
5. I am angry over the loss.	.52		**.49**
6. I try to avoid reminders of the deceased or the death as much as possible.		**.45**	.20
7. I blame others or the circumstances for the death.		.29	**.56**
8. I have trouble or just don't want to accept the loss.	**.39**	.32	.27
9. I feel that I have lost a part of myself.	**.65**	.21	
10. I have trouble or have no desire to experience joy or satisfaction.		**.89**	
11. I feel emotionally numb.	.07	**.82**	
12. I have difficulties engaging in activities I enjoyed prior to the death.		**.92**	

Note: Only significant loadings are shown ($p < .05$). Highest loadings are bolded.

DISCUSSION

The current study had three primary aims, which were to (a) examine the latent structure of PGD as measured by the IPGDS, (b) identify predictors of the identified factors, and (c) examine the associations between each factor and functional impairment. The results showed that the latent structure of the IPGDS was best represented by three factors: Loss, Emotional Numbing, and Emotional Reactivity. In addition, the findings indicate that loss-related variables (i.e., younger age of the deceased, shorter bereavement timeframe) were shared across all three factors, whereas demographic predictors were differentially associated with particular factors. Moreover, only the Emotional Numbing factor was significantly associated with functional impairment.

The multidimensionality of the IPGDS in the current study stands in contrast to prior EFA research in which a one-factor model was found to be the best fit (Killikelly et al., 2020). Interestingly, prior studies (Boelen et al., 2018, 2019) have replicated a three-factor model of persistent complex bereavement disorder, which is included in the *Diagnostic and Statistical Manual of Mental Disorders* (5th ed.; *DSM-5*; American Psychiatric Association, 2013), that includes two symptom clusters that align closely with the *ICD-11* PGD core symptom and emotional pain clusters, classified as "separation distress" and "reactive distress." The third cluster is classified as "social/identity disruption" and includes symptoms such as "feeling life is empty or meaningless" and "difficulties to pursue interests," which are similar to the IPGDS items that loaded onto the Emotional Numbing factor in our analyses. Moreover, our findings align to an extent with the *ICD-11* description of PGD, which implies that PGD comprises both core symptoms (i.e., longing or yearning and preoccupation) and emotional symptoms (i.e., sadness, guilt, anger, denial, blame, and difficulty accepting the death; WHO, 2019). The findings from the present study suggest that the emotional symptoms proposed in the *ICD-11* can be further separated into two distinct, albeit related, dimensions categorized as Emotional Numbing and Emotional Reactivity. It should be noted that multiple ESEM models (i.e., the two-factor and four-factor models) provided an excellent fit to the data and that the decision as to which model to select was not clear-cut. Future studies may wish to adopt the methodological procedure assumed in the current study to determine whether a three-factor model is replicated.

Support for the three-factor model also comes from a recent study by Killikelly et al. (2023) that was based on data from 1,393 bereaved adults across five countries. A

TABLE 4 Standardized regression coefficients for regression models for the three-factor model

Variable	Loss[a]			Emotional Numbing[a]			Emotional Reactivity[a]			Functional impairment[b]		
	B	*SE*	*p*	*B*	*SE*	*p*	*B*	*SE*	*p*	*B*	*SE*	*p*
Age (years)	.01	.039	.853	−.14	.04	< .001	−.13	.05	< .05			
Gender (female)	.08	.035	< .05	−.02	.04	.507	.03	.04	.511			
Income bands	−.13	.034	< .001	−.14	.03	< .001	−.06	.04	.143			
Bereavement timeframe	−.20	.035	< .001	−.15	.04	< .001	−.15	.06	< .001			
Age of deceased	−.23	.039	< .001	−.22	.04	< .001	−.31	.06	< .001			
Factor 1										−.04	.05	.344
Factor 2										.89	.08	< .001
Factor 3										.06	.08	.452
R^2 estimate	.11	.02	< .001	.12	.02	< .001	.15	.04	< .001	.81	.03	< .001

[a]Latent factors regressed on demographic and loss-related predictors
[b]Functional impairment regressed on latent factors.

network model was fitted to the pooled data, and three obvious clusters of items emerged: A cluster of items that loaded onto the Loss latent variable in the present study (Items 1, 2, 3, and 9), a cluster that loaded onto the Emotional Numbing latent variable (Items 10, 11, and 12), and a cluster that loaded onto the Emotional Reactivity latent variable (Items 4, 5, and 7). Indeed, Item 8 was the center of the network and linked to all three clusters, and in the ESEM model in the present study, the loadings for this item are similar on all factors. Thus, there is an almost perfect representation of the factor analytic part of the ESEM model in the structure of network edges; such a comparison is possible, as Christensen and Golino (2021) demonstrated the similarity between network node connections and factor loadings.

Inspection of factor loadings across the three factors highlighted some symptom indicators that were exclusive to each factor and some that simultaneously loaded onto multiple factors to a similar degree. Symptoms that were unique to the Loss factor included longing, preoccupation, intense sadness, and loss of identity; symptoms unique to Emotional Numbing included difficulty experiencing positive emotion, emotional numbness, and difficulties engaging in activities; and those unique to Emotional Reactivity included anger and blame. However, several IPGDS symptom items had factor loadings of a similar magnitude on Loss and Emotional Reactivity: guilt, anger, and difficulty accepting the death. This indicated that the identified factors did not exclusively capture the variance in their assigned symptom indicators, and, therefore, are likely not entirely distinctive factors.

A recent study (Maccallum et al., 2023) examined gender differences in PGD symptom endorsement using network analysis. Results from this study illustrated how the PGD symptoms of bitterness and difficulty accepting the death were strongly connected for both genders. As illustrated in our findings, the item pertaining to difficulty accepting the death loaded onto both the Loss and Emotional Reactivity factors to a relatively similar degree, albeit to a greater extent for Loss. It may be that there is considerable overlap between the dimensions of Emotional Reactivity and Loss, a matter that warrants further exploration. Nevertheless, the correlation between the Emotional Reactivity and Loss factors was moderate in nature, indicating an adequate degree of distinguishability between these dimensions. Overall, despite there being evidence that the IPGDS is capturing distinct dimensions of PGD, the solution is not neatly organized. This may be inherent to the nature of PGD symptoms, especially given that some prior studies have identified cross-loadings of PGD items, as measured using an alternative measure, and have selected simpler solutions as a result (e.g., Boelen et al., 2018). The findings from the current study support the use

of ESEM in the exploration of the latent structure of PGD given the patterns of factor loadings observed.

We also sought to examine demographic and loss-related predictors of Loss, Emotional Numbing, and Emotional Reactivity. Consistent with our initial hypothesis, all predictor variables (i.e., gender, age of the bereaved, income, relationship status, age of the deceased, and bereavement timeframe) were associated with at least one aspect of PGD. The findings illustrate how bereavement timeframe was a negative predictor and age of the deceased was a positive predictor of all factors. These findings are in line with existing research showing how levels of PGD symptoms tend to be most potent during the earlier stages of grief (Lundorff et al., 2021) and that younger age of the deceased increases the risk of PGD (e.g., Burke & Neimeyer, 2013; He et al., 2014). Hence, it was unsurprising that these bereavement-related predictors were associated with all factors. Regarding demographic predictors, the patterns of association were not consistent across all factors. For instance, age of the bereaved was identified as a negative predictor of Loss and Emotional Reactivity but not Emotional Numbing. Typically, older adults are more accustomed to experiencing the loss of loved ones, whereas in younger adulthood, there is likely to be an element of a lack of preparedness. Research has shown how this lack of preparedness for a loved one's death can challenge an individual's capacity to acknowledge and reconcile with one's self the permanent separation from their loved one, in turn leading to higher levels of PGD symptoms (Barry et al., 2002). It is interesting that there was no association between age of the bereaved and the Emotional Numbing factor. It is possible that although older adults may be better equipped to negotiate the symptoms comprising the Loss and Emotional Reactivity factors, the symptoms comprising Emotional Numbing are applicable across all age groups. Prior research has highlighted how not being in a committed relationship and lower income represent important risk factors for PGD (e.g., Burke & Neimeyer, 2013), with findings from the current study suggesting that the symptoms comprising Loss and Emotional Numbing may be responsible for driving these associations. Finally, female gender was identified as a unique predictor of experiencing symptoms related to the Loss factor, a finding that coincides with research indicating that women are more likely to experience severe PGD symptoms than their male counterparts (Burke & Neimeyer, 2013; Killikelly et al., 2019). There are several potential explanations for the association between female gender and PGD symptoms. For instance, women have been shown to engage in more rumination than men, leading to a higher risk of depression and anxiety among women (Nolen-Hoeksema, 2012). Some studies have shown how rumination moderates the association between meaning-making and an increased risk of PGD (Milman et al., 2018), whereas other studies have shown how rumination predicts the severity of prolonged grief symptoms (Morina, 2011). The items characterizing the Loss factor (i.e., longing or yearning, preoccupation with thoughts) can be considered to have ruminative features. Moreover, women are often more expressive about their grief than men (Strobe et al., 2001), and it may be that the symptoms comprising the Loss factor (e.g., "I have intense feelings of sorrow, related to the deceased") are more relevant to women. Finally, there is a widely established gender gap in mental health (Seedat et al., 2009), and it is possible that this gender disparity extends to PGD. Further research is necessary to unpack the mechanisms underpinning the association between PGD symptoms and gender. It is important to note, however, that some prior research (Shevlin et al., 2023) identified no gender differences in PGD symptom severity levels. Hence, it may be that women are more likely to endorse symptoms related to the Loss factor but may not be at an increased risk of meeting the PGD diagnostic criteria.

The final aim of the current study was to examine the association between the latent dimensions and functional impairment. Interestingly, the results illustrate how only the Emotional Numbing factor was significantly and positively associated with functional impairment. Thus, it appears that it is largely these depression-like symptoms that are contributors to functional impairment. Although factor analytic research has shown PGD to represent a distinct construct from depression (e.g., Boelen et al., 2010), there is also research indicating that although symptoms of PGD and depression are conceptually distinguishable, they are also highly connected with one another (Djelantik et al., 2020). Low mood and loss of interest are considered two of the most debilitating symptoms of depression (Fried et al., 2014), and, hence, it is not surprising that these symptoms are also impairing within the context of grief. Moreover, the Emotional Numbing factor was also defined by the item "I try to avoid reminders of the deceased or the death as much as possible," with grief-related avoidance linked to functional impairment (Shear et al., 2007). Future research may benefit from exploring the distinguishability of PGD and depression at a symptom level to determine the discriminant validity of the PGD diagnosis. The finding that the symptoms constituting the Loss and Emotional Reactivity factors were not linked to functional impairment is surprising and suggests that these symptoms on their own may not necessarily be impairing in nature. Future research is required to determine whether such findings replicate across different samples. Overall, given that the Emotional Numbing symptoms are linked to functional impairment, it may be necessary for the diagnostic algorithm to reflect this to determine

the caseness of PGD. Currently, as noted, two diagnostic algorithms are available and are defined as the strict and moderate algorithms. The strict criterion requires the endorsement of one or more core symptoms (i.e., yearning and preoccupation) plus one or more emotional symptoms, significant functional impairment, and the grief response persisting beyond cultural or community norms, all of which must be present often or always. The moderate criterion lowers the threshold for endorsement to ratings of *sometimes*, *often*, or *always* (Killikelly et al., 2020). If the current findings replicate across other studies, it may suggest that the diagnostic algorithm should be amended to require the presence of at least one Emotional Numbing symptom.

The findings from the current study should be considered in terms of several limitations. First, the cross-sectional nature of the data prevents conclusions regarding the temporal ordering of the variables. Second, although many established predictors were assessed, it is likely that there were other potentially relevant predictors that were not included. Finally, this study used self-report measures to assess PGD, which may have led to the overreporting of symptom indicators. The development of a structural clinical interview for PGD has been highlighted as an important endeavor (O'Connor et al., 2020).

Notwithstanding these limitations, the findings from this study add to current knowledge by highlighting how PGD, when measured using the IPGDS and analyzed using ESEM, represents a multidimensional construct. The observed patterns of factor and cross-factor loadings indicate that ESEM approaches may be most appropriate for understanding the dimensionality of PGD. The identification of predictors both shared across and unique to various factors provides insight into the discriminant validity of these factors. The findings from the present study have numerous clinical implications. First, the identification of demographic and bereavement-related factors associated with various dimensions of PGD symptoms highlights to clinicians the characteristics of individuals most vulnerable to experiencing elevated PGD symptom levels. Such risk factors can be essential for early identification and targeted intervention. Second, the association between the Emotional Numbing factor and functional impairment highlights to clinicians the symptoms most imperative to ease the burden of prolonged grief. Although further research in this area is required to test this hypothesis, the findings suggest that targeting symptoms of emotional numbing can improve treatment response rapidity. Third, the present findings indicate that several symptoms are not unique to specific symptom clusters; for example, difficulty accepting the death loaded onto both the Loss and Emotional Reactivity latent dimensions. This indicates that caution is required when screening for potential PGD cases and that clinical presentations can be idiosyncratic. This is typical for all *ICD-11* disorders characterized as "disorders associated with stress." Finally, because the latent structure of any diagnostic construct has important implications for the resulting diagnostic algorithm (Shevlin et al., 2017), the unique association between the Emotional Numbing factor and functional impairment may suggest that the PGD diagnostic algorithm needs to be refined to require the presence of at least one emotional numbing symptom. It may be that these findings are specific to the IPGDS, and, hence, the replication of this study using alternative measures of *ICD-11* PGD is crucial.

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OPEN PRACTICES STATEMENT

This study was not formally preregistered. However, the Wave 5 data used in the current study are available at https://osf.io/qv47z/

ORCID

Mark Shevlin https://orcid.org/0000-0001-6262-5223
Enya Redican https://orcid.org/0000-0002-8863-2234
Philip Hyland https://orcid.org/0000-0002-9574-7128

REFERENCES

Akaike, H. (1987). Factor analysis and AIC. *Psychometrika*, *52*, 317–332. http://doi.org/10.1007/BF02294359

American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). https://doi.org/10.1176/appi.books.9780890425596

Asparouhov, T., & Muthén, B. (2009). Exploratory structural equation modeling. *Structural Equation Modeling: A Multidisciplinary Journal*, *16*(3), 397–438. https://doi.org/10.1080/10705510903008204

Asparouhov, T., Muthén, B., & Morin, A. J. (2015). Bayesian structural equation modeling with cross-loadings and residual covariances: Comments on Stromeyer et al. *Journal of Management*, *41*(6), 1561–1577. https://doi.org/10.1177/0149206315591075

Barry, L. C., Kasl, S. V., & Prigerson, H. G. (2002). Psychiatric disorders among bereaved persons: The role of perceived circumstances of death and preparedness for death. *The American Journal of Geriatric Psychiatry*, *10*(4), 447–457. https://doi.org/10.1097/00019442-200207000-00011

Beauducel, A., & Herzberg, P. Y. (2006). On the performance of maximum likelihood versus means and variance adjusted weighted least squares estimation in CFA. *Structural Equation Modeling: A*

Multidisciplinary Journal, *13*(2), 186–203. https://doi.org/10.1207/s15328007sem1302_2

Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin*, *107*(2), 238–246. https://doi.org/10.1037/0033-2909.107.2.238

Boelen, P. A., Lenferink, L. I., Nickerson, A., & Smid, G. E. (2018). Evaluation of the factor structure, prevalence, and validity of disturbed grief in *DSM-5* and *ICD-11*. *Journal of Affective Disorders*, *240*, 79–87. https://doi.org/10.1016/j.jad.2018.07.041

Boelen, P. A., Lenferink, L. I., & Smid, G. E. (2019). Further evaluation of the factor structure, prevalence, and concurrent validity of *DSM-5* criteria for persistent complex bereavement disorder and *ICD-11* criteria for prolonged grief disorder. *Psychiatry Research*, *273*(6), 206–210. https://doi.org/10.1080/07481187.2018.1480546

Boelen, P. A., van de Schoot, R., van den Hout, M. A., de Keijser, J., & van den Bout, J. (2010). Prolonged grief disorder, depression, and posttraumatic stress disorder are distinguishable syndromes. *Journal of Affective Disorders*, *125*(1–3), 374–378. https://doi.org/10.1016/j.jad.2010.01.076

Browne, M. W., & Cudeck, R. (1992). Alternative ways of assessing model fit. *Sociological Methods & Research*, *21*(2), 230–258. https://doi.org/10.1177/0049124192021002005

Bui, E., Mauro, C., Robinaugh, D. J., Skritskaya, N. A., Wang, Y., Gribbin, C., Ghesquiere, A., Horenstein, A., Duan, N., Reynolds, C., Zisook, S., Simon, N. M., & Shear, M. K. (2015). The Structured Clinical Interview for Complicated Grief: Reliability, validity, and exploratory factor analysis. *Depression and Anxiety*, *32*(7), 485–492. https://doi.org/10.1002/da.22385

Burke, L., & Neimeyer, R. (2013). Prospective risk factors for complicated grief: A review of the empirical literature. In M. Stroebe, H. Schut, & J. van den Bout (Eds.), *Complicated grief: Scientific foundations for health care professionals* (pp. 163–179). Taylor & Francis. https://doi.org/10.4324/9780203105115-21

Christensen, A. P., & Golino, H. (2021). On the equivalency of factor and network loadings. *Behaviour Research Methods*, *53*(4), 1563–1580. https://doi.org/10.3758/s13428-020-01500-6

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). Lawrence Erlbaum.

Djelantik, A. M. J., Robinaugh, D. J., Kleber, R. J., Smid, G. E., & Boelen, P. A. (2020). Symptomatology following loss and trauma: Latent class and network analyses of prolonged grief disorder, posttraumatic stress disorder, and depression in a treatment-seeking trauma-exposed sample. *Depression and Anxiety*, *37*(1), 26–34. https://doi.org/10.1002/da.22880

Fried, E. I., & Nesse, R. M. (2014). The impact of individual depressive symptoms on impairment of psychosocial functioning. *PloS one*, *9*(2), Article e90311. https://doi.org/10.1371/journal.pone.0090311

He, L., Tang, S., Yu, W., Xu, W., Xie, Q., & Wang, J. (2014). The prevalence, comorbidity and risks of prolonged grief disorder among bereaved Chinese adults. *Psychiatry Research*, *219*(2), 347–352. https://doi.org/10.1016/j.psychres.2014.05.022

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling*, *6*(1), 1–55. https://doi.org/10.1080/10705519909540118

Jöreskog, K. G., & Sörbom, D. (1981). *LISREL V: Analysis of linear structural relationships by maximum likelihood and least squares methods*. University of Uppsala, Department of Statistics.

Killikelly, C., Kagialis, A., Henneman, S., Coronado, H., Demanarig, D., Farahani, H., Özdoğru, A. A., Yalçın, B., Yockey, A., Gosnell, C. L., Jia, F., Maisel, M., Stelzer, E., Wilson, D., Anderson, J., Charles, K., Cummings, J. P., Faas, C., Knapp, B., … Irgens, M. S. (2023). Measurement and assessment of grief in a large international sample. *Journal of Affective Disorders*, *327*, 306–314. https://doi.org/10.1016/j.jad.2023.01.095

Killikelly, C., Lorenz, L., Bauer, S., Mahat-Shamir, M., Ben-Ezra, M., & Maercker, A. (2019). Prolonged grief disorder: Its co-occurrence with adjustment disorder and post-traumatic stress disorder in a bereaved Israeli general-population sample. *Journal of Affective Disorders*, *249*, 307–314. https://doi.org/10.1016/j.jad.2019.02.014

Killikelly, C., Zhou, N., Merzhvynska, M., Stelzer, E. M., Dotschung, T., Rohner, S., Sun, L. H., & Maercker, A. (2020). Development of the International Prolonged Grief Disorder Scale for the *ICD-11*: Measurement of core symptoms and culture items adapted for Chinese and German-speaking samples. *Journal of Affective Disorders*, *277*, 568–576. https://doi.org/10.1016/j.jad.2020.08.057

Lenferink, L. I., Eisma, M. C., Smid, G. E., de Keijser, J., & Boelen, P. A. (2022). Valid measurement of DSM-5 persistent complex bereavement disorder and DSM-5-TR and ICD-11 prolonged grief disorder: The Traumatic Grief Inventory-Self Report Plus (TGI-SR+). *Comprehensive Psychiatry*, *112*, 152281. https://doi.org/10.1016/j.comppsych.2021.152281

Lenferink, L. I. M., Van Den Munckhof, M. J. A., de Keijser, J., & Boelen, P. A. (2021). *DSM-5-TR* prolonged grief disorder and *DSM-5* posttraumatic stress disorder are related, yet distinct: Confirmatory factor analyses in traumatically bereaved people. *European Journal of Psychotraumatology*, *12*(1), Article 2000131. https://10.1080/20008198.2021.2000131

Louison Vang, M., Shevlin, M., Hansen, M., Lund, L., Askerod, D., Bramsen, R. H., & Flanagan, N. (2020). Secondary traumatisation, burn-out and functional impairment: findings from a study of Danish child protection workers. *European Journal of Psychotraumatology*, *11*(1), Article 1724416. https://doi.org/10.1080/20008198.2020.1724416

Lundorff, M., Holmgren, H., Zachariae, R., Farver-Vestergaard, I., & O'Connor, M. (2017). Prevalence of prolonged grief disorder in adult bereavement: A systematic review and meta-analysis. *Journal of Affective Disorders*, *212*, 138–149. https://doi.org/10.1016/j.jad.2017.01.030

Lundorff, M., Johannsen, M., & O'Connor, M. (2021). Time elapsed since loss or grief persistency? Prevalence and predictors of *ICD-11* prolonged grief disorder using different applications of the duration criterion. *Journal of Affective Disorders*, *279*, 89–97. https://doi.org/10.1016/j.jad.2020.09.116

Maccallum, F., Lundorff, M., Johannsen, M., Farver-Vestergaard, I., & O'Connor, M. (2023). An exploration of gender and prolonged grief symptoms using network analysis. *Psychological Medicine*, *53*(5), 1770–1777. https://doi.org/10.1017/S0033291721003391

Mai, Y., Zhang, Z., & Wen, Z. (2018). Comparing exploratory structural equation modeling and existing approaches for multiple regression with latent variables. *Structural Equation Modeling: A Multidisciplinary Journal*, *25*(5), 737–749. https://doi.org/10.1080/10705511.2018.1444993

McBride, O., Butter, S., Hartman, T. K., Murphy, J., Hyland, P., Shevlin, M., Gibson-Miller, J., Levita, L., Mason, L., Martinez, A. P., McKay, R., Lloyd, A., Stocks, T. V. A., Bennett, K. M., Vallières, F., Karatzias, T., Valiente, C., Vazquez, C., Contreras, A., … Bentall, R. P. (2020). Sharing data to better understand one of the world's most significant shared experiences: Data resource profile of the longitudinal COVID-19 Psychological Research

Consortium (C19PRC) study. *International Journal of Population Data Science*, *5*(4), Article 1704. https://10.23889/ijpds.v5i4.1704

McBride, O., Butter, S., Murphy, J., Hartman, T. K., McKay, R., Hyland, P., Shevlin, M., Bennett, K. M., Stocks, T. V. A., Lloyd, A., Gibson-Miller, J., Levita, L., Mason, L., Martinez, A. P., Vallières, F., Karatzias, T., & Bentall, R. P. (2022). Tracking the psychological and socio-economic impact of the COVID-19 pandemic in the UK: A methodological report from Wave 5 of the COVID-19 Psychological Research Consortium (C19PRC) Study. *International Journal of Methods in Psychiatric Research*, *31*(4), Article e1928. https://10.1002/mpr.1928

Milman, E., Neimeyer, R. A., Fitzpatrick, M., MacKinnon, C. J., Muis, K. R., & Cohen, S. R. (2019). Rumination moderates the role of meaning in the development of prolonged grief symptomatology. *Journal of Clinical Psychology*, *75*(6), 1047–1065. https://doi.org/10.1002/jclp.22751

Morina, N. (2011). Rumination and avoidance as predictors of prolonged grief, depression, and posttraumatic stress in female widowed survivors of war. *Journal of Nervous and Mental Disease*, *199*(12), 921–927. https://10.1097/NMD.0b013e3182392aae

Muthén, L. K., & Muthén, B. (2017). *Mplus user's guide: Statistical analysis with latent variables*. Muthén & Muthén.

Nolen-Hoeksema, S. (2012). Emotion regulation and psychopathology: The role of gender. *Annual Review of Clinical Psychology*, *8*, 161–187. https://10.1146/annurev-clinpsy-032511-143109

O'Connor, M., Larsen, L., Joensen, B. V., Boelen, P. A., Maccallum, F., Komischke-Konnerup, K., & Bryant, R. A. (2020). Valid *ICD-11* PGD scales and structured clinical interviews needed. *Frontiers in Psychology*, *11*, 1120. https://doi.org/10.3389/fpsyg.2020.01120

Prigerson, H. G., Horowitz, M. J., Jacobs, S. C., Parkes, C. M., Aslan, M., Goodkin, K., Raphael, B., Marwit, S. J., Wortman, C., Neimeyer, R. A., Bonanno, G., Block, S. D., Kissane, D., Boelen, P., Maercker, A., Litz, B. T., Johnson, J. G., First, M. B., & Maciejewski, P. K. (2009). Prolonged grief disorder: Psychometric validation of criteria proposed for *DSM-V* and *ICD-11*. *PLoS Medicine*, *6*(8), Article e1000121. https://doi.org/10.1371/journal.pmed.1000121

Sclove, S. L. (1987). Application of model-selection criteria to some problems in multivariate analysis. *Psychometrika*, *52*, 333–343. https://doi.org/10.1007/BF02294360

Shear, K., Monk, T., Houck, P., Melhem, N., Frank, E., Reynolds, C., & Sillowash, R. (2007). An attachment-based model of complicated grief including the role of avoidance. *European Archives of Psychiatry and Clinical Neuroscience*, *257*(8), 453–461. https://doi.org/10.1007/s00406-007-0745-z

Shevlin, M., & Adamson, G. (2005). Alternative factor models and factorial invariance of the GHQ-12: A large sample analysis using confirmatory factor analysis. *Psychological Assessment*, *17*(2), 231–236. https://doi.org/10.1037/1040-3590.17.2.231

Shevlin, M., Redican, E., Hyland, P., Murphy, J., Karatzias, T., McBride, O., … & Bentall, R. P. (2023). Symptoms and levels of ICD-11 Prolonged Grief Disorder in a representative community sample of UK adults. *Social Psychiatry and Psychiatric Epidemiology*, 1–13. https://doi.org/10.1007/s00127-023-02469-1

Shevlin, M., Hyland, P., Karatzias, T., Bisson, J. I., & Roberts, N. P. (2017). Examining the disconnect between psychometric models and clinical reality of posttraumatic stress disorder. *Journal of Anxiety Disorders*, *47*, 54–59. https://doi.org/10.1016/j.janxdis.2017.02.006

Seedat, S., Scott, K. M., Angermeyer, M. C., Berglund, P., Bromet, E. J., Brugha, T. S., Demyttenaere, K., de Girolamo, G., Haro, J. M., Jin, R., Karam, E. G., Kovess-Masfety, V., Levinson, D., Medina Mora, M. E., Ono, Y., Ormel, J., Pennell, B.-E., Posada-Villa, J., Sampson, N. A., … Kessler, R. C. (2009). Cross-national associations between gender and mental disorders in the World Health Organization World Mental Health Surveys. *Archives of General Psychiatry*, *66*(7), 785–795. https://doi.org/10.1001/archgenpsychiatry.2009.36

Simon, N. M., Shear, M. K., Reynolds, C. F., Cozza, S. J., Mauro, C., Zisook, S., Skritskaya, N., Robinaugh, D. J., Malgaroli, M., Spandorfer, J., & Lebowitz, B. (2020). Commentary on evidence in support of a grief-related condition as a *DSM* diagnosis. *Depression and Anxiety*, *37*(1), 9–16. https://doi.org/10.1002/da.22985

Stroebe, M., Stroebe, W., & Schut, H. (2001). Gender differences in adjustment to bereavement: An empirical and theoretical review. *Review of General Psychology*, *5*(1), 62–83. https://doi.org/10.1037/1089-2680.5.1.62

Sveen, J., Bondjers, K., Heinsoo, J., & Arnberg, F. K. (2020). Psychometric evaluation of the Swedish version of the Prolonged Grief Disorder–13 (PG-13) in a bereaved mixed trauma sample. *Frontiers in Psychiatry*, *11*, Article 541789. https://doi.org/10.3389/fpsyt.2020.541789

Tucker, L. R., & Lewis, C. (1973). A reliability coefficient for maximum likelihood factor analysis. *Psychometrika*, *38*(1), 1–10. https://doi.org/10.1007/BF02291170

World Health Organization. (2019). *International statistical classification of diseases and related health problems* (11th ed.). https://icd.who.int/

Yuan, K. H., & Bentler, P. M. (2000). 5. Three likelihood-based methods for mean and covariance structure analysis with nonnormal missing data. *Sociological Methodology*, *30*(1), 165–200. https://doi.org/10.1111/0081-1750.00078

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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