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Are there gender differences in prolonged grief trajectories? A registry-sampled cohort study

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ABSTRACT

Research suggests variation in how grief develops across time, and gender may account for some of this variation. However, gender differences in growth patterns of the newly codified *ICD-11* prolonged grief disorder (PGD) are unknown. This study examined gender-specific variances in grief trajectories in a registry-sampled cohort of 857 spousal bereaved individuals (69.8% female). Participants completed self-report questionnaires of PGD symptoms at 2, 6, and 11 months post-loss. Using Growth Mixture Modeling, four PGD trajectories emerged: *resilient* characterized by low symptoms (64.4%), *moderate-stable* characterized by moderate symptoms (20.4%), *recovery* characterized by elevated symptoms showing a decrease over time (8.4%), and *prolonged grief* characterized by continuous elevated symptoms (6.8%). Similar proportions of men and women comprised the four trajectories. Gender influenced the parameter estimates of the *prolonged grief* trajectory as men evidenced more baseline symptoms (higher intercept) than women did and a decreasing symptom-level (negative slope), while women showed symptom-increase over time (positive slope). The *prolonged grief* trajectory captured the largest proportion of probable PGD cases in both genders. Low optimism and low mental health predicted membership in this class. Altogether, the absolute majority of both men and women followed a low-symptom *resilient* trajectory. While a comparable minority followed a high-symptom *prolonged grief* trajectory, men and women within this trajectory expressed varying symptom development. Men expressed *prolonged grief* as an acute, decreasing reaction, whereas women showed an adjourned, mounting grief reaction. This study suggests that gender may influence symptom development in highly distressed individuals across early bereavement.

1. Introduction

Bereavement is a universal experience most people undergo during their life (Holmes and Rahe, 1967), but there are marked individual variations in grief severity and duration (Bonanno and Kaltman, 2001). Most bereaved individuals manage to adjust and continue normal functioning after the loss, while a small minority of approximately 10% experiences impairing and pervasive grief reactions (Bonanno et al., 2002; Prigerson et al., 2009; Shear et al., 2011). This observation resulted in the recent codification of prolonged grief disorder (PGD) as a bereavement-specific mental disorder in the *International Classification of Diseases* (11th version; *ICD-11*; World Health Organization, 2018). PGD describes a pervasive grief response characterized by an intense longing for or persistent preoccupation with the deceased accompanied by intense emotional pain, causing significant functional impairment. Additionally, the disorder includes a duration criterion, requiring the grief response to persist "for an atypically long period of time following the loss (more than 6 months at a minimum)" (World Health Organization, 2018).

Given the forthcoming implementation of *ICD-11* PGD, knowledge of variances in risk towards bereavement-related impairment is of particular importance. Gender possibly accounts for some of the observed grief variability. A systematic overview identified female gender as a potential risk factor for intense and complicated grief reactions (Burke and Neimeyer, 2013), and a meta-analysis demonstrated a small positive association between female gender and prolonged grief in adults

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exposed to violent loss (Heeke et al., 2017). Moreover, cross-sectional studies informed by the *ICD-11* guidelines showed how female gender was positively associated with PGD symptom-severity (Killikelly et al., 2019; Zhou et al., 2020). Meanwhile, in recent meta-analyses, gender did not significantly moderate prevalence rates of disturbed grief following neither natural nor unnatural losses (Djelantik et al., 2020; Lundorff et al., 2017). These seemingly contradictory findings could reflect how similar proportions of men and women express problematic grief reactions (i.e., no gender difference in grief when studied as a binary outcome); however, these reactions might be worse in female diagnostic cases (i.e., a gender difference in grief when studied as a continuous outcome). As the pathology of *ICD-11* PGD symptoms lies in their impairment and continuance (Maciejewski et al., 2016; Maercker et al., 2013), longitudinal research seems necessary to explore possible gender differences in symptom-severity, specifically within an *ICD-11* PGD framework.

Growth mixture modeling (GMM) is a robust computational method to examine changes in psychopathological symptoms over time (Muthén and Muthén, 2018). With GMM, it is possible to differentiate longitudinal patterns (i.e., trajectories) of PGD from other normative grief reactions, such as natural recovery (Bonanno and Malgaroli, 2020), and to investigate systematic variations in these patterns among subgroups, such as differences between men and women. Earlier GMM studies based on depression scores have repeatedly demonstrated distinct trajectories following a loss; a majority of bereaved individuals exhibit minimal distress, some express acute distress followed by recovery, while a minority show chronic high-level distress (e.g., Bonanno et al., 2005; Galatzer-Levy and Bonanno, 2012; Maccallum et al., 2015). Recent studies extend this prior line of research by using grief-specific measures to investigate longitudinal patterns of normative and pathological grief (Bonanno and Malgaroli, 2020; Lenferink et al., 2018; Nielsen et al., 2018; Smith and Ehlers, 2019; Sveen et al., 2018).

The present study evaluated gender differences in grief trajectories trough GMM in a large registry-sampled cohort of spousally bereaved individuals. Previous grief-trajectory studies examined symptoms from different conceptualizations of pathological grief, such as Persistent Complex Bereavement Disorder (PCBD; American Psychiatric Association, 2013), PGD (World Health Organization, 2018), and Prolonged Grief as per Prigerson et al. (2009). A recent comparative analysis, however, indicated that trajectories based on the symptoms of PGD from the *ICD-11* best-captured change across time (Bonanno and Malgaroli, 2020). Accordingly, the present study relied on these symptoms and investigated whether men and women differed in a) membership proportions across trajectories, b) distribution of PGD cases across trajectories, and c) early predictors of trajectory membership. To our knowledge, this is the first study to investigate gender differences in growth patterns of *ICD-11* PGD using GMM.

2. Materials and methods

2.1. Data

Data were collected for The Aarhus Bereavement Study (TABstudy), a large multi-wave cohort study on natural and prolonged grief reactions managed by the last author of this paper [psy.au.dk/grief]. The TABstudy follows the General Data Protection Regulation of the European Union [2016/679], is conducted under the surveillance of the Danish Data Protection Agency [registration number: 2015-57-0002-62908-266] and was, due to the involvement of human volunteers, pre-registered as an observational study at ClinicalTrials.org [NCT03049007]. Data were collected and managed using the research electronic data capture (REDCap) tool hosted at Aarhus University (Harris et al., 2009).

2.2. Participants and procedures

Extractions from the Danish Civil Registration System (DCRS) identified individuals in the greater metropolitan area of Aarhus, Denmark, who lost a spouse from January 2017 to March 2018. One month post-loss, these individuals were contacted and invited to participate in the study. Participants provided written informed consent and received self-report questionnaires at two (T1: $M = 2.49 \pm 0.54$), six (T2: $M = 6.23 \pm 0.52$), and eleven (T3: $M = 11.13 \pm 0.45$) months post-loss. To accommodate different needs, participants chose between receiving the questionnaire by mail or postal service.

2.3. Measures

Participants completed measures of prolonged grief symptomatology and hypothesized predictors of grief trajectories (i.e., optimism, neuroticism, mental and physical health). Grief symptomatology was measured at all time-points (T1-T3), while predictors were measured at baseline (T1).

2.3.1. PGD symptomatology

PGD was assessed by mapping the *ICD-11* (World Health Organization, 2018) core symptoms (longing, preoccupation) and emotional pain symptoms (sadness, guilt, anger, denial, blame, difficulty accepting the death, feeling one has lost a part of one's self, an inability to experience positive mood, emotional numbness, difficulty in engaging with social or other activities) with items from three questionnaires (see Supplementary Table 1). The *Prolonged Grief-13* (PG-13; Prigerson et al., 2009) and the *Inventory of Complicated Grief-Revised* (ICG-R; Prigerson and Jacobs, 2001) measure functionally impairing grief symptoms (e.g., "Do you feel emotionally numb since your loss?"). Individuals rate how disturbing these symptoms are, and higher scores indicate elevated grief. The *PTSD Checklist-Civilian Version* (PCL-C; Ruggiero et al., 2003) measures post-traumatic stress symptoms (PTSS) following potentially traumatic events. In the current study, PCL-C items were adjusted to refer to "the death" instead of the generic term "stressful experience" (e.g., "Trouble experiencing positive feelings after the death?"). PCL-C was included to augment the capture of prolonged grief symptoms, and not as a PTSS-specific measure. The mapped PGD items showed excellent internal consistency ($\alpha[T1] = 0.89$; $\alpha[T2] = 0.90$; $\alpha[T3] = 0.90$).

For the GMM analyses, the two core and the ten emotional pain symptoms were rated as present/absent and then summed for a total PGD symptom-severity score (range: 0–12). It was also tested how well trajectories captured diagnostic PGD cases at T2 and T3. In line with earlier research (e.g., Boelen et al., 2019, 2018), probable PGD caseness required $\geq$ one core symptom, $\geq$one emotional pain symptom, and present significant impairment. The dichotomous (yes/no) PG-13 item, "Have you experienced a significant reduction in social, occupational, or other important areas of functioning (e.g., domestic responsibilities)?", assessed impairment.

2.3.2. Hypothesized psychosocial predictors

The *Life Orientation Test-Revised* (LOT-R; Scheier et al., 1994) measured optimism by rating agreement with ten statements (e.g., "In uncertain times, I usually expect the best"). Higher scores indicate higher levels of optimism. Neuroticism was captured with its respective subscale on the *NEO Personality Inventory-Revised* (NEO-PI-R Short Version; Costa and McCrae, 1992), consisting of domain-specific personality statements (e.g., "I often feel tense and nervous"). Higher scores specify higher levels of neuroticism. The *Short-Form Health Survey* (SF-12; Ware et al., 1996) is a generic measure of health status, addressing different aspects of emotional states and daily activities (e.g., "Have you felt downhearted and blue?", "Have you accomplished less than you would like as a result of your physical health?"). The SF-12 calculates subscores for mental and physical health based on population norms with higher scores indicating better health. These covariates

showed good internal validity (α[LOT-R] = 0.78. α[NEO-PI-R] = 0.89. α[SF-12] = 0.85).

2.4. Statistical analyses

First, the appropriateness of conducting GMM was established through growth curve modeling, where an unconditional single growth curve was fitted to the data. Adequate fit (Yu, 2002) was indicated by Comparative Fit Index (CFI≥0.96), Tucker-Lewis Index (TLI≥0.95), root-mean-square error of approximation (RMSEA≤0.05), and standardized root-mean-square residual (SRMR≤0.07).

Second, GMM explored unconditional models with one to five trajectories (classes) with intercept and slope tested as fixed or random effects. To facilitate convergence in the final model testing, intercept variances were allowed to be random across classes, while slope variances were fixed. Identification of the optimal number of classes entailed comparison of progressive model solutions using standard fit indices, including Akaike Information Criterion (AIC), Bayesian Information Criterion (BIC), and Sample Size Adjusted BIC (SSA-BIC) for which lower values suggest better model fit. Entropy values range between 0 and 1 with higher values signifying better classification accuracy, and finally, the Lo-Mendell-Rubin likelihood ratio test (LMR-LRT) and the bootstrapped LRT (B-LRT) indicate whether adding a class improves model fit significantly. These indices, explanatory properties, and theoretical coherence (Bonanno, 2004; Muthén, 2003; Nagin and Odgers, 2010) informed final model selection.

Third, multiple-group GMM analysis conditioned by the best-fitting model with gender as a known-class variable tested the effect of gender on trajectories. Wald Chi-Square Tests of parameter equality examined the extent to which model parameters (i.e., slope and intercept) differed between men and women. Z-tests compared proportions of men versus women in each trajectory. Fisher's Exact Tests evaluated distributional variances of *ICD-11* PGD cases across male and female trajectories. Finally, multinomial regression examined potential predictors of trajectory membership by nesting theoretically relevant covariates (optimism, neuroticism, mental health, and physical health) in the model. Analyses were performed using Mplus, version 8.1 (Muthén and Muthén, 2018), and SPSS, version 26 (IBM Corporation, 2019).

3. Results

3.1. Study population

Consecutive registry-extractions identified a total of 2006 bereaved spouses, of whom 857 provided sufficient PGD data for inclusion in the present GMM analysis. Comparisons between those from the total sampling pool not included ($N = 1149$) and the analyzed sample ($N = 857$) revealed no significant gender differences ($\chi^2(1) = 0.974$, $p = .805$), but those not included were older than the analyzed sample ($t = 3.839$, $p < .001$). Conventional cut-off (Sullivan and Feinn, 2012) suggest this difference reflects an unsubstantive effect size ($d = 0.17$; 95% confidence interval [CI] = 0.08-0.26). Number of responses on the PGD measure varied across data-points (T1: $N = 839$, T2: $N = 773$, T3: $N = 749$), but was neither statistically associated with gender, age, education, source of income, cause of death, nor PGD symptom-severity at T1-T3 ($ps > .05$).

The analyzed sample had an average age of 70.3 years (±9.8), 69.8% was female, 55.8% had completed primary education, and 76.5% was retired. The male subsample was significantly older, reported better mental health, and lower neuroticism compared to the female subsample (see Table 1), reflecting differences of small effect sizes ($ds = 0.21–45$; 95% CIs = 0.06-0.61). Men and women also differed regarding the cause of death ($p = .001$), primarily due to a higher proportion of men bereaved by dementia ($z = 2.6$, $p < .01$).

Table 1
Socio-demographic, loss-related, and psychological characteristics.

	Total sample ($N = 857$)	Male subsample ($n = 259$)	Female subsample ($n = 598$)	p
Gender, *n* (%)				
Males	259 (30.2)	259	–	–
Females	598 (69.8)	–	598	
Age, mean (*SD*)	70.3 (9.8)	71.7 (9.8)	69.7 (9.8)	**.006**
Educational attainment[a], *n* (%)				
Primary education	498 (55.8)	136 (52.5)	342 (57.2)	.313
Secondary education	337 (39.3)	107 (41.3)	230 (38.5)	
Missing	*42 (4.9)*	*16 (6.2)*	*26 (4.3)*	
Source of income[b], *n* (%)				
Salary	132 (15.4)	39 (15.0)	93 (15.5)	.605
Pension	656 (76.5)	197 (76.1)	459 (76.8)	
Out of employment	36 (4.2)	8 (3.1)	28 (4.7)	
Missing	*33 (3.9)*	*15 (5.8)*	*18 (3.0)*	
Cause of death, *n* (%)				
Old age	21 (2.4)	2 (0.8)	19 (3.2)	**.001**
Cancer	473 (55.2)	156 (60.2)	317 (53.0)	
Cardiovascular disease	99 (11.6)	24 (9.3)	75 (12.5)	
Dementia	17 (2.0)	11 (4.2)	6 (1.0)	
Accident/suicide	23 (2.7)	7 (2.7)	16 (2.7)	
Diabetes	8 (0.9)	3 (1.2)	5 (0.8)	
Other	179 (20.9)	41 (15.8)	138 (23.1)	
Missing	*37 (4.3)*	*15 (5.8)*	*22 (3.7)*	
PGD symptom-severity[c], *M* (*SD*)				
T1	3.2 (2.4)	3.1 (2.4)	3.3 (2.4)	.212
T2	2.6 (2.5)	2.4 (2.6)	2.6 (2.4)	.317
T3	1.9 (2.2)	1.7 (2.2)	2.0 (2.3)	.056
Optimism, *M* (*SD*)	15.4 (3.9)	15.7 (3.8)	15.2 (4.0)	.151
Neuroticism, *M* (*SD*)	29.9 (8.4)	27.3 (8.0)	31.0 (8.4)	**<.001**
Mental health, *M* (*SD*)	43.5 (12.1)	45.6 (11.5)	42.5 (12.2)	**.001**
Physical health, *M* (*SD*)	48.8 (11.1)	49.4 (11.3)	48.6 (11.1)	.352

PGD, prolonged grief disorder; SD, standard deviation; T1, time 1 (2 months post-loss); T2, time 2 (6 months post-loss); T3, time 3 (11 months post-loss). Statistically significant values indicated in bold font.

[a] Educational attainment was dichotomized as 1) primary education (primary school, high school, vocational training) and 2) secondary education (college, university).

[b] Source of income was categorized as 1) salary for those holding a job, 2) pension for those on early voluntary retirement and those receiving self-financed or government-assisted pension, and 3) out of employment (including unemployment benefits, government-sponsored support, social security payments due to sickness).

[c] PGD symptom-severity reflects the summed score of present core and emotional pain symptoms (ranging from 0 to 12).

3.2. Growth curve modeling

Growth curve modeling of PGD scores over time with an unconditional growth curve demonstrated excellent data fit (CFI = 0.997; TLI = 0.991; SRMS = 0.014; RMSEA = 0.065) and found the latent slope variance significant ($p < .001$). Although the RMSEA was marginally above the suggested cut-off, the remaining fit indices indicated that GMM was appropriate to explore heterogeneous classes within the data.

3.3. Growth mixture modeling

Unconditional models with one to five classes were compared to identify the best-fitting number of classes (Table 2). Information criteria (AIC, BIC, SSA-BIC) decreased steadily across consecutive models, indicating an increasingly better model fit. Except for the three-class solution, entropy was above 0.8, suggesting high classification accuracy (Clark and Muthén, 2009). The LMR-LRT varied, but demonstrated

Table 2
Fit Indices for one- to five-class models of prolonged grief symptomatic trajectories.

Fit index	One-class	Two-class	Three-class	**Four-class**	Five-class
AIC	9587.890	9447.235	9367.912	**9272.219**	9220.444
BIC	9616.411	9490.016	9424.953	**9343.521**	9306.006
SSA-BIC	9597.356	9461.434	9386.844	**9295.885**	9248.843
Entropy	–	0.818	0.769	**0.815**	0.827
LMR-LRT (*p*)	–	.010	.002	**.005**	.229
B-LRT (*p*)	–	<.001	<.001	**<.001**	<.001

AIC, Akaike Information Criterion; BIC, Bayesian Information Criterion; B-LRT, bootstrapped likelihood ratio test; LMR-LRT, Lo-Mendell-Rubin likelihood ratio test; SSA-BIC, Sample Size Adjusted BIC.
Best-fitting model indicated in bold font.

significantly worse model fit for the five-class model solution ($p = .229$). Given these indices, the optimal solution was the four-class model with random intercept and fixed slope.

In the four-class model (see Fig. 1), the majority of the sample followed a *resilient* (64.4%) trajectory characterized by low-level PGD symptoms at T1 (intercept $M = 2.16 \pm 0.13$, $p < .001$) with a slight decline over time (slope $M = -0.14 \pm 0.01$, $p < .001$). The second-largest class, *moderate-stable* (20.4%), showed a moderate symptom level at T1 (intercept $M = 4.50 \pm 0.27$, $p < .001$) and an almost flat growth curve (slope $M = -0.01 \pm 0.03$, $p = .644$). A third class, *recovery* (8.4%), endorsed high baseline grief symptoms (intercept $M = 6.58 \pm 0.54$, $p < .001$) and a steady time-wise decline (slope $M = -0.43 \pm 0.04$, $p < .001$). The fourth class was characterized by high-level *prolonged grief* (6.8%) symptoms at T1 (intercept $M = 7.77 \pm 0.42$, $p < .001$), showing minimal decrease over time (slope $M = -0.04 \pm 0.05$, $p < .487$).

3.4. Gender differences

3.4.1. Multiple-group GMM

Within the four-class model, gender was used as a known-class variable to evaluate gender-specific differences in trajectory parameters. The multiple-group GMM analysis demonstrated high entropy (0.88). The overall Wald Test revealed significant differences in trajectory parameters for men and women ($p < .05$), suggesting that the known-class variable increased model fit (see Supplementary Table 2). Focused comparisons indicated significant between-gender variation in intercept ($p = .018$) and slope ($p = .004$) of the *prolonged grief* class. No other significant parameter differences emerged. Fig. 2 illustrates almost identical growth patterns for male and female *resilient*, *moderate-stable*, and *recovery* classes, while the *prolonged grief* classes visibly differ between genders.[1] Exploratory analyses examined whether specific symptoms contributed to this difference. Men in the *prolonged grief* class endorsed symptoms "feeling one has lost a part of one's self" ($p = .009$) and "engagement difficulties" ($p = .004$) significantly more often than women at T1 and symptoms "inability to experience positive mood" ($p = .008$) and "engagement difficulties" ($p = .003$) more often at T2.

3.4.2. Proportions across trajectories

Comparisons of gender prevalence rates within the different classes were non-significant (*ps* > .05); i.e., men and women did not differ in membership proportions across trajectories.

[1] Four-class GMM analyses on the male and female subsamples separately resulted in comparable trajectory patterns as in the multiple-group model [male- and female-only four-class figures available upon request]. Multiple-group GMM was conducted to enable focused comparisons of gender-specific trajectory parameters (i.e., slope and intercept) within the same model, expanding knowledge beyond separated models.

3.4.3. PGD case match

Distribution of PGD caseness at T2 and T3 differed significantly (*ps* < .001) across the identified trajectories (Table 3). At T2, a minority (6.8%) of those characterized as *resilient* met probable PGD caseness, while 84.6% of the male and 67.7% of the female *prolonged grief* class met caseness. Similar results were found at T3, with 45.5% of the male and 74.1% of the female *prolonged grief* class meeting caseness. The within-class percentages of caseness decreased from T2 to T3 for most classes, but the female *prolonged grief* and *moderate-stable* classes showed a percentual increase across time.

3.4.4. Predictors of class membership

Covariates (i.e., optimism, neuroticism, mental health, and physical health) were nested within the four-class model to investigate predictors of class membership. The first set of analyses used the covariates as predictors and the four classes as outcomes (Table 4). Compared to the *resilient* class, the *moderate-stable* class showed lower mental and physical health, the *prolonged grief* class showed lower mental health and optimism, while the *recovery* class showed lower mental health. Compared to the *prolonged grief* class, the *moderate-stable* and the *recovery* classes showed lower mental health. Comparisons between *moderate-stable* and *recovery* classes did not reach statistical significance. Analyses with interactions between gender and psychosocial covariates included did not reach statistical significance; that is, associations of class membership and covariates did not differ according to gender.

4. Discussion

Given the adverse effects associated with spousal bereavement (Stroebe et al., 2007), knowledge of variations in risk towards loss-related complications is critical. Gender might account for some of the variability, but studies on gender differences within the newly introduced *ICD-11* diagnosis of PGD is lacking. With symptom duration as a critical distinguisher between normal and pathological grief reactions, GMM is a particularly suitable method to explore possible gender variations within the bereavement field. The present study is the first to explore gender differences in *ICD-11* PGD within a GMM framework.

Our analyses revealed four trajectories with different symptomatic patterns, indicating considerable variation in the natural course of grief symptoms. While the *resilient, moderate-stable*, and *recovery* classes did not differ according to gender, men and women in the *prolonged grief* trajectory demonstrated different symptom profiles. In this class, men expressed significantly more baseline grief symptomatology (i.e., higher intercept) compared to women. Symptom development also differed in the *prolonged grief* class as men expressed symptom decrease (i.e., negative slope), while women expressed symptom increase (i.e., positive slope). The nature of this difference is uncertain. Exploratory analyses indicated that men in the *prolonged grief* class more often than women endorsed the PGD symptom "difficulty in engaging with social or other activities" at two and six months post-loss, while no gender difference appeared at eleven months. Hypothetically, men in the *prolonged grief* class experience acute engagement difficulties, but over time – as engagement improves or does not cause difficulties – symptom endorsement resembles the female level. Perhaps, this change may contribute to explain the overall symptom decline (i.e., negative slope) in the male class. Considering this hypothesis, varied symptom endorsement at T3 was expectable, reflecting the female *prolonged grief* symptom increase (i.e., positive slope). Yet, no symptoms were endorsed significantly more often by women. Given the highly exploratory nature of these analyses, further research could investigate how symptom endorsement contributes to gender differences in symptomatic development of PGD.

Similar proportions of men and women received membership of the respective trajectories. Consistent with previous research (Bonanno et al., 2005; Bonanno and Malgaroli, 2020; Galatzer-Levy and Bonanno,

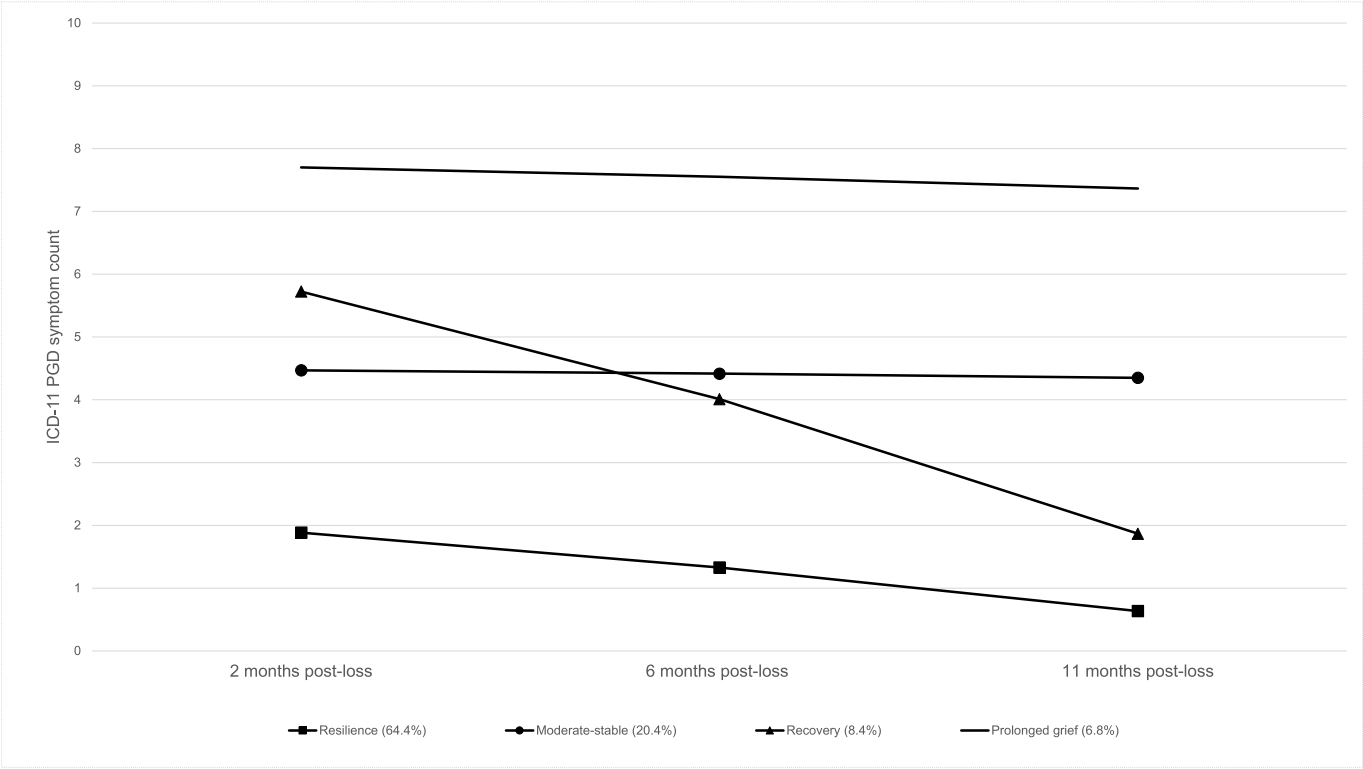

Fig. 1. Four-class unconditional trajectory model of *ICD-11* prolonged grief disorder symptoms ($N = 857$).

2012; Maccallum et al., 2015), the majority of both men (68.0%) and women (65.1%) followed a *resilient* trajectory characterized by a constant low symptom-level. Although spousal loss is a significant life event (Holmes and Rahe, 1967), most individuals are seemingly capable of coping effectively with the associated distress. Comparable proportions of men (5.8%) and women (5.2%) followed the *prolonged grief* trajectory. Thus, whereas this class develops differently across time for men and women, the presence of elevated PGD symptoms are similarly frequent. This finding appears in agreement with earlier studies, demonstrating how prevalence rates of disturbed grief do not differ according to gender (Djelantik et al., 2020; Lundorff et al., 2017).

The identified trajectories differed in their ability to capture PGD

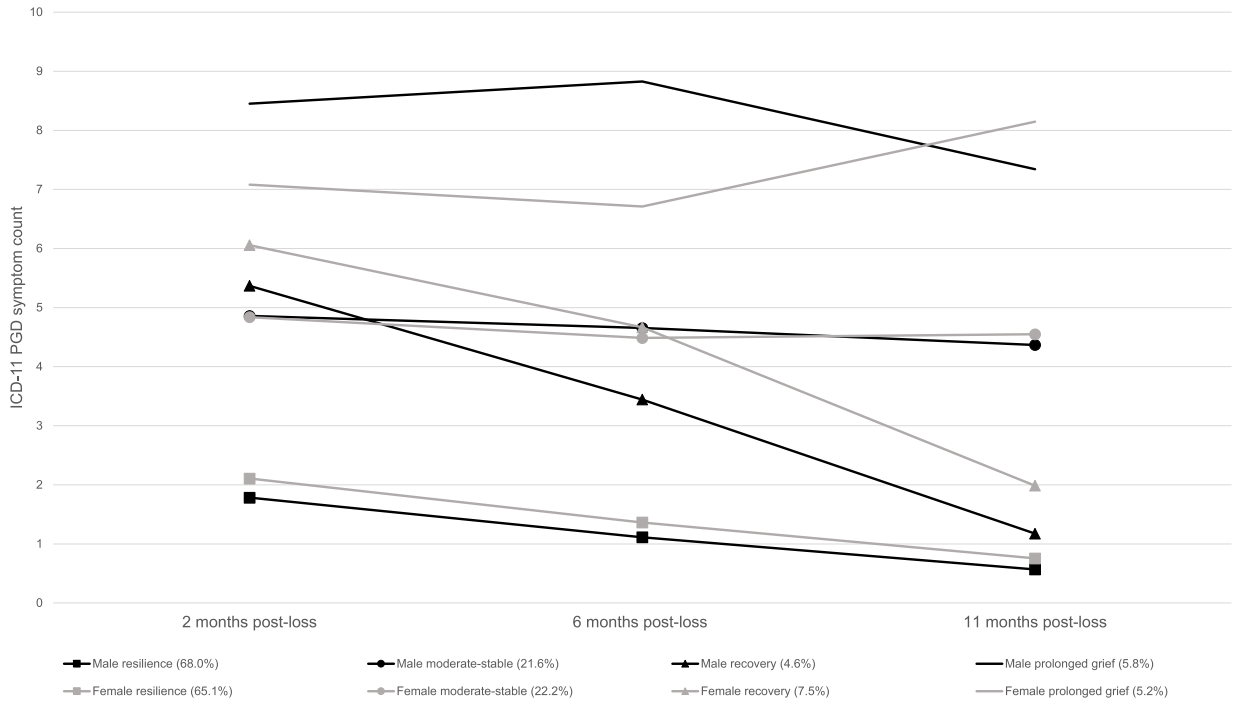

Fig. 2. Multiple-group (gender) four-class trajectory model of *ICD-11* prolonged grief disorder symptoms ($N = 857$).

Table 3
Diagnostic PGD cases within prolonged grief symptomatic trajectories.

	Males		Females	
	PGD at T2, % (*n*)	PGD at T3, % (*n*)	PGD at T2, % (*n*)	PGD at T3, % (*n*)
Resilient	6.8 (11)	**1.3 (2)**	6.8 (24)	**3.2 (11)**
Moderate-stable	30.6 (15)	29.2 (14)	37.4 (43)	37.5 (42)
Recovery	27.3 (3)	**0 (0)**	44.2 (19)	14.0 (6)
Prolonged grief	84.6 (11)	45.5 (5)	67.7 (21)	74.1 (20)
Fisher's Exact Test (*N*)	49.39 (234)	44.02 (228)	112.79 (540)	132.62 (523)
p	<.001	<.001	<.001	<.001

PGD, prolonged grief disorder; T2, time 2 (six months post-loss); T3, time 3 (eleven months post-loss).
PGD cases reported the presence of at least one core symptom (longing or preoccupation), at least one symptom of emotional pain, and significant functional impairment.
Adjusted sample sizes reported due to missing values on the diagnostic test for probable *ICD-11* PGD.
Cells with ≤5% observations indicated in bold font.

Table 4
Multinomial logistic regression estimates for predictors of class membership.

	Covariate	Est	SE	*p*
Compared to resilient				
Moderate-stable	Physical health	−0.041	0.016	**.008**
	Mental health	−0.140	0.031	**.000**
	Optimism	−0.064	0.053	.226
	Neuroticism	−0.006	0.028	.821
Prolonged grief	Physical health	−0.090	0.047	.052
	Mental health	−0.323	0.060	**.000**
	Optimism	−0.326	0.162	**.044**
	Neuroticism	0.010	0.060	.873
Recovery	Physical health	−0.040	0.022	.076
	Mental health	−0.178	0.028	**.000**
	Optimism	−0.098	0.063	.120
	Neuroticism	−0.007	0.032	.831
Compared to prolonged grief				
Recovery	Physical health	0.051	0.045	.258
	Mental health	0.145	0.065	**.026**
	Optimism	0.229	0.161	.155
	Neuroticism	−0.016	0.053	.759
Moderate-stable	Physical health	0.049	0.044	.262
	Mental health	0.182	0.046	**.000**
	Optimism	0.263	0.153	.085
	Neuroticism	−0.016	0.063	.803
Compared to moderate-stable				
Recovery	Physical health	0.001	0.023	.952
	Mental health	−0.038	0.041	.361
	Optimism	−0.034	0.062	.584
	Neuroticism	−0.001	0.030	.984

Est, Parameter Estimate; SE, Standard Error.
Statistically significant values indicated in bold font.

cases. Few individuals in the *resilient* class, regardless of gender, met *ICD-11* PGD criteria, resembling findings from earlier research (Bonanno and Malgaroli, 2020). Six months post-loss, the *prolonged grief* class best-captured caseness as 84.6% of men and 67.7% of women demonstrated criteria for probable *ICD-11* PGD. However, the *recovery* and the *moderate-stable* classes also captured substantial proportions of PGD cases in both genders six months into bereavement. Eleven months post-loss, the *prolonged grief* class, characterized by elevated symptoms, similarly best captured PGD caseness. This finding aligns with the notion that the central distinguishing feature of PGD is the persistent, intense grief symptoms (Maciejewski et al., 2016; Maercker et al., 2013). Within the *prolonged grief* trajectory, an important gender difference emerged; eleven months post-loss PGD proportions had dropped to 45.5% among men and increased to 74.1% in the female subsample. Accordingly, PGD cases were most frequent in the male *prolonged grief* class at six months post-loss (T2) and in the female *prolonged grief* class at eleven months (T3). The multiple-group trajectory model illustrates this visually as male and female *prolonged grief* demonstrate symptom peak at different times. From a diagnostic perspective, men were most likely to exhibit complications resembling probable PGD around six months post-loss, subsequently declining. At the same time, a small female minority experienced worsening symptom-severity and increasing probable case rate across time. Considering time-frames used for diagnosing grief, this might explain why past research identifies female gender as a risk factor for developing pathological grief reactions (Burke and Neimeyer, 2013; Heeke et al., 2017). Given the current study's reliance on self-report data, additional research should explore the complex relationship between gender, timing, and diagnosing PGD.

Low optimism measured at two months following bereavement predicted membership of the PGD-frequent trajectory (viz., *prolonged grief*). Optimism reflects favorable expectations for the future (Carver et al., 2010). Corresponding to earlier findings (e.g., Golden and Dalgleish, 2012; Thomsen et al., 2018), the absence of positivity in future thinking might be a key marker of later bereavement-related distress. Neuroticism – reflecting a tendency towards intense and frequent negative emotions and thoughts (McCrae and Costa, 2008) – has previously been identified as a predictor of pathological grief (Burke and Neimeyer, 2013). Contrary to expectations, neuroticism did not predict membership in the *prolonged grief* class. Although considered an enduring indicator of emotional stability (Costa and McCrae, 2011), our study assessed neuroticism fairly early following bereavement, at which point statements such as "I am rarely depressed or sad" might be endorsed more frequently. As negative emotions are a natural part of acute grief for many, even healthy individuals (Zisook and Shear, 2009), the insignificant association between neuroticism and PGD trajectories might reflect a generally deflated mood among the participants. Low physical health significantly predicted the *moderate-stable* class, which also included substantial proportions of probable PGD cases, and approached significance as a predictor of the *prolonged grief* class ($p = .052$). This finding suggests how severe PGD symptoms may entail physical constraints. The *resilient* class reported higher mental health compared to all other classes, indicating how healthy mental states enable better coping with grief. Relatedly, studies demonstrate how pathological grief predicts future lower mental health (Boelen and Prigerson, 2007) and lower functioning (Bonanno et al., 2007). This tentatively indicates a bidirectional relationship; restricted mental health incapacitates resilient grieving, accelerating PGD-related distress, leading to a further decrease in mental well-being. Notably, interactions between these predictors and gender were non-significant, indicating that the tested covariates did not systematically differ in their ability to predict trajectories across men and women.

The study has numerous strengths, including its registry-based recruitment. The trajectory analysis relied on the official *ICD-11* PGD criteria, and the large study cohort enabled subgroup exploration. Importantly, the study's primary outcome (i.e., PGD symptom-severity) did not significantly differ between the male and female subsamples, making the sample suitable for studying subgroup-specific gender differences. Hence, the study is the first to explore gender differences in *ICD-11* PGD symptom development across early bereavement within a GMM framework. Still, some limitations should be mentioned. First, predictors were measured two months into bereavement, at which point many individuals are still affected by their recent loss, potentially influencing the stability of otherwise fixed constructs. Additional research, preferably with pre-morbid measures, is needed to expand knowledge on which psychosocial factors distinguish normative from more pathological classes of *ICD-11* PGD. Second, although the total sample size was sufficient for GMM analyses, the limited power of the smaller gender-subgroups (especially in the *prolonged grief* trajectory) might explain the non-significant interactions between gender and covariates. Results from the multiple-group GMM should be interpreted with caution. Third, PGD assessment relied on items combined from

different self-report measures. Without structured clinical interviews, only probable PGD caseness is assigned. In continuation of this, the GMM analysis did not distinguish between core and accompanying emotional pain symptoms of PGD. Still, we found high internal consistency for our PGD measure at T1-T3 (α = 0.89-0.90).

Notwithstanding these limitations, the present study revealed gender similarities and differences in *ICD-11* PGD symptomatology during the first year of spousal bereavement. The vast majority of men and women followed a *resilient* trajectory with a continuous low grief-level, confirming this is the modal response to spousal bereavement. While a comparable minority of both genders followed a *prolonged grief* trajectory characterized by high-level PGD symptoms, this class' symptomatic pattern differed between men and women. Men expressed an acute, decreasing grief reaction, whereas women showed an adjourned, increasing response. Applying a diagnostic algorithm for PGD, the *prolonged grief* trajectory best captured diagnostic caseness and was predicted by low optimism and low mental health. From a clinical perspective, findings indicate how men and women show time-dependent differences in their vulnerability towards PGD symptoms. The study provides valuable knowledge before the *ICD-11* PGD implementation by suggesting how gender may account for decreasing and increasing symptom development in early spousal bereavement.

Contributions

M. Lundorff, G.A. Bonanno, M. Johannsen, and M. O'Connor designed the study. M. Lundorff and G.A. Bonanno analyzed and interpreted the data. M. Lundorff wrote the manuscript. All authors have approved the final manuscript.

Declaration of conflicting interest (COI)

None.

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Appendix A. Supplementary data

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