



RESEARCH ARTICLE



Trajectories of grief, depression, and posttraumatic stress in disaster-bereaved people

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Background: Previous latent trajectory studies in adult bereaved people have identified individual differences in reactions postloss. However, prior findings may not reflect the complete picture of distress postloss, because they were focused on depression symptoms following nonviolent death. We examined trajectories of symptom-levels of persistent complex bereavement disorder (PCBD), depression, and posttraumatic stress disorder (PTSD) in a disaster-bereaved sample. We also investigated associations among these trajectories and background and loss-related factors, psychological support, and previous mental health complaints.

Methods: Latent class growth modeling was used to identify distinct trajectories of PCBD, depression, and PTSD symptoms in people who lost loved ones in a plane disaster in 2014. Participants ($N = 172$) completed questionnaires for PCBD, depression, and PTSD at 11, 22, 31, and 42 months postdisaster. Associations among class membership and background and loss-related variables, psychological support, and previous mental health complaints were examined using logistic regression analyses.

Results: Two PCBD classes emerged: mild (81.8%) and chronic (18.2%) PCBD. For both depression and PTSD, three classes emerged: mild (85.6% and 85.2%), recovered (8.2% and 4.4%), and chronic trajectory (6.2% and 10.3%). People assigned to the chronic PCBD, depression, or PTSD class were less highly educated than people assigned to the mild/recovered classes.

Conclusions: This is the first latent trajectory study that offers insights in individual differences in longitudinal symptom profiles of PCBD, depression, and PTSD in bereaved people. We found support for differential trajectories and predictors across the outcomes.

KEYWORDS

bereavement, grief, PTSD/posttraumatic stress disorder, stress, trauma

1 | INTRODUCTION

A total of 10% to 20% of people develop chronic complaints after the natural death (e.g., illness) of a significant other, including disturbed grief reactions (Lundorff, Holmgren, Zachariae, Farver-Vestergaard, & O'Connor, 2017), depression, and/or posttraumatic stress disorder (PTSD; Onrust & Cuijpers, 2006). Disturbed grief reactions causing significant distress and impairments in life are referred to as Persistent Complex Bereavement Disorder (PCBD) in the fifth Diagnostic and Statistical Manual of Mental Disorders (DSM-5; APA, 2013). Disturbed grief overlaps with depression (e.g., diminished interest, feeling that life is meaningless since the loss; Boelen, van den Bout, &

de Keijser, 2003) and PTSD (e.g., re-experiencing and avoidance symptoms; O'Connor, Lasgaard, Shevlin, & Guldin, 2010). Furthermore, in treatment-seeking bereaved people with clinically relevant grief reactions, disturbed grief reactions are frequently accompanied by comorbid depression and PTSD (Simon et al., 2007).

While these three disorders show considerable overlap and commonly co-occur, factor analytic studies have shown that these disorders are distinguishable (Boelen et al., 2003; Boelen, van de Schoot, van den Hout, de Keijser, & van den Bout, 2010; O'Connor et al., 2010). Furthermore, studies employing latent class analyses have shown that subgroups can be distinguished based on disturbed grief reactions, depression, and/or PTSD (Boelen, Reijntjes, Djelantik, & Smid, 2016;

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Djelantik, Smid, Kleber, & Boelen, 2017; Heeke, Stammel, Heinrich, & Knaevelsrud, 2017; Lenferink, de Keijser, Smid, Djelantik, & Boelen, 2017; Nickerson et al., 2014). These studies identified a subgroup of people endorsing elevated grief reactions only and people endorsing grief reactions plus symptoms of depression and/or PTSD. However, these studies did not examine changes in these symptom profiles over time.

Traditional views, assuming that a grief process is characterized by “grief work” (Freud, 1917/1957; Kübler-Ross, 1969; Worden, 1991, 2008) have been challenged by, among others, latent trajectory studies. These studies indicated that coping with loss is not merely characterized by a recovery pattern (i.e., initial elevated distress postloss followed by significant decline) or a chronic distress pattern (i.e., chronic high distress levels; Aneshensel, Botticello, & Yamamoto-Mitani, 2004; Galatzer-Levy & Bonanno, 2012; Maccallum, Galatzer-Levy, & Bonanno, 2015; Zhang, Mitchell, Bambauer, Jones, & Prigerson, 2008). In fact, a resilient pattern (i.e., stable low distress levels) has been found to be the most common response. The least common response was the chronic pattern, demonstrated by 8–17% of the participants.

Prior latent trajectory studies may not provide a full understanding of individual differences in distress postloss for at least two reasons. First, these studies focused on depression and, therefore, do not shed light on trajectories of PCBD and PTSD. To date, only one latent trajectory study explored grief trajectories postloss, yielding a stable low, intermediate, and elevated grief trajectory (Melhem, Porta, Shamseddeen, Walker Payne, & Brent, 2011). That study relied on minors and its findings possibly do not generalize to adults. Second, prior trajectory studies primarily focused on people who experienced loss due to illness (Aneshensel et al., 2004; Galatzer-Levy & Bonanno, 2012; Zhang et al., 2008). Exposure to a violent and/or unexpected death is an important risk factor for disturbed grief (Burke & Neimeyer, 2013) and comorbid PTSD (Djelantik et al., 2017), and is the most commonly reported event that can give rise to PTSD (Benjet et al., 2016).

A growing body of research has examined trajectories of distress following potentially traumatic events. Based on systematic reviews (Galatzer-Levy, Huang, & Bonanno, 2018; van de Schoot et al., 2018), the most commonly identified trajectories were resilient, recovery, and chronic patterns across a variety of outcomes, for example, PTSD and depression. Although some of these studies included subgroups exposed to *both* disaster/war-related stressors *and* bereavement (see Johannesson, Arinell, & Arnberg, 2015), it is still uncertain to what extent these findings generalize to samples exclusively comprised of bereaved people.

The present study examined trajectories of symptom-levels of PCBD, depression, and PTSD in people who had lost loved ones in a plane disaster. In line with previous studies (Galatzer-Levy et al., 2018; van de Schoot et al., 2018), we expected to identify three trajectories for PCBD, depression, and PTSD (subjected to distinct analyses): a resilient, recovery, and chronic pattern. In addition, we explored predictors of trajectories. Because little is known about predictors of subgroups of people displaying different trajectories of PCBD, depression, and PTSD postloss, we included predictors based on their association with postloss distress found in prior studies examining sample

means. These studies indicated that people with more severe symptoms are more frequently (i) women (Kristensen, Weisæth, & Heir, 2010), (ii) younger of age, (iii) less educated (Burke & Neimeyer, 2013), (iv) more closely related to the deceased (Kristensen et al., 2010), and (v) confronted with multiple losses (see Hengst, Smid, & Laban, 2018). Furthermore, people with more severe symptoms report more prior stressful life events (Johnson & Thompson, 2008), a history of mental health complaints (Tsai et al., 2016), and greater help-seeking behaviors (Wijngaards-de Meij et al., 2005). Last, highly symptomatic people report more impairments in functioning (Kristensen, Weisæth, Hussain, & Heir, 2015). In the present study, we explored if bereaved people with different trajectories differed in terms of these variables.

2 | MATERIALS AND METHODS

2.1 | Participants and procedures

On July 17, 2014 flight MH17, departing from the Netherlands, crashed in the Ukraine due to a missile impact killing all 298 people on board. Ten months later, we started collecting data among adult Dutch people who suffered one or more losses of someone close, including a spouse, family member, friend, or acquaintance due to this disaster. Three prior studies relied on data of the first wave (Boelen, Djelantik, de Keijser, Lenferink, & Smid, 2018; Lenferink et al., 2017; van der Velden, Meulen, Lenferink, & Ijzermans, 2018). In total, 172 participants filled in a questionnaire at least once. For more details about the recruitment strategies see Lenferink et al. (2017). Data from four waves (W1 through W4) were analyzed for the current study. Data from an additional wave were collected, but due to substantial overlap between this wave and W1 and W2 (see Boelen et al., 2018), we excluded this wave. In total, 43 people participated in one wave (25.0%), 28 (16.3%) in two waves, 35 (20.3%) in three waves, and 66 (38.4%) in all four waves. Table 1 displays the sample characteristics.

2.2 | Outcomes

PCBD symptoms were assessed with the 18-item Traumatic Grief Inventory-Self Report (TGI-SR; Boelen & Smid, 2017), which includes 16 items tapping PCBD symptoms, as per DSM-5. In the case of multiple losses, participants were instructed to fill in the TGI-SR while keeping in mind the loss that was most often on their minds and/or was experienced as most stressful.¹ Participants rated the frequency of symptoms (e.g., “I felt a strong longing or yearning for the deceased”) during the previous month on 5-point scales (1 = never and 5 = always). Total scores ranged from 16–80. A cut-off score of ≥ 54 (i.e., mean item score of 3.0) is indicative of PCBD when using the total score (Boelen et al., 2018). Because we used 16 out of 18 items, we considered a score of ≥ 48 (i.e., $54 - 6 = 48$) as the cut-off. Instructions for the TGI-SR were adapted from “the death of your loved one” to “the death of your loved one(s) due to the Ukrainian Plane Crash.” Psychometric properties of the TGI-SR are adequate (Boelen et al., 2018). Cronbach's alphas were 0.89, 0.93, 0.94, and 0.92 for W1 through W4.

Depression symptoms were assessed with the 16-item Quick Inventory of Depressive Symptomatology-Self Report (QIDS-SR; Rush et al.,

TABLE 1 Sample characteristics

Gender (N = 172), N (%)	
Men	70 (40.7)
Women	102 (59.3)
Age at time of disaster (N = 172), M (SD), range	
51.55 (15.51), 19–87	
Time since loss(es) in months, M (SD), range	
W1 (N = 167)	10.73 (1.77), 10–17
W2 (N = 94)	21.91 (1.47), 21–28
W3 (N = 102)	31.31 (0.98), 30–34
W4 (N = 103)	41.66 (0.59), 41–43
Educational level (N = 171), N (%)	
Lower than university	54 (31.6)
University	117 (68.4)
Closest related deceased person was my ^a ... (N = 169), N (%)	
Child	48 (28.4)
Spouse	2 (1.2)
Parent	15 (8.9)
Sibling	48 (28.4)
Other family member	30 (17.8)
Friend	12 (7.1)
Other than spouse/family member/friend	14 (8.3)
Number of relatives lost (N = 170), N (%)	
1	54 (31.8)
2	58 (34.1)
3	22 (12.9)
4	32 (18.8)
5	2 (1.2)
6	2 (1.2)
Number of stressful life events (N = 163), M (SD), range	
2.21 (1.43), 0–8	
Received professional psychological support after crash but before W1 (N = 167), N, %	
No	106 (63.5)
Yes	61 (36.5)
Previous mental health complaints (N = 129), N, %	
No	86 (66.7)
Yes	43 (33.3)

W1 = first wave; W2 = second wave; W3 = third wave; W4 = fourth wave.

^aFor those who experienced multiple losses, the most intimate relationship from child, through partner/spouse, to parent, to sibling, or other relative was reported.

2003). Participants chose one of four options (0–3) indicating how frequently they experienced a symptom (e.g., “Feeling sad”) during the past 7 days. The highest answer option of the item tapping “thoughts of deaths or suicide” was removed for ethical reasons. Following the original scoring rule, total scores were obtained by summing scores on the nine aggregated items. A score ≥ 16 was considered as indicative of severe depression. The QIDS-SR showed good psychometric properties (Rush et al., 2003). Cronbach's alphas were 0.82, 0.84, 0.84, and 0.76 at W1 through W4.

DSM-5 PTSD symptoms were assessed with the 20-item PTSD Checklist for DSM-5 (Blevins, Weathers, Davis, Witte, & Domino, 2015).² Participants rated to what extent they experienced PTSD symptoms during the preceding month, on 5-point Likert scales ranging from 0 = not at all to 4 = extremely (e.g., “In the past month, how much were you bothered by: “Repeated, disturbing, and unwanted memories of the stressful experience”). The loss of loved one(s) in the plane crash was referred to as the anchor event. A score of >32 is indicative of probable PTSD caseness (Krüger-Gottschalk et al., 2017). The psychometric properties of the posttraumatic stress disorder checklist for DSM-5 are adequate (Blevins et al., 2015). Cronbach's alphas were 0.93, 0.94, 0.94, and 0.92 at W1 through W4.

2.3 | Predictors of class membership

2.3.1 | Functional impairment

W1 data of the 5-item Work and Social Adjustment Scale (de Graaf et al., 2009; Mundt, Marks, Shear, & Greist, 2002) were used to compare the classes in terms of functional impairment (e.g., difficulties in their ability to work). Higher total scores (0–40) indicated more impairments. Cronbach's alpha was 0.85.

2.3.2 | Background and loss-related characteristics

The background and loss-related characteristics included: gender (0 = men, 1 = women), age at time of disaster (in years), educational level (0 = university, 1 = other than university), kinship to the deceased (0 = other than spouse/child, 1 = child/spouse³), and number of losses due to disaster (0 = single loss, 1 = multiple loss). Further, at W1 participants rated whether they experienced 13 potentially stressful life events (e.g., traffic accident; coded as 0 = no, 1 = yes), using the Life Events Scale (van der Velden, van der Burg, Steinmetz, & van den Bout, 1992). The total number of events was included in our analyses.

2.3.3 | Psychological support and previous mental health complaints

At W1, we asked whether participants had contact with a care provider from a mental health care institution or psychiatrist, psychologist, or psychotherapist for themselves after the disaster (0 = no, 1 = yes). At W2 (for pragmatic reasons not at W1) participants rated prior psychological complaints: “Have you ever suffered from psychological complaints prior to the plane disaster?” (0 = no, 1 = yes). Because people could (re-)enter the study at W3 and/or W4, we also added this question at W3 and W4.

2.3.4 | Statistical analyses

Logistic regression analyses were used to examine differences in background characteristics and W1 symptom severity between those who did versus did not complete W2, W3, or W4 measures. Latent class growth modeling (LCGM), using summed scores of PCBD, depression, or PTSD separately, was performed using Mplus 8.0 (Muthen & Muthen, 1998–2017). Although latent growth mixture modeling is a more flexible technique, because it allows for variation in responses within classes, we chose the less computationally demanding LCGM because of our small sample size (van de Schoot, Sijbrandij,

Winter, Depaoli, & Vermunt, 2017). To determine the optimal number of classes, we fit a one-class model followed by increasing numbers of classes. First, models were examined with intercept and slope parameters. Second, quadratic parameters, allowing changes in symptom levels to go faster or slower over time, were added to examine whether this improved model fit. For the sake of model convergence, the variances of the parameters were fixed to zero. Robust maximum-likelihood estimation was used to handle missing data.

The best-fitting model was selected on the basis of the following statistical criteria: (1) lower values of the Akaike Information Criterion (AIC) and sample-size adjusted Bayesian information criterion (SS-BIC), (2) entropy R^2 values closer to one, and (3) significant ($P < 0.05$) Vuong-Lo-Mendell-Rubin test, Lo-Mendell-Rubin likelihood ratio test, and bootstrap likelihood ratio test. The selection of optimal class solution was also based on interpretability and consistency with prior research (Nylund, Asparouhov, & Muthén, 2007). After selection of the optimal class solution, participants were assigned to the class with the highest posterior probability estimate. Associations between functional impairment levels and class membership were examined using logistic regression analyses for each outcome in Statistical Package for the Social Sciences version 25. Then, to examine associations between class membership and background variables, univariate logistic regression analyses were carried out, followed by multivariate analyses (including all variables significantly associated with classes in the univariate analyses).

3 | RESULTS

3.1 | Preliminary analyses

Those who completed W1, but not W2 ($B = 1.21$, standard error (SE) = 0.38, $P = 0.001$), W3 ($B = 0.93$, SE = 0.37, $P = 0.012$), or W4 ($B = 1.07$, SE = 0.38, $P = 0.005$) were more distantly related to the deceased than those who completed these waves. Participants not completing W3 ($B = 0.08$, SE = 0.04, $P = 0.021$) or W4 ($B = 0.10$, SE = 0.04, $P = 0.006$) reported lower depression levels at W1 compared with those who completed this wave. The groups did not differ in terms of gender, age, kinship, education, number of losses, and PCBD, depression, and PTSD levels at the (other) waves.

3.2 | Unconditional models for symptom-levels of PCBD, depression, and PTSD

Table 2 summarizes fit statistics. For PCBD, the two-class linear quadratic model yielded overall the best fit (e.g., lowest AIC and SS-BIC values). The model's entropy was acceptable and its bootstrap likelihood ratio test (B-LRt) indicated that this model fit better than the one-class solution. For depression, the three-class linear quadratic model yielded overall the best fit, based on the AIC and SS-BIC. The entropy was high for this solution, the B-LRt was marginally significant, and the interpretability of the classes was straightforward. We therefore selected this model as optimal class solution. For PTSD, comparable fit statistics were found for the three-class linear quadratic model; hence, this model was retained.

Figures 1A, 1B, and 1C display the optimal class solutions for symptom-levels of PCBD, depression, and PTSD, respectively. Supporting Information Figures S1–S3 includes plots of the other solutions. For PCBD, the largest class (81.8%) showed a relatively low initial intercept ($b = 38.97$, SE = 1.18, $P < 0.001$) and significant linear ($b = -0.55$, SE = 0.11, $P < 0.001$) and quadratic slopes ($b = 0.01$, SE < 0.01, $P = 0.011$). This class was characterized by subthreshold PCBD severity and was labeled as the "Mild PCBD class." The second class (18.2%) showed a higher initial intercept ($b = 50.50$, SE = 3.55, $P < 0.001$) and marginally significant linear ($b = 0.53$, SE = 0.28, $P = 0.059$) and quadratic slopes ($b = -0.02$, SE = 0.01, $P = 0.051$) and was labeled as the "Chronic PCBD class."

For depression, the largest class (85.6%) showed a relatively low initial intercept ($b = 6.62$, SE = 0.37, $P < 0.001$) and nonsignificant linear ($b = -0.02$, SE = 0.04, $P = 0.543$) and quadratic slopes ($b < 0.01$, SE < 0.01, $P = 0.652$). This class was characterized by stable mild depression levels over time and labeled as the "Mild depression class." The second largest class (8.2%) showed a high initial intercept ($b = 15.16$, SE = 2.42, $P < 0.001$) and significant linear ($b = -0.56$, SE = 0.14, $P < 0.001$) and quadratic slopes ($b = 0.01$, SE < 0.01, $P = 0.046$) and was labeled as the "Recovered depression class." The smallest class (6.2%) showed a high initial intercept ($b = 14.65$, SE = 4.36, $P = 0.001$) and significant linear ($b = 0.32$, SE = 0.16, $P = 0.048$) and marginally significant quadratic slopes ($b = -0.01$, SE = 0.01, $P = 0.054$) and was labeled as the "Chronic depression class."

For PTSD, the largest class (85.2%) showed a relatively low initial intercept ($b = 16.22$, SE = 1.17, $P < 0.001$) and significant linear ($b = -0.42$, SE = 0.08, $P < 0.001$) and quadratic slopes ($b < 0.01$, SE < 0.01, $P < 0.001$) and was labeled as the "Mild PTSD class." The second largest class (10.3%) showed a high initial intercept ($b = 39.53$, SE = 6.41, $P < 0.001$) and significant linear ($b = 0.95$, SE = 0.46, $P = 0.036$) and quadratic slopes ($b = -0.03$, SE = 0.01, $P = 0.040$) and was labeled as the "Chronic PTSD class." The smallest class (4.4%) showed a high initial intercept ($b = 50.58$, SE = 5.76, $P < 0.001$) and significant linear ($b = -0.84$, SE = 0.43, $P = 0.049$) and nonsignificant quadratic slopes ($b = -0.01$, SE = 0.01, $P = 0.612$) and was labeled as "Recovered PTSD class."

3.3 | Overlap in class membership

Table 3 shows overlap in people assigned to different PCBD, depression, and PTSD classes. The largest class that was characterized by chronic distress levels was the Chronic PCBD class ($n = 24$). All people, except one, who were assigned to the chronic depression class, were also assigned to the chronic PCBD class; six out of 17 people who were assigned to the chronic PTSD class were not assigned to the chronic PCBD class.

3.4 | Correlates of class membership

To avoid small group sizes in the logistic regression analyses and to reduce the number of tests, we used binary logistic regression analyses to compare people assigned to the mild and recovered depression classes with people in the chronic depression class, and people in the

TABLE 2 Fit statistics for unconditional models of PCBD, depression, and PTSD symptom trajectories

	AIC	BIC	SS-BIC	Entropy	P value VLMR-LRt	P value LMR-LRt	P value B-LRt
PCBD							
Linear only							
1 class	3323.84	3345.87	3323.70				
2 class	3308.00	3339.48	3307.81	0.68	0.023	0.028	<0.001
3 class	3307.36	3348.28	3307.11	0.73	0.719	0.725	0.375
Linear + quadratic							
1 class	3322.35	3347.53	3322.20				
2 class	3302.12	3339.89	3301.89	0.67	0.088	0.098	<0.001
3 class	3302.28	3352.64	3301.97	0.64	0.269	0.282	0.250
Depression							
Linear only							
1 class	2505.17	2527.03	2504.87				
2 class	2487.77	2519.01	2487.35	0.85	0.004	0.005	<0.001
3 class	2474.39	2515.00	2473.84	0.80	0.215	0.233	<0.001
Linear + quadratic							
1 class	2507.02	2532.01	2506.68				
2 class	2485.71	2523.20	2485.21	0.88	0.002	0.003	<0.001
3 class	2474.16	2524.14	2473.48	0.86	0.147	0.161	0.050
PTSD							
Linear only							
1 class	3265.20	3286.81	3264.65				
2 class	3240.80	3271.68	3240.02	0.93	0.174	0.189	<0.001
3 class	3228.51	3268.64	3227.49	0.89	0.503	0.517	<0.001
Linear + quadratic							
1 class	3264.55	3289.25	3263.92				
2 class	3233.17	3270.22	3232.23	0.87	0.303	0.318	<0.001
3 class	3218.70	3268.11	3217.45	0.89	0.132	0.141	<0.001

AIC, Akaike Information Criterion; BIC, Bayesian Information Criterion; B-LRt, bootstrap likelihood ratio test; LMR-LRt = Lo-Mendel-Rubin likelihood ratio test; PCBD, persistent complex bereavement disorder; PTSD, posttraumatic stress disorder; SS-BIC, sample size adjusted Bayesian Information Criterion; VLMR-LRt, Vuong-Lo-Mendell-Rubin likelihood ratio test.

mild and recovered PTSD classes with people in the chronic PTSD class. We chose to combine people in the mild and recovered classes, rather than the mild and chronic classes, because we wished to explore risk factors for developing long-term, chronic complaints. Table 4 summarizes the outcomes.

People in the chronic PCBD class ($M = 24.64$, $SD = 10.56$) reported more difficulties in functioning 11 months postdisaster compared with people in the mild PCBD class ($M = 14.82$, $SD = 8.65$; odds ratio (OR) = 1.12, 95% confidence interval [CI] [1.06, 1.18], $P < 0.001$). We found similar results for depression ($M_{\text{Chronic}} = 30.17$, $SD = 8.38$; $M_{\text{Recovered/Mild}} = 15.65$, $SD = 9.03$; OR = 1.19, 95% CI [1.07, 1.33], $P = 0.002$), and PTSD ($M_{\text{Chronic}} = 26.20$, $SD = 8.75$; $M_{\text{Recovered/mild}} = 15.36$, $SD = 8.95$; OR = 1.14, 95% CI [1.06, 1.21], $P < 0.001$).

For PCBD, the multivariate results showed that people in the chronic PCBD class were 3.71 ($P = 0.010$) times more likely less educated and were 4.19 ($P = 0.017$) times more likely to have lost at least a child or spouse than the mild class. Age was significantly related to

PCBD class membership in the univariate but not in the multivariate analyses. For depression, only educational level significantly predicted class membership; people in the chronic class were 5.83 ($P = 0.039$) times more likely to have a lower educational level compared with the mild/recovered class. For PTSD, the multivariate results showed that people in the chronic class were 4.80 ($P = 0.009$) times more likely to have a lower educational level and 7.71 ($P = 0.003$) times more likely to have received professional support after the disaster from a mental health care professional than people in the mild/recovered class.

4 | DISCUSSION

Four previous studies examined depression trajectories in bereaved people (Aneshensel et al., 2004; Galatzer-Levy & Bonanno, 2012; Maccallum et al., 2015; Zhang et al., 2008). This is the first study in which latent trajectories of multiple outcomes, including depression plus PCBD and PTSD, were examined. In doing so, we aimed

TABLE 3 Overview of class memberships

	PCBD (N = 172)	
	Mild PCBD (N = 148)	Chronic PCBD (N = 24)
Depression (N = 168)		
Chronic depression (N = 7)		
N (%) within chronic depression class	1 (14.3)	6 (85.7)
Recovered depression (N = 11)		
N (%) within recovered depression class	9 (81.8)	2 (18.2)
Mild depression (N = 150)		
N (%) within Mild depression class	135 (90.0)	15 (10.0)
PTSD (N = 162)		
Recovered PTSD (N = 6)		
N (%) within recovered PTSD class	5 (83.3)	1 (16.7)
Mild PTSD (N = 139)		
N (%) within mild PTSD class	127 (91.4)	12 (8.6)
Chronic PTSD (N = 17)		
N (%) within chronic PTSD class	6 (35.5)	11 (64.7)

PCBD, persistent complex bereavement disorder; PTSD, posttraumatic stress disorder.

to enhance our understanding of different symptom profiles following losses caused by a plane disaster. Consistent with our expectations, we found that a three-class model best represented our depression data; a mild (85.6%), recovered (8.2%), and chronic (6.2%) depression class, characterized by stable mild depression levels, relatively high initial depression levels followed by a decline, and moderate depression levels increasing to severe depression levels over time, respectively. As expected, we found similar classes for PTSD: a mild (85.2%), recovered (4.4%), and chronic (10.3%) class. Different from the mild depression class, symptom levels significantly decreased over time in the mild PTSD class. These accords with previous PTSD research (van de Schoot et al., 2018). In line with prior research on trajectories of distress following a stressful life event (Galatzer-Levy et al., 2018), we found that the trajectory characterized by relatively low and stable levels of distress was the most common response.

For PCBD, a two-class solution yielded the best fit, representing a mild (81.8%) class, characterized by subthreshold PCBD levels that decreased over time, and a chronic (18.2%) class, characterized by above threshold PCBD levels that increased over time. We did not identify a recovered pattern, suggesting that PCBD has a more stable course than bereavement-related depression and PTSD. Pending replicating of our findings in other bereaved samples, this implies that elevated PCBD levels 1 year following the loss of someone close are unlikely to decrease over time. Furthermore, this finding supports the chosen time criterion for diagnosing PCBD, that is, 1 year postloss in the DSM-5 (APA, 2013).

Following Infuna and Luthar (2017), we used a multidimensional approach, which gives a more complete picture of bereavement-related distress than prior studies examining only one outcome. Our findings indicate that long-lasting PCBD is more common (18.2%)

than chronic bereavement-related depression (6.2%) and PTSD (10.3%). This emphasizes the need for systematic screening of PCBD postloss, apart from focusing on depression and/or PTSD only. In addition, previous trajectory studies focusing on bereavement-related depression, may have overestimated resilient responses (Aneshensel et al., 2004; Galatzer-Levy & Bonanno, 2012; Maccallum et al., 2015; Zhang et al., 2008). Furthermore, we found that most people in the chronic depression and PTSD class were also assigned to the chronic PCBD class. This indicates that violent/unexpected losses render people prone to comorbid symptoms, which has also been found in prior studies (for an overview see Kristensen, Weisæth, & Heir, 2012). The combination of PCBD with depression and/or PTSD following unexpected and violent deaths has also been referred to as traumatic grief (Smid et al., 2015). According to a cognitive stress model of traumatic grief (Smid et al., 2015), people with traumatic grief might benefit most from treatment designed to address comorbidity (see de Heus et al., 2017).

With respect to our second aim, we explored what factors, including background and loss-related factors, psychological support, and previous mental health complaints, could predict the development of chronic complaints. In line with prior research in bereavement based on sample means, having a lower educational level emerged as predictor of the chronic PCBD, depression, and PTSD trajectories. Being more closely related to the deceased was also a unique predictor of the chronic PCBD trajectory. We also found that those who received professional support within 11 months postloss were more likely included in the chronic PTSD class than in the mild/recovered PTSD class. This suggests that previously received support failed to alleviate PTSD symptoms. Interestingly, previously received support was unrelated to PCBD and depression classes. In future studies, it might be useful to assess what type of support disaster-bereaved people received, to refine treatment options. Importantly, we did not detect other significant predictors of trajectories. This might be due to the relatively small sample, limiting statistical power. Prior research on depression trajectories post-loss indicated that well-known correlates of depression may act differently when trajectories of distress across subgroups are examined (Galatzer-Levy & Bonanno, 2012). It could therefore be relevant to further examine the role of these potential predictors of post-loss distress in studies with larger samples.

Several other limitations are noteworthy. Firstly, because of our small sample size we combined the Recovered and Mild depression and PTSD classes to examine correlates of class-membership. Consequently, we could not examine differences between these Recovered and Mild classes. Our primary interest, however, was in what distinguished individuals with severe and chronic symptomatology from those who showed mild symptoms at the final wave. Secondly, a significant proportion of the sample received support from a mental health care professional during this study. This limits the generalizability of our findings to people not receiving help.

This is, to our knowledge, the first latent trajectory study that examined trajectories of PCBD, depression, and PTSD in bereaved people. We found support for differential trajectories and predictors across the outcomes. This offers new insights in individual differences

TABLE 4 Results of logistic regression analyses

	PCBD				Depression				PTSD			
	Mild (N = 148)	Chronic (N = 24)	Univariate odds ratio (95% CI)	Multivariate odds ratio (95% CI)	Mild or recovered (N = 161)	Chronic (N = 7)	Univariate odds ratio (95% CI)	Multivariate odds ratio (95% CI)	Mild or recovered (N = 145)	Chronic (N = 17)	Univariate odds ratio (95% CI)	Multivariate odds ratio (95% CI)
Gender (0 = male), N, %	62 (41.9)	8 (33.3)	1.44 (0.58, 3.58)	-	66 (41.0)	1 (14.3)	4.17 (0.49, 35.44)	-	61 (42.1)	4 (23.5)	2.36 (0.73, 7.59)	-
Age (in years), M (SD)	50.34 (15.34)	59.04 (14.74)	1.04* (1.01, 1.08)	1.00 (0.96, 1.04)	51.49 (15.33)	60.00 (15.17)	1.04 (0.99, 1.10)	-	51.26 (15.24)	56.18 (15.47)	1.02 (0.99, 1.06)	-
Educational level (0 = university), N, %	108 (73.5)	9 (37.5)	4.62** (1.87, 11.40)	3.71* (1.37, 9.99)	112 (70.0)	2 (28.6)	5.83* (1.09, 31.12)	-	103 (71.5)	5 (29.4)	6.03** (2.00, 18.19)	4.80** (1.47, 15.68)
Kinship (0 = other than child or spouse), N, %	110 (75.3)	9 (39.1)	4.75** (1.90, 11.90)	4.19* (1.30, 13.50)	112 (70.4)	4 (57.1)	1.79 (0.39, 8.30)	-	101 (70.6)	10 (62.5)	1.44 (0.49, 4.22)	-
Single versus multiple loss (0 = single loss), N, %	44 (29.9)	10 (43.5)	0.56 (0.23, 1.36)	-	51 (31.9)	2 (28.6)	1.17 (0.22, 6.23)	-	46 (31.9)	5 (31.3)	1.03 (0.34, 3.15)	-
Number of stressful life events, M (SD)	2.18 (1.47)	2.38 (1.20)	1.10 (0.81, 1.49)	-	2.21 (1.42)	2.67 (1.86)	1.22 (0.73, 2.03)	-	2.14 (1.43)	2.86 (1.41)	1.35 (0.96, 1.90)	-
Received professional psychological support after crash but before W1 (0 = no), N, %	96 (66.2)	10 (45.5)	2.35 (0.95, 5.82)	-	102 (64.6)	3 (50.0)	1.82 (0.36, 9.33)	-	96 (67.6)	3 (20.0)	8.35** (2.25, 31.03)	7.71** (2.02, 29.44)
History of psychiatric complaints (0 = no), N, %	70 (65.4)	16 (72.7)	0.71 (0.26, 1.97)	-	81 (66.9)	5 (71.4)	0.81 (0.15, 4.36)	-	80 (69.6)	6 (42.9)	3.05 (0.98, 9.44)	-

Values represent N (%), M (SD), or odds ratios (95% CI) if indicated in the column or row heading.

95% CI = 95% confidence interval; PCBD, persistent complex bereavement disorder; PTSD, posttraumatic stress disorder; W1, first wave.

* $P < 0.05$.

** $P < 0.01$.

*** $P < 0.001$.

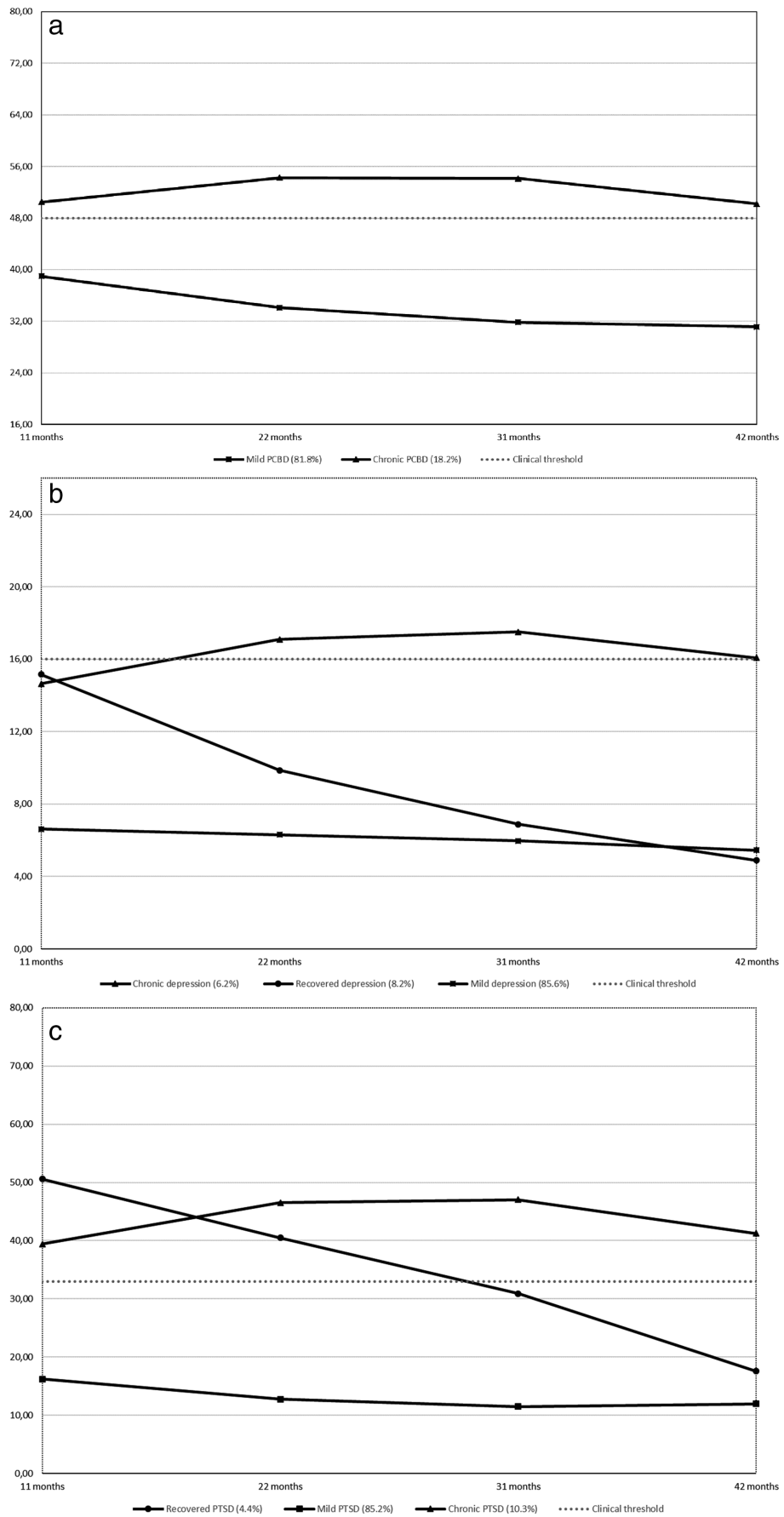


FIGURE 1 (a) Two-class linear quadratic model for symptom-levels of persistent complex bereavement disorder (PCBD) ($N = 172$); (b) three-class linear quadratic model for symptom-levels of depression ($N = 168$); and (c) three-class linear quadratic model for symptom-levels of posttraumatic stress disorder (PTSD) ($N = 162$)

in longitudinal symptom profiles following losses caused by a plane disaster.

CONFLICTS OF INTEREST

The authors declare no conflicts of interest.

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ENDNOTES

¹ Only for W1; in case participants felt unable to choose, they could fill in the measure multiple times. The TGI-SR with the highest sum score was used in the analyses.

² Because data collection at W1 took place in collaboration with other research institutes, 25 randomly chosen participants did not fill in the PCL-5 at W1. These participants were included in the analyses for PTSD if they completed the PCL-5 at one or more subsequent waves.

³ Two participants had lost at least their spouse. To avoid small sample sizes per category, we included people who had lost at least their spouse or child into one category in our analyses.

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REFERENCES

- Aneshensel, C. S., Botticello, A. L., & Yamamoto-Mitani, N. (2004). When caregiving ends: The course of depressive symptoms after bereavement. *Journal of Health and Social Behavior, 45*, 422–440.
- Association American Psychiatric. (2013). *Diagnostic and statistical manual of mental disorders* (5th ed.). Arlington, VA: American Psychiatric Publishing.
- Benjet, C., Medina-Mora, M. E., Bromet, E., Karam, E. G., Kessler, R. C., Shahly, V., ... Koenen, K. C. (2016). The epidemiology of traumatic event exposure worldwide: Results from the world mental health survey consortium. *Psychological Medicine, 46*(2), 327–343.
- Blevins, C. A., Weathers, F. W., Davis, M. T., Witte, T. K., & Domino, J. L. (2015). The posttraumatic stress disorder checklist for DSM-5 (PCL-5): Development and initial psychometric evaluation. *Journal of Traumatic Stress, 28*(6), 489–498.
- Boelen, P. A., Djelantik, A. A. A. M. J., de Keijser, J., Lenferink, L. I. M., & Smid, G. E. (2018). Further validation of the Traumatic Grief Inventory-Self Report (TGI-SR): A measure of persistent complex bereavement disorder and prolonged grief disorder. *Death Studies, 1*–14. <https://doi.org/10.1080/07481187.2018.1480546>
- Boelen, P. A., Reijntjes, A., Djelantik, A. A. A. M. J., & Smid, G. E. (2016). Prolonged grief and depression after unnatural loss: Latent class analyses and cognitive correlates. *Psychiatry Research, 240*(8), 358–363.
- Boelen, P. A., & Smid, G. E. (2017). The Traumatic Grief Inventory Self Report Version (TGI-SR): Introduction and preliminary psychometric evaluation. *Journal of Loss and Trauma, 22*, 196–212.
- 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.
- Boelen, P. A., van den Bout, J., & de Keijser, A. (2003). Traumatic grief as a disorder distinct from bereavement-related depression and anxiety: A replication study with bereaved mental health care patients. *American Journal of Psychiatry, 160*(7), 1339–1341.
- Burke, L. A., & Neimeyer, R. A. (2013). Prospective risk factors for complicated grief: A review of the empirical literature. In M. S. Stroebe, H. Schut, & J. van den Bout (Eds.), *Complicated grief: Scientific foundations for healthcare professionals* (pp. 145–161). Washington, DC: American Psychological Association.
- de Graaf, L. E., Gerhards, S. A., Arntz, A., Riper, H., Metsemakers, J. F., Evers, S. M., ... Huibers, M. J. (2009). Clinical effectiveness of online computerised cognitive-behavioural therapy without support for depression in primary care: Randomised trial. *British Journal of Psychiatry, 195*(1), 73–80.
- de Heus, A., Hengst, S. M. C., de la Rie, S. M., Djelantik, A. A. A. M. J., Boelen, P. A., & Smid, G. E. (2017). Day patient treatment for traumatic grief: Preliminary evaluation of a one-year treatment programme for patients with multiple and traumatic losses. *European Journal of Psychotraumatology, 8*(1), 1375335. <https://doi.org/10.1080/20008198.2017.1375335>
- Djelantik, A. A. A. M. J., Smid, G. E., Kleber, R. J., & Boelen, P. A. (2017). Symptoms of prolonged grief, post-traumatic stress, and depression after loss in a Dutch community sample: A latent class analysis. *Psychiatry Research, 247*, 276–281.
- Freud, S. (1917/1957). Mourning and melancholia. In J. Strachey (Ed., Trans.). *Standard edition of the complete psychological works of Sigmund Freud* (pp. 251–268). London, England: Hogarth.
- Galatzer-Levy, I. R., & Bonanno, G. A. (2012). Beyond normality in the study of bereavement: Heterogeneity in depression outcomes following loss in older adults. *Social Science & Medicine, 74*, 1987–1994.
- Galatzer-Levy, I. R., Huang, S. H., & Bonanno, G. A. (2018). Trajectories of resilience and dysfunction following potential trauma: A review and statistical evaluation. *Clinical Psychology Review, 63*, 41–55.
- Heeke, C., Stammel, N., Heinrich, M., & Knaevelsrud, C. (2017). Conflict-related trauma and bereavement: Exploring differential symptom profiles of prolonged grief and posttraumatic stress disorder. *BMC Psychiatry, 17*, 118. [https://doi.org:10.1186/s12888-017-1286-2](https://doi.org/10.1186/s12888-017-1286-2)
- Hengst, S. M. C., Smid, G. E., & Laban, C. J. (2018). The effects of traumatic and multiple loss on psychopathology, disability, and quality of life in Iraqi asylum seekers in the Netherlands. *Journal of Nervous and Mental Disease, 206*(1), 52–60.
- Infurna, F. J., & Luthar, S. S. (2017). The multidimensional nature of resilience to spousal loss. *Journal of Personality and Social Psychology, 112*(6), 926–947.
- Johannesson, K. B., Arinell, H., & Arnberg, F. K. (2015). Six years after the wave. Trajectories of posttraumatic stress following a natural disaster. *Journal of Anxiety Disorders, 36*, 15–24.
- Johnson, H., & Thompson, A. (2008). The development and maintenance of post-traumatic stress disorder (PTSD) in civilian adult survivors of war trauma and torture: A review. *Clinical Psychology Review, 28*(1), 36–47.
- Kristensen, P., Weisæth, L., & Heir, T. (2010). Predictors of complicated grief after a natural disaster: A population study two years after the 2004 South-East Asian Tsunami. *Death Studies, 34*(2), 137–150.
- Kristensen, P., Weisæth, L., & Heir, T. (2012). Bereavement and mental health after sudden and violent losses: A review. *Psychiatry, 75*(1), 76–97.
- Kristensen, P., Weisæth, L., Hussain, A., & Heir, T. (2015). Prevalence of psychiatric disorders and functional impairment after loss of a family member: A longitudinal study after the 2004 Tsunami. *Depression and Anxiety, 32*(1), 49–56.

- Krüger-Gottschalk, A., Knaevelsrud, C., Rau, H., Dyer, A., Schäfer, I., Schellong, J., & Ehring, T. (2017). The German version of the post-traumatic stress disorder checklist for DSM-5 (PCL-5): Psychometric properties and diagnostic utility. *BMC Psychiatry*, *17*, 379. <https://doi.org/10.1186/s12888-017-1541-6>
- Kübler-Ross, E. (1969). *On death and dying*. New York city, NY: Macmillan.
- Lenferink, L. I. M., de Keijser J., Smid G. E., Djelantik A. A. M. J., & Boelen P. A. (2017). Prolonged grief, depression, and posttraumatic stress in disaster-bereaved individuals: Latent class analysis. *European Journal of Psychotraumatology*, *8*(1), 1298311. <https://doi.org/10.1080/20008198.2017.1298311>
- 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.
- Maccallum, F., Galatzer-Levy, I. R., & Bonanno, G. A. (2015). Trajectories of depression following spousal and child bereavement: A comparison of the heterogeneity in outcomes. *Journal of Psychiatric Research*, *69*, 72–79.
- Melhem, N. M., Porta, G., Shamseddeen, W., Walker Payne, M., & Brent, D. A. (2011). Grief in children and adolescents bereaved by sudden parental death. *Archives of General Psychiatry*, *68*(9), 911–919.
- Mundt, J. C., Marks, I. M., Shear, M. K., & Greist, J. H. (2002). The work and social adjustment scale: A simple measure of impairment in functioning. *British Journal of Psychiatry*, *180*, 461–464.
- Muthén L. K., & Muthén B. O. (1998–2017). *Mplus user's guide* (8th ed.). Los Angeles, CA: Muthén & Muthén.
- Nickerson, A., Liddell, B. J., Maccallum, F., Steel, Z., Silove, D., & Bryant, R. A. (2014). Posttraumatic stress disorder and prolonged grief in refugees exposed to trauma and loss. *BMC Psychiatry*, *14*, 106. <https://doi.org/10.1186/1471-244X-14-106>
- Nylund, K. L., Asparouhov, T., & Muthén, B. O. (2007). Deciding on the number of classes in latent class analysis and growth mixture modeling: A Monte Carlo simulation study. *Structural Equation Modeling*, *14*, 535–569.
- O'Connor, M., Lasgaard, M., Shevlin, M., & Guldin, M. B. (2010). A confirmatory factor analysis of combined models of the Harvard Trauma Questionnaire and the Inventory of Complicated Grief-Revised: Are we measuring complicated grief or posttraumatic stress? *Journal of Anxiety Disorders*, *24*(7), 672–679.
- Onrust, S. A., & Cuijpers, P. (2006). Mood and anxiety disorders in widowhood: A systematic review. *Aging and Mental Health*, *10*(4), 277–283.
- Rush, A., Trivedi, M., Ibrahim, H., Carmody, T., Arnow, B., Klein, D., ... Keller, M. (2003). The 16-Item Quick Inventory of Depressive Symptomatology (QIDS), Clinician rating (QIDS-C), and Self-Report (QIDS-SR): A psychometric evaluation in patients with chronic major depression. *Biological Psychiatry*, *54*(5), 573–583.
- Simon, N. M., Shear, K. M., Thompson, E. H., Zalta, A. K., Perlman, C., Reynolds, C. F., ... Silowash, R. (2007). The prevalence and correlates of psychiatric comorbidity in individuals with complicated grief. *Comprehensive Psychiatry*, *48*, 395–399.
- Smid, G. E., Kleber, R. J., de la Rie, S. M., Bos, J. B. A., Gersons, B. P. R., & Boelen, P. A. (2015). Brief eclectic psychotherapy for traumatic grief (BEP-TG): Toward integrated treatment of symptoms related to traumatic loss. *European Journal of Psychotraumatology*, *6*(1). <https://doi.org/10.3402/ejpt.v6.27324>
- Tsai, W., Prigerson, H. G., Li, C., Chou, W., Kuo, S., & Tang, S. T. (2016). Longitudinal changes and predictors of prolonged grief for bereaved family caregivers over the first 2 years after the terminally ill cancer patient's death. *Palliative Medicine*, *30*(5), 495–503.
- van de Schoot, R., Sijbrandij, M., Depaoli, S., Winter, S. D., Olf, M., & Van Loey, N. E. (2018). Bayesian PTSD-trajectory analysis with informed priors based on a systematic literature search and expert elicitation. *Multivariate Behavioral Research*, *53*(2), 267–291.
- van de Schoot, R., Sijbrandij, M., Winter, S. D., Depaoli, S., & Vermunt, J. K. (2017). The GRoLTS-Checklist: Guidelines for reporting on latent trajectory studies. *Structural Equation Modeling*, *24*(3), 451–467.
- van der Velden, P. G., Meulen, E., Lenferink, L. I. M., & Ijzermans, J. C. (2018). Media experiences and associations with mental health among the bereaved of the MH17-disaster: A latent profile analysis. *Scandinavian Journal of Psychology*, *59*(3), 281–288.
- van der Velden, P. G., van der Burg, S., Steinmetz, C. H. D., & van den Bout, J. (1992). *Slachtoffers van bankovervallen* [Victims of bank robberies]. Houten, Netherland: Bohn Stafleu van Loghem.
- Wijngaards-de Meij, L., Stroebe, M., Schut, H., Stroebe, W., van den Bout, J., van der Heijden, P., & Dijkstra, I. (2005). Couples at risk following the death of their child: Predictors of grief versus depression. *Journal of Consulting and Clinical Psychology*, *73*(4), 617–623.
- Worden, J. (1991). *Grief counselling and grief therapy: A handbook for the mental health practitioner* (2nd and 4th ed.). New York city, NY: Springer Publishing Company.
- Zhang, B., Mitchell, S. L., Bambauer, K. Z., Jones, R., & Prigerson, H. G. (2008). Depressive symptom trajectories and associated risks among bereaved Alzheimer disease caregivers. *American Journal of Geriatric Psychiatry*, *16*(2), 145–155.

SUPPORTING INFORMATION

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