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Patterns and predictive value of acute prolonged grief and posttraumatic stress in youngsters confronted with traumatic loss: A latent class analysis

Paul A. Boelen[a,b,*], Ioanna Giannopoulou[c], Danai Papadatou[c]

[a] Department of Clinical Psychology, Faculty of Social Sciences, Utrecht University, PO Box 80140, 3508 TC Utrecht, the Netherlands
[b] ARQ National Psychotrauma Centre, Nienoord 5, NL-1112 XE Diemen, the Netherlands
[c] National and Kapodistrian University of Athens, Athens, Greece

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ABSTRACT

Deaths of relatives and peers in potentially traumatizing circumstances may lead to symptoms of prolonged grief (PG, e.g.,yearning, preoccupation) and posttraumatic stress (PTS, e.g., re-experiencing, hypervigilance). There is limited knowledge about how symptoms of PG and PTS co-occur following such events. The current study aimed to identify patterns of DSM-5-TR defined PG symptomatology and PTS in a sample of 213 youngsters, involved in a school bus accident killing seven peers 2 months earlier. Using latent class analysis, three groups were identified evidencing moderate endorsement of most symptoms (Class 1), high endorsement of almost all but the avoidance symptoms (Class 2), and high endorsement of almost all symptoms (Class 3), respectively. Classes differed in terms of levels of grief, PTS, and depression, assessed concurrently, and—in a subgroup of n=137 participants—assessed at 16 month follow-up. E.g., Class 3 membership was associated with a greater likelihood of meeting criteria for DSM-5-TR defined prolonged grief disorder at follow-up. Gender (fewer females in Class 1) but not age and proximity to the accident were associated with class membership. Findings indicate that it is important to identify groups with elevated PG and PTS early after traumatic bereavement who may be en route to persistent mental health problems.

1. Introduction

The confrontation with traumatic events in childhood and adolescence may cause posttraumatic stress disorder (PTSD) posing a significant threat to the victim's development and mental health and functioning in adulthood (e.g., Alisic et al., 2014; Hiscox et al., 2022). A specific category of negative life-events that youngsters may be exposed to are events that are both potentially traumatizing and lead to the death of someone known. Examples are losing a family member or peer in circumstances that are unnatural or violent, such as deaths caused by homicides, suicides, or traffic accidents (e.g., Noppe and Meyer, 2014). Reactions to such traumatic loss events may include both traumatic stress (e.g., intrusions, hypervigilance) and separation distress (e.g., yearning, preoccupation). There is some evidence that the majority of youngsters confronted with traumatic losses do not develop mental health problems (e.g., following suicide: Brent et al., 1995; following the Oklahoma City bombing in 1995: Pfefferbaum et al., 1999). Yet, a minority does suffer combinations of severe traumatic stress and grief. Mannarino and Cohen (2011) coined the term childhood traumatic grief (CTG) to refer to a condition where, following traumatic loss, trauma symptoms encroach on the grieving process, blocking processing. Prior work has helped to understand the burden of children's emotional responses to traumatic loss. Yet, little is known about common clinical manifestations of traumatic stress and separation distress following such events. Moreover, research in this area has adopted different operationalizations of grief (e.g., normal grief, Brent et al., 1995, or CTG, Mannarino and Cohen, 2011) or focused on traumatic stress only or other outcomes than grief (Pfefferbaum et al., 1999; Unterhitzenberger et al., 2020).

In recent years, consensus about characteristics of disordered grief has grown. This has resulted in the inclusion of prolonged grief disorder (PGD) in the text revision of DSM-5 (DSM-5-TR; American Psychiatric Association, 2022) and in the ICD-11 (WHO, 2019). In both systems, PGD is characterized by separation distress (yearning, preoccupation) and accompanying symptoms (e.g., emotional pain, disrupted sense of self) present to a distressing and disabling degree, beyond the first six months of bereavement. PGD is distinct from other disorders that may occur following traumatic and non-traumatic loss, including PTSD

* Corresponding author.
E-mail address: p.a.boelen@uu.nl (P.A. Boelen).

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(Prigerson et al., 2021). For instance, separation distress is a key emotion in PGD, whereas anxiety is central to PTSD. And in PGD, avoidance relates primarily to cues reminding of the irreversibility of the separation, whereas in PTSD avoidance focuses primarily on cues associated with threatening circumstances and memories thereof. The recognition that PGD is distinct from PTSD raises the question to what extent youngsters confronted with traumatic loss experience diverse responses characterized by distinct patterns of symptoms of prolonged grief (PG) and posttraumatic stress (PTS). The current study sought to enhance knowledge on this issue. To this end, we analysed data from a Greek longitudinal study, examining psychological responses of youngsters involved in a school bus accident, in which seven peers lost their lives (Giannopoulou et al., 2021; Papadatou et al., 2018). Self-reported data on PG and PTS (among other data) were gathered at two months after the event (Wave 1) and again 16 months later at 18 months after the event (Wave 2). We used latent class analysis (LCA) to group children into homogenous subgroups, or classes, based on their endorsement of symptom of PG and PTS at two months. This allowed us to capture typologies of early PG and PTS which is relevant to inform advancements in the early identification and care for youngsters at risk for problematic recovery.

The overarching aim of this study was to examine patterns, predictive values, and predictors of combinations of symptoms of PG and PTS. Specifically, the first aim was to examine if subgroups of youngsters could be identified based on their endorsement of PG and PTS symptoms. Two possible findings were anticipated. It was possible that *parallel profiles* would emerge differentiated by increasing likelihoods of endorsing symptoms of both PG and PTS. That would indicate that items cluster together with subgroups distinguished by, e.g., no, low, moderate, and severe symptomatology. Alternatively, it was possible that *non-parallel profiles* would emerge, differing in the endorsement of some but not all PG and PTS items (e.g., representing groups with relatively high PG and low PTS or low PG and high PTS). The latter is consistent with LCA-research identifying such non-parallel profiles among more remotely bereaved children (Boelen et al., 2017; Geronazzo-Alman et al., 2019) and research among bereaved adults (e.g., Boelen, 2021; Cozza et al., 2019; Heeke et al., 2017; Nickerson et al., 2014).

The second aim was to examine whether emerging subgroups differed in term of indicators of psychological distress, assessed concurrently (Wave 1) and 16 months later (Wave 2). Specifically, we examined if subgroups differed in terms of the percentages of youngsters who met criteria for probable PGD as per DSM-5-TR (APA, 2022), with the exception of the six months timing criterion, and for clinically relevant PTS. In addition, we examined differences between groups on total scores of measures assessing PGD, PTSD, and depression. To examine the predictive value of emerging classes, we also examined associations of class membership at Wave 1 with PGD caseness, clinically relevant PTS, and total scores on PGD, PTSD, and depression measures at Wave 2.

The third aim was to examine if emerging subgroups differed in terms of age, gender, and their proximity to the accident. There is some evidence of a relationship between traumatic event magnitude and poor outcome (Kira et al., 2012). That would lead us to expect that youngsters who were on the affected bus would be overrepresented in classes characterized by more pervasive symptoms. However, earlier analyses with the same dataset have not pointed at a linkage between proximity to the event and mean levels of grief (Giannopoulou et al., 2021). Thus, we examined if age, gender, and proximity to the accident qualified class-membership in an exploratory manner.

The sample has been included in two prior studies. The first was based on a subsample of 30 youngsters and showed that symptoms of PTS and perceptions of self, others, and life improved over the course of time (Papadatou et al., 2018). The second focused on changes in mean scores on indices of grief and correlates thereof (Giannopoulou et al., 2021). That study provided some indications of different response patterns, with one in five youngsters showing a response characterized by low grief, little over half showing a recovery response, and the remaining youngsters evidencing persistent grief from two to 18 months after the accident. However, that study employed a variable-centred approach (dividing groups based on mean grief scores) and did not consider PTS symptoms. The current study extended this prior work by using a person-centered approach (Howard and Hoffman, 2018), by focusing on DSM-5-TR defined PG symptomatology, and by identifying predominant typologies of combinations of PG and PTS symptoms.

2. Methods

2.1. Participants and procedure

Data were available from 284 youngsters, belonging to the same community, who were all directly or indirectly involved in the school bus accident. In this study, we included data from 213 youngsters who answered “yes” to the question if someone close died in the accident (leaving out the n=3 who did not answer this question and n=68 answering with “no”). The children's mean age was 14.83 (SD=1.37, range 13-18) years; 106 self-identified as males, 107 as females. In total, 29 (13.6%) were on the affected bus, 113 (53.1%) on buses that preceded or followed it, and 71 (33.3%) did not participate in the school trip but learned from the accident through the TV news and words of mouth.

2.2. Measurement instruments

2.2.1. Traumatic grief inventory for children (TGIC)

The TGIC is a 23-item adjusted version of the Inventory of Complicated Grief (ICG; Prigerson et al., 1995). Its items represent most of the DSM-5-TR symptoms of PGD (e.g., "Does missing him/her hurt so much that you can't stand it?" representing yearning; “Is it hard for you to feel anything?” representing numbness) and other putative markers of disordered grief. Respondents rate the frequency of items on 5-point scales with anchors 1=*almost never* to 5=*always/several times per day*. Prior research supported psychometric properties of the scale (Dillen et al., 2009, Study 1; Kalantari et al., 2012). In the present sample, Cronbach's alpha reliability at Wave 1 and Wave 2 were .87 and .91, respectively.

2.2.2. Children's revised impact of events scale (CRIES-13)

The CRIES-13 is a 13-item adjusted version of the Impact of Event Scale (Horowitz et al., 1979) developed by Smith et al. (2003). The abbreviated content of its items is included in Table 1. Items measure different symptoms of PTS, including re-experiencing (items 1-4), avoidance (items 5-8), and hyperarousal (items 9-13). Respondents rate the frequency of PTS reactions during the past week on 4-point scales (0=*none*, 1=*rarely*, 3=*sometimes*, 5=*a lot*). Prior research supported psychometric properties of the Greek (Giannopoulou et al., 2006) and the original English version (Smith et al., 2003). In the present study, Cronbach's alpha for the CRIES-13 was .73 at Wave 1 and .82 at Wave 2.

2.2.3. Depression self-rating scale (DSRS)

The DSRS is an 18-item questionnaire, measuring symptoms of depression. Its items are scored on 4-point scales ranging from 0=*never* to 3=*often* and, after reversing scores of positively worded items, summed to obtain an index of overall depression severity. It was developed by Birleson (1981) and validated in Greek by Giannopoulou et al. (2006). In the current sample, alpha reliabilities were .79 and .81 at Wave 1 and Wave 2, respectively.

2.4. Statistical analyses

To achieve our first aim, LCA was performed using Mplus 8 (Muthén and Muthén, 1998-2017). As indicators for PTS, we used all thirteen

Table 1
Abbreviated content of items included in the latent class analysis and probability of item endorsement in the three class solution (N = 213).

	Abbreviated content of items	Overall symptom frequency		Class 1: Moderate PTS and PG class (n = 71; 33.3%)		Class 2: Nonavoidant High PTS and PG (n = 48; 22.5%)		Class 3: Avoidant High PTS and PG (n = 94; 44.1%)		Differences in continuous symptom scores between classes
Prolonged Grief		%	N	Probability	SE	Probability	SE	Probability	SE	
1	Yearning, missing the person, wishing s/he was there	0.915	195	0.822	0.051	0.974	0.028	0.955	0.027	1 < 2 = 3
2	Think so much about him/her, getting upset when thinking about him/her	0.587	125	0.220	0.063	0.662	0.084	0.824	0.056	1 < 2 = 3
3	Disbelief, thinking that s/he will return, do not believe s/he is dead	0.742	158	0.585	0.082	0.775	0.071	0.843	0.041	1 < 2 = 3
4	Avoid things (pictures, places) reminding of dead person, avoid talking	0.310	66	0.241	0.061	0.072	0.052	0.486	0.061	2 < 1 < 3
5	Pain, anger	0.810	170	0.607	0.071	0.913	0.051	0.908	0.034	1 < 2 = 3
6	Impairment, the grief gets in the way of doing things (school, friends, at home)	0.236	48	0.068	0.053	0.115	0.054	0.420	0.060	1 = 2 = 3
7	Numbness, it is hard to feel anything	0.196	39	0.104	0.044	0.116	0.059	0.304	0.052	1 = 2 < 3
8	Feel lonely since s/he died	0.364	75	0.170	0.058	0.429	0.083	0.470	0.057	1 < 2 = 3
Posttraumatic Stress										
1	Think about the event even when you don't want to	0.877	185	0.677	0.063	1.000	0.000	0.961	0.031	1 < 2 = 3
2	Waves of strong feelings about event	0.783	166	0.495	0.084	0.854	0.068	0.964	0.023	1 < 2 = 3
3	Pictures about event pop into your mind	0.774	164	0.517	0.072	0.954	0.036	0.874	0.040	1 < 2 = 3
4	Other things keep making you think about event	0.763	161	0.431	0.072	0.927	0.069	0.925	0.039	1 < 2 = 3
5	Try to remove it from your memory	0.621	131	0.711	0.066	0.065	0.078	0.847	0.047	2 < 1 = 3
6	Stay away from reminders of the event (e.g., places or situations)	0.453	96	0.462	0.071	0.000	0.000	0.677	0.066	2 < 1 < 3
7	Try not to talk about event	0.576	121	0.672	0.068	0.267	0.078	0.660	0.057	2 < 1 = 3
8	Try not to think about event	0.591	125	0.635	0.071	0.133	0.104	0.795	0.049	2 < 1 = 3
9	Difficulties paying attention or concentrating	0.557	117	0.214	0.056	0.607	0.086	0.782	0.068	1 < 2 < 3
10	Startle more easily or feel more nervous than before event	0.610	128	0.286	0.067	0.750	0.082	0.780	0.059	1 < 2 = 3
11	Get easily irritated	0.533	112	0.120	0.062	0.732	0.083	0.734	0.058	1 < 2 = 3
12	Alert and watchful even when there is no need to be	0.488	101	0.248	0.076	0.564	0.086	0.627	0.058	1 < 2 = 3
13	Sleep problems	0.299	63	0.058	0.034	0.275	0.074	0.494	0.068	1 < 2 < 3

CRIES-13 items. As indicators of PGD, we used twelve items from the TGIC that optimally mapped onto the DSM-5-TR PGD criteria (APA, 2022). Of all 10 PGD symptom criteria, two were not captured by the TGIC (namely: C1, identity disruption and C7, life feels empty/meaningless). Both B criteria (B1, yearning and B2, preoccupation) were captured by two TGIC-items. Two C criteria (C2, disbelief and C3, avoidance) were also captured by two TGIC-items. Four C criteria (C4, emotional pain, C5, difficulties moving on, C6, numbness, and C8, loneliness) were all captured by one TGIC-item. We dichotomized PTS items by considering scores 0 (none) and 1 (rarely) as symptom absent and scores 3 (sometimes) and 5 (a lot) as symptom present. TGIC items were dichotomized by considering scores of 1 (almost never), 2 (rarely), and 3 (sometimes) as symptom absent and scores 4 (often) and 5 (always/several times) as symptom present. When a PGD symptom was represented by two TGIC-items (which was the case for, e.g., both B criteria), the highest of both item scores counted toward symptom present or absent. Table 1 shows the abbreviated content of all items included in the analyses.

We evaluated models with one up to six latent classes. To determine the optimal number of classes, we considered statistical indices, interpretability, and parsimony (Nylund et al., 2007). As for fit statistics, we considered Akaike's information criterion (AIC), the Bayesian information criterion (BIC), and the sample-size adjusted BIC (SA-BIC) with lower values indicating better fit. We also considered the entropy, with values >0.80 considered acceptable, and the bootstrap likelihood ratio test (BLRt) and Vuong, Lo, Mendel, Rubin likelihood ratio test (VLRT) of which p-values <0.05 indicate a significant improvement of the fit of a model relative to the model with one less class. Class solutions with small class sizes were not retained, considering that these may yield computational difficulties (e.g., inaccurate estimates of class sizes) and inflated risk of Type 2 error (e.g., when examining correlates of class membership). Lastly, parsimonious solutions were preferred over solutions with more classes.

For exploratory reasons, we examined differences between classes in terms of continuous scores on the items included as indicators. To this end, the most likely class membership was merged with the original data and included in a series of analyses of variance (ANOVAs) in SPSS (Version 25) to examine if continuous item scores differed between classes. For PGD items assessed with two items, a person's highest score was included in these analyses.

To achieve our second aim, we used chi square testing to examine if classes differed in terms of percentages of children meeting vs. not meeting criteria for probable PGD caseness and clinically relevant PTS both concurrently (at Wave 1) and longitudinally (at Wave 2). In addition, with the merged dataset, ANOVAs were conducted to examine if classes differed in terms of total scores on the TGIC, CRIES-13, and DSRS (at Wave 1 and Wave 2). Meeting criteria for PGD caseness was determined using the DSM-5-TR scoring rule requiring the presence of ≥1 criterion B symptom and ≥3 criterion C symptoms (APA, 2022). Clinically relevant PTS was defined as a score of ≥17 on the intrusion and avoidance items of the CRIES-13; this cut-off has been put forth by Perrin et al. (2005) and validated by Giannopoulou et al. (2006).

To achieve our third aim, we used the same merged set and used chi square testing and ANOVAs to examine if classes differed in terms of age, gender, and proximity to the accident. All chi square tests were followed by Bonferroni adjusted z-tests for column proportions, to examine differences between pairs of subgroups.

3. Results

3.1. Latent classes of prolonged grief and posttraumatic stress

Fit indices for the one-class through six-class solutions are shown in Table 2. The three-class solution was retained. AIC, BIC, and SA-BIC values were lower for that solution compared to the two-class model and the VLRT indicated that this solution fit better than the two-class model. AIC and SA-BIC values were slightly lower for the four-class models but the magnitude of reductions in these values was small and the VLRT indicated that this model was not significantly better than the three-class model. Parsimony and interpretability supported selection of the three-class model. Fig. 1 shows symptom probabilities and Table 1 shows symptom frequencies and probabilities of item endorsement across the three classes.

In accord with other LCA research (e.g., Boelen, 2021), values ≤0.15 were considered as representing a low probability that the symptom was present, values between 0.15 and 0.59 a moderate probability, and values ≥0.60 a high probability that the symptom was present. Accordingly, Class 1 included 71 children (33.3%) with high endorsement of three PG symptoms and four PTS symptoms, moderate endorsement of three PG symptoms and seven PTS symptoms, and low endorsement of two PG symptoms and two PTS symptoms. This class was named the "Moderate PTS and PG class". The second class included 48 children (22.5%) with high endorsement of four PG symptoms and seven PTS symptoms, moderate endorsement of one PG symptom and three PTS symptoms, and low endorsement of three PG symptoms and three PTS symptoms. Considering the relatively low endorsement of avoidance symptoms, this class was called the "Nonavoidant High PTS and PG class". The third class included 94 children (44.1%) with high endorsement of four PG symptoms and 12 PTSD symptoms and moderate endorsement of four PG symptom and one PTS symptom. This class was called the "Avoidant High PTS and PG class".

3.2. Differences in continuous symptom scores between classes

We used Welch's ANOVAs (because the assumption of homogeneity of variance was violated) to compare the continuous scores of all items included in the LCA. F-values were statistically significant for all item scores (all F's > 7.42, all p's < 0.01) except for the PGD functional impairment item (PG item 6 in Table 1; F = 2.88, p = 0.06) that, thus, did not differentiate between the classes (Class 1 = Class 2 = Class 3). Post-hoc testing showed that, for seven of the thirteen PTS symptoms, scores were lowest in the Moderate PTS and PG class and significantly higher in the Nonavoidant High PTS and PG class and the Avoidant High PTS and PG classes, with no difference between these latter classes (Class 1 < Class 2 = Class 3). A similar ordering of scores (Class 1 < Class 2 = Class 3) was observed for five of the eight PGD symptoms. For the PGD avoidance symptom (item 4) and the PTS avoid reminders symptom (item 6), scores were higher in Class 1 compared to Class 2 and higher in Class 3 compared to both Class 1 and Class 2 (Class 2 < Class 1 < Class 3). For the other three PTS avoidance symptoms (items 5, 7, 8) scores were lowest in Class 2 and higher in Class 1 and Class 3 (Class 2 < Class 1 = Class 3). Scores on PGD numbness (item 7) were ordered as Class 1 = Class 2 < Class 3. The PTS difficulties concentrating and sleeping items were ordered as Class 1 < Class 2 < Class 3. Thus, for 12 of all 21 items, the Nonavoidant High PTS and PG class and the Avoidant High PTS and PG class did not differ and scored higher than the Moderate PTS and PG class; for all 5 avoidance symptoms, scores were lower in Class 2 compared to Class 1 and Class 3.

3.3. Differences between classes at Wave 1 in terms of probable PGD caseness, clinically relevant PTS, and total symptom scores at Wave 1

Of the n = 71, n = 48, and n = 94 children included in Class 1, Class 2, and Class 3, 64.8% (n = 46), 83.3% (n = 40), and 97.7% (n = 92), respectively, met criteria for probable PGD caseness (with the exception of the six months timing criterion) at Wave 1 (Table 3). Percentages differed significantly (chi square = 32.24, df = 2, p < 0.001). In addition, 62.0% (n = 44), 85.4% (n = 41), and 98.9% (n = 93) in Class 1, Class 2, and Class 3, respectively, met criteria for clinically relevant PTS (Table 3). Percentages differed significantly (chi square = 40.41, df = 2, p < 0.001). Both for PGD caseness and clinically relevant PTS, percentages were significantly higher in Class 2 compared to Class 1 and in Class 3 compared to both Class 1 and Class 2 (i.e. Class 1 < Class 2 < Class 3).

Mean total scores on the TGIC, CRIES-13, and DSRS at Wave 1 differed significantly (Table 3). Post-hoc testing showed that, for the TGIC and CRIES-13, Class 1 had the lowest score, Class 2 scored significantly higher than Class 1, and Class 3 scored significantly higher than Class 1 and Class 2 (Class 1 < Class 2 < Class 3). For the DSRS score, scores were ordered: Class 1 < Class 2 = Class 3.

3.4. Differences between classes at Wave 1 in terms of probable PGD caseness, clinically relevant PTS, and total symptom scores at Wave 2

Of all 213 children with available data at Wave 1, n = 137 had available data at Wave 2. We examined the association between class membership at Wave 1 and meeting criteria for probable PGD caseness and clinically relevant PTS at Wave 2. The n = 137 were categorized such that n = 48, n = 37, and n = 52 were included in Class 1, Class 2, and Class 3, respectively. Across the classes 31.3% (n = 14), 56.8% (n = 21), and 80.8% (n = 42), respectively, met criteria for probable PGD caseness at Wave 2 (see Table 3). Percentages differed significantly (chi square = 24.96, df = 2, p < 0.001). The percentage was significantly higher in Class 2 compared to Class 1 and in Class 3 compared to both Class 1 and Class 2 (i.e. Class 1 < Class 2 < Class 3). Regarding clinically relevant PTS, 47.9% (n = 23), 62.2% (n = 23), and 75.0% (n = 39), in Class 1, 2, and 3, respectively, met criteria for clinically relevant PTS at Wave 2. Percentages differed significantly (chi square = 7.77, df = 2, p = 0.02). The percentage was significantly higher in Class 3 compared to Class 1, but did not differ between the other classes.

Mean total scores on TGIC, CRIES-13, and DSRS at Wave 2 differed significantly (Table 3). Post-hoc testing showed that, for the TGIC and CRIES-13, scores were ordered Class 1 < Class 2 < Class 3. For the DSRS, scores were ordered Class 1 < Class 2 = Class 3.

Table 2
Goodness-of-fit indices for latent class models (N = 213).

Model	Log Likelihood	AIC	BIC	SA-BIC	Entropy	BLRt p value	VLRt p-value	Sample size by class based on most likely membership
1 class	-2599.51	5241.02	5311.61	5245.07	-	-	-	213
2 class	-2415.81	4917.62	5062.15	4925.90	0.842	< 0.0001	< 0.0001	77/136
3 class	-2341.20	4812.41	5030.89	4824.93	0.862	< 0.0001	0.0055	48/71/94
4 class	-2307.35	4788.70	5081.13	4805.45	0.863	< 0.0001	0.911	19/51/63/80
5 class	-2281.81	4781.61	5147.99	4802.61	0.867	0.2857	0.2418	20/39/45/49/60
6 class	-2253.40	4768.81	5209.14	4794.04	0.884	0.0659	0.495	7/17/38/44/46/61

Note. AIC = Akaike information criterion. BIC = Bayesian information criterion. BLRt = Bootstrap Likelihood Ratio test. SA-BIC = Sample-size adjusted Bayesian information criterion. VLRt = Vuong-Lo-Mendell-Rubin likelihood ratio test. With Model 6 the best log likelihood value was not replicated.

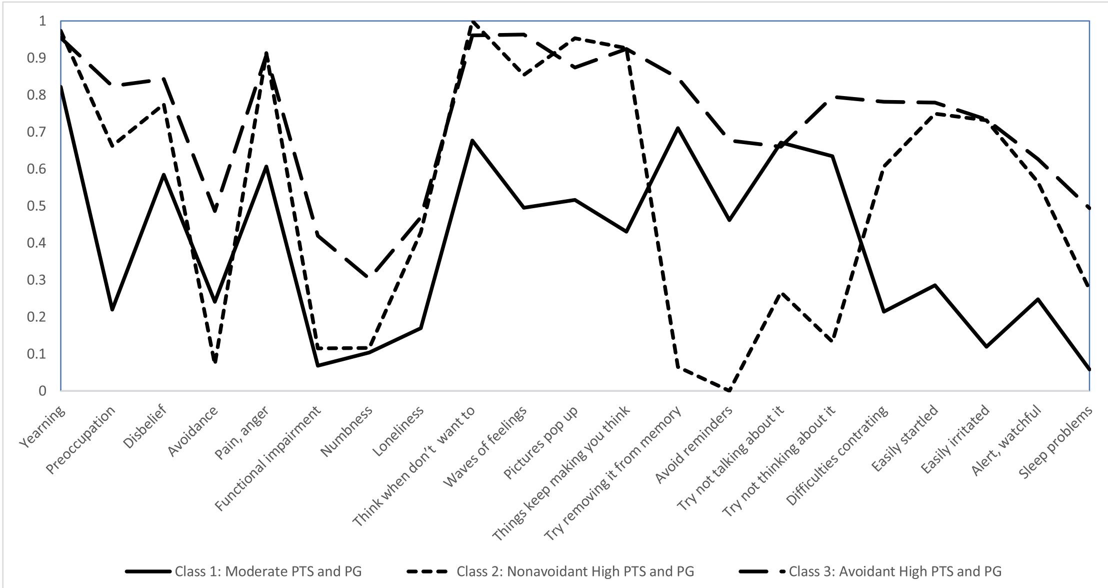

Fig. 1. Conditional Probability Estimates of the Prolonged Grief and Post-Traumatic Stress symptoms for the Three-class Solution.

3.5. Differences between classes in terms of youngster's age, gender, and their proximity to the event

Age did not differ between classes. Gender differed significantly between classes (chi square = 27.57, df = 2, $p < 0.001$). The percentage of females was significantly lower in Class 1 compared to Class 2 and Class 3 but did not differ between Class 2 and Class 3. Classes did not differ in terms of percentages of children on the affected bus, on buses that preceded or followed it, and not participating in the school trip.

4. Discussion

When children and adolescents are confronted with traumatic events involving deaths of family members or peers, symptoms of traumatic stress and separation distress are likely to coincide (Cohen et al., 2016). This may be the case following different traumatic losses, including traffic accidents taking the lives of close relatives or other known persons. Studying the impact of fatal traffic accidents on youngsters is particularly relevant considering that deadly traffic accidents taking the lives of relatives or peers occur relatively often (cf. Noppe and Meyer, 2014). The first aim of this study was to examine if, in a sample of 213 young people confronted with traumatic loss, subgroups of youngsters could be identified based on their endorsement of symptoms of DSM-5-TR defined PG (APA, 2022) and PTS. The LCA supported a three class-solution, including a group with moderate PTS and PG symptoms (Class 1, called the Moderate PTS and PGD class), a group with high probabilities of endorsing most symptoms, with the exception of the avoidance and numbing symptoms (Class 2, the Nonavoidant High PTS and PG class), and a group with high probabilities of endorsing all symptoms including the avoidance symptoms (Class 3, the Avoidant High PTS and PG class). This distinction of classes was also clearly reflected in the fact that, in terms of mean scores on continuously scored symptoms, the Avoidant High PTS and PG class (Class 3) scored significantly higher than the Nonavoidant High PTS and PG class (Class 2) on all six items assessing avoidance and numbing but did not differ on most (i.e. 12) of the other 15 symptoms. On 13 of all 21 symptoms of PTS and PG considered, Class 2 and Class 3 scored significantly higher than Class 1.

Our findings are consistent with adult research also pointing out that people confronted with traumatic loss formed subgroups that differed in terms of the combination of symptoms (i.e., with groups evidencing high scores in some but not other symptom domains) more than the severity of symptoms (i.e., with groups evidencing low, moderate, and high levels of all symptom domains considered) (e.g., Boelen et al., 2016; Cozza et al., 2019; Heeke et al., 2017; Nickerson et al., 2014). Notably, unlike Boelen et al. (2017) examining a heterogenous bereaved group of children and Geronazzo-Alman et al. (2019) studying children who suffered loss in the 9/11 terrorist attacks, we did not identify a subgroup evidencing elevated PGD only. This may be due to our sample being more recently bereaved, compared to children in these two studies, and differences in loss events across studies, stressing the need for further research on heterogeneity in responses following traumatic loss in children and moderators thereof.

It is also interesting that we found two classes with pervasive disturbance that differed in terms of avoidance and numbness; that is consistent with some prior LCA-research. For example, in two samples of trauma-exposed adults, Breslau et al. (2005) identified three classes, with no, intermediate, and high PTS symptoms, respectively, with numbing being present more frequently in the last class. In three studies among veterans, Maguen et al. (2013), Hebenstreit et al. (2014), and Naifeh et al. (2010) similarly found that, apart from differences in overall symptom severity, groups with intermediate and high PTS were distinct in terms of numbness symptoms. Even more striking was that the two classes with pervasive disturbance differed markedly in terms of avoidance symptoms. This has been observed before in at least one prior study: based on data from 164 treatment-seeking older adults with childhood war-related trauma, Böttche et al. (2015) identified three classes evidencing moderate symptoms, severe symptoms with low avoidance, and severe symptoms with high avoidance, respectively. We should be cautious in comparing between studies based on such diverse groups. Nevertheless, it appears that, at least in certain traumatized populations, groups can be distinguished that differ "quantitatively" in the severity of most symptoms and also differ "qualitatively" in their experience of numbness and avoidance.

The second aim was to examine whether emerging subgroups differed in term of psychological distress, assessed concurrently (at two-month post-accident, Wave 1) and 16 months later (at 18-month post-accident, Wave 2). Our analyses yielded several findings indicating that differences between the Nonavoidant High PTS and PG class and Avoidant High PTS and PG class were indeed meaningful. That is, at Wave 1, percentages of youngsters meeting criteria for probable PGD caseness (except the six months timing criterion) and scoring above the

Table 3
Characteristics of participants by class in the three class solution (N = 213).

	Total group	Class 1: Moderate PTS and PG class (n = 71; 33.3%)	Class 2: Nonavoidant High PTS and PG (n = 48; 22.5%)	Class 3: Avoidant High PTS and PG (n = 94; 44.1%)	Test for differences
Sociodemographic background variables					
Gender, *N (%)*					
Male (N, % within column)	106 (49.8)	53 (74.6)	21 (43.3)	32 (34.0)	X^2 =27.57, df = 2, p < 0.001
Female (N, % within column)	107 (50.2)	18 (25.4)	27 (56.3)	62 (66.0)	
Age, *M (SD), range*	14.83 (1.37)	14.87 (1.37)	14.47 (1.22)	14.97 (1.41)	F(2, 212) = 2.19, p = 0.11
Proximity to the accident					
In bus (N, % within column)	29 (13.6)	9 (12.7)	9 (18.8)	11 (11.7)	X^2 = 6.60, df = 4, p = 0.15
Not in bus (N, % within column)	113 (53.1)	31 (43.7)	26 (54.2)	56 (59.6)	
Did not take part in trip (N, % within column)	71 (33.3)	31 (43.7)	13 (27.1)	27 (28.7)	
Concurrent indicators of distress (Wave 1)					
TGIC total score, M (SD), n	42.85 (14.87), 204	28.59 (12.27), 65	45.82 (10.07), 46	51.34 (10.61), 93	F(2, 203) = 83.13, p < 0.001
CRIES-13 total score, M (SD), n	34.09 (11.37), 211	23.93 (8.97), 71	31.71 (5.69), 46	42.93 (7.42)	Welch F(2,123.97) = 114.74, p < 0.001 [a]
DSRS total score, M (SD), n	25.75 (7.62), 212	18.42 (8.96), 70	27.58 (7.58), 48	30.26 (7.62), 94	F(2, 211) = 44.66, p < 0.001
Meeting criteria for probable PGD caseneses					
No (N, % within column)	35 (16.4)	25 (35.2)	8 (16.7)	2 (2.1)	X^2 = 32.24, df = 2, p < 0.001
Yes (N, % within column)	178 (83.6)	46 (64.8)	40 (83.3)	92 (97.9)	
Clinically relevant PTS					
No (N, % within column)	35 (16.4)	27 (38.0)	7 (14.6)	1 (1.1)	X^2 = 40.40, df = 2, p < 0.001
Yes (N, % within column)	178 (83.6)	44 (62.0)	41 (58.4)	93 (98.9)	
Longitudinal indicators of distress (Wave 2)					
TGIC total score, M (SD), n	30.59 (15.14), 137	22.66 (13.91), 48	30.12 (11.98), 37	38.24 (14.59), 52	F(2, 136) = 16.18, p < 0.001
CRIES-13 total score, M (SD), n	28.33 (13.19), 136	20.71 (12.59), 48	28.83 (12.23), 37	35.14 (10.97), 51	F(2, 135) = 18.68, p < 0.001
DSRS total score, M (SD), n	24.04 (10.36), 137	18.75 (9.44), 48	25.45 (8.85), 37	27.93 (10.28)	F(2, 136) = 11.90, p < 0.001
Meeting criteria for probable PGD caseness					
No (N, % within column)	59 (43.1)	33 (68.8)	16 (43.2)	10 (19.2)	X^2 = 24.96, df = 2, p < 0.001
Yes (N, % within column)	78 (56.9)	15 (31.3)	21 (56.8)	42 (80.8)	
Clinically relevant PTS					
No (N, % within column)	52 (38.0)	25 (52.1)	14 (37.8)	13 (25.0)	X^2 = 7.77, df = 2, p = 0.02
Yes (N, % within column)	85 (62.0)	23 (47.9)	23 (62.2)	39 (75.0)	

Note. CRIES-13 = Children's Revised Impact of Events Scale. DSRS = Depression Self-Rating Scale. PGD = Prolonged Grief Disorder. PTS = Post-Traumatic Stress. TGIC = Traumatic Grief Inventory for Children. [a] Welch's ANOVAs.

cutoff for clinical relevant PTS were higher in the Avoidant High PTS and PG class compared to the other classes and higher in the Non-avoidant High PTS and PG class compared to the Moderate PTS and PG class (i.e. Class 1 < Class 2 < Class 3). Total scores on measures assessing PTS and PG at Wave 1 were similarly ordered. More importantly, classes differed in terms of percentages of youngsters meeting criteria for caseness of PGD at follow-up. That is, compared to both the Moderate PTS and PG class and the Nonavoidant High PTS and PG class, significantly more youngsters in the Avoidant High PTS and PG class met criteria for PGD caseness at Wave 2. Compared to the Moderate PTS and PG class (but not the Nonavoidant High PTS and PG class) these youngsters were also more likely to report clinically relevant PTS. At two months after the accident, youngsters with elevated distress who engaged in avoidance of stimuli reminding them of the traumatic loss event were thus substantially more likely to be left with severe PGD 16 months later than their non-avoidant peers. This finding is in accordance with cognitive behavioural theories of PTS (Ehlers and Clark, 2000) and PG (Boelen et al., 2006) claiming that avoidant responses interfere with the elaboration and integration of traumatic and loss events, thereby maintaining acute responses. The findings are also broadly consistent with research showing that avoidance early in the grieving process contributes to longer-term stagnation in grieving (Boelen and Eisma, 2015; Bonanno et al., 2005). Interestingly, compared to the Moderate PTS and PG class, the Nonavoidant High PTS and PG class and Avoidant High PTS and PG class both scored higher on depression at Wave 1 and Wave 2, but depression scores did not differ between these Nonavoidant and Avoidant classes. This suggests that, with the increase of symptoms of PG and PTS in youngsters confronted with fatal accidents, depression symptoms also increase, even among those who are less inclined to avoid cues associated with the accident.

Notably, although participants in Class 1 (Moderate PTS and PG class) had lower scores on most symptoms than participants in the other classes, they still had at least a moderate probability of endorsing most symptoms. It is striking that we did not find a class characterized by low PTS and PG. As argued in previous work based on this sample (Giannopoulou et al., 2021), this indicates that the sudden traumatic loss of peers has a huge psychological impact on young people. Importantly, although youngsters in the Moderate PTS and PG class reported moderate distress, they had considerably lower odds of meeting criteria for probable PGD caseness and clinically relevant PTS 16 months later at Wave 2. Youngsters in the Nonavoidant High PTS and PG class and the Avoidant High PTS and PG class had a high chance of meeting these criteria. This is in keeping with prior work among young people (Melhem et al., 2011) and adults (Boelen and Lenferink, 2020) indicating that intense responses of grief in the first months following loss predict a problematic recovery process in the long run.

Regarding our third aim, we examined if gender, age, and proximity to the accident were associated with subgroup membership. Females had significantly higher chances of inclusion in Class 2 and Class 1 than males. This is consistent with some prior findings that girls are more vulnerable to the emotional impact of bereavement (Reinherz et al., 1999). Findings are inconsistent with more recent LCA studies in which patterns of separation distress and traumatic stress were not qualified by gender (e.g., Boelen et al., 2017; Geronazzo-Alman et al., 2019; Keulen et al., 2022). Our finding of no impact of age accords with some (e.g., Boelen et al., 2017; Keulen et al., 2022) but not other (Geronazzo-Alman et al., 2019) studies. Taken together, it seems useful for future studies to continue examining the role of age and gender in affecting patterns of responses to traumatic loss. The finding that the proximity to the accident did not differ between classes is consistent with Milgram et al.'s (1988) findings that the degree of physical proximity to a fatal school bus accident did not moderate stress reactions of victims.

Several limitations should be considered when interpreting the present findings. First, data were all based on self-report. Thus, shared method variance may have influenced the findings. Second, as reported by Giannopoulou et al. (2021), youngsters in higher school classes at Wave 1 were no longer available at Wave 2. Thus, participants who were younger at Wave 1 were overrepresented at Wave 2. Third, possible engagement in bereavement care between Wave 1 and Wave 2 was not registered. We therefore cannot rule out that associations between class membership and emotional distress at Wave 2 were moderated by engagement in bereavement care. Fourth, we did not obtain any data on other factors that might have affected class membership, such as pre-accident vulnerabilities, parental support, and family functioning. It is relevant for future research to consider the association of these and other non-assessed variables with different response patterns following traumatic loss. Fifth, that we focused on relatively recently bereaved children sheds light on early signs of difficult grief. At the same time, it is unclear to what extent data can be generalized to children who suffered loss longer ago. Last, the measurement instrument we used to measure PTS symptoms included most but not all PTS symptoms distinguished in the DSM-5. Future research, with a DSM-5 based measure of PTS is needed to investigate if the current findings apply to DSM-5-based PTS.

Notwithstanding these considerations, this study has increased knowledge of the heterogeneity of early response patterns of PG and PTS symptoms, in youngsters confronted with traumatic loss. We identified patterns varying in terms of both the severity and type of symptoms, where a pattern characterized by elevated scores on all symptoms—including avoidance—was associated with the greatest odds of experiencing elevated emotional difficulties one and a half year later. That early response patterns predicted persistent difficulties indicates that youngsters experiencing early symptoms may be en route toward problematic recovery and are, therefore, candidates for early preventative care or watchful waiting. Confronting, and not avoiding, stimuli associated with the traumatic loss may be one key ingredient of such care. However, more research is needed to enhance knowledge about underlying mechanisms of intense acute PTS and PG following traumatic losses, to inform advances in such care.

Author disclosure

The authors have nothing to disclose.

CRediT authorship contribution statement

Paul A. Boelen: Conceptualization, Formal analysis, Writing – original draft. **Ioanna Giannopoulou:** Investigation, Data curation, Writing – review & editing. **Danai Papadatou:** Investigation, Data curation, Writing – review & editing.

Declaration of Competing Interest

The authors declare to have no conflicts of interest.

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