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Latent Classes of Posttraumatic Stress Symptoms in Two Samples of Bereaved People

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Although the heterogeneity of posttraumatic stress (PTS) symptoms has been well-documented in various traumatized samples, no study has investigated the heterogeneity of *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*, PTS symptomatology in samples exclusively composed of bereaved people. We examined what classes could be distinguished based on the endorsement of self-rated *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*, PTS symptoms in a sample of 509 bereaved people confronted with losses due to a variety of causes and a sample of 331 homicidally bereaved people. Associations between class membership and sociodemographic and loss-related variables were also examined. On the basis of latent class analyses, conducted in both samples separately, we identified three PTS classes: a No disturbance, Intermediate disturbance, and Pervasive disturbance class, characterized by low, moderate, and high probability of endorsement of PTS symptoms, respectively. In both samples, the largest class was characterized by participants who endorsed intermediate PTS symptom levels. As expected, being a woman, more closely related to the deceased person, more recently bereaved, and (in the sample of 509 bereaved people) confronted with unexpected loss were related to classes with more PTS disturbances. There is evidence that intermediate PTS levels are associated with negative outcomes. Because this seems to be a relative large group in the current study, it is useful to further our knowledge about variables underlying and maintaining subclinical PTS levels.

Keywords: posttraumatic stress disorder, grief, bereavement, death, homicide

Posttraumatic stress disorder (PTSD) encompasses reexperiencing (e.g., nightmares), avoidance (e.g., of places related to the stressor), and hyperarousal (e.g., sleep difficulties) symptoms that result from witnessing or experiencing a traumatic event, according to the fourth edition of the *Diagnostic and Statistical Manual*

of Mental Disorders (DSM-IV; American Psychiatric Association, 1994). The most common reported event that can give rise to posttraumatic stress (PTS) symptoms is the unexpected death of a significant other (e.g., heart attack, suicide, or homicide), according to a study among 69,000 participants in 24 countries (Benjet et al., 2016). PTSD prevalence in this subgroup is 5.2% (Atwoli et al., 2017). Nonviolent losses (due to, for example, illness) of loved ones may also precipitate PTS (Gold, Marx, Soler-Baillo, & Sloan, 2005; Onrust & Cuijpers, 2006). A systematic review showed that 11.8% of the conjugal bereaved people met the diagnostic criteria for interview-based PTSD within three years postloss (Onrust & Cuijpers, 2006).

In the abovementioned studies, as well as in many other studies (Brancu et al., 2016), PTSD was considered a dichotomous phenomenon. This approach ignores the heterogeneity among PTS symptoms (Steenkamp et al., 2012). Specifically, by treating PTSD as either present or absent, people who suffer from subclinical levels of PTS may unjustly be considered as resilient or recovered, even though subclinical PTS is a prevalent, chronic, and debilitating response that merits clinical attention (Brancu et al., 2016). Another common method to explore PTS is to examine population means, which reveals how people respond on average and, consequently, also ignores heterogeneity in people's responses (Galatzer-Levy & Bryant, 2013).

A statistical technique that is useful for examining heterogeneity in PTS symptoms is latent class analysis (LCA). LCA is a person-

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The ideas and findings appearing in this article have not been presented previously at conferences, meeting, or websites. Data for the current study were gathered in two (on-going) research projects. We refer to these research projects in the first paragraph of the Method section. The Victim Fund and the University of Groningen subsidized parts of this work.

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centered statistical technique that identifies distinct homogeneous subgroups of people (i.e., classes) based on their responses (e.g., endorsement of PTS symptoms). Numerous studies have examined latent classes of *DSM-IV* PTS symptoms in different samples exposed to various traumatic events, including two community samples of which 10.3% and 9.0% experienced an unexpected death of a significant other (Breslau, Reboassin, Anthony, & Storr, 2005), two samples of young adults exposed to different traumatic events, of which about half of the participants were exposed to the unexpected death of a significant other (Chung & Breslau, 2008), female veterans (Hebenstreit, Madden, & Maguen, 2014), disaster responders (Horn et al., 2016), disaster survivors of which 19.8% were exposed to the disaster-related death of a significant other (Rosellini, Coffey, Tracy, & Galea, 2014). Across these LCA studies, the most consistent evidence was found for three classes that are distinguishable in terms of the severity of different PTS symptoms: (a) no disturbance (i.e., low probability of experiencing PTS symptoms), (b) intermediate disturbance (i.e., moderate to high probability of experiencing multiple PTS symptoms, but in most cases not sufficient to adhere to “full-blown” PTSD), and (c) pervasive disturbance (i.e., high probability of experiencing PTS symptoms in accordance with PTSD diagnostic criteria).

Although some of these previous LCA studies also included people who were exposed to the death of a significant other, there is very limited knowledge about the nature and number of latent classes of PTS symptoms that can be distinguished in samples exclusively composed of people confronted with the death of a loved one. To the best of our knowledge, only one study examined this issue, in a sample of people exposed to infant death (Elklit, Hyland, & Shevlin, 2014). Elklit et al. (2014) assessed PTS symptoms as well as symptoms of “complex PTSD” (including affective dysregulation and negative self-view) based on the proposed criteria for the 11th edition of the International Classification of Diseases (ICD-11; Maercker et al., 2013). Consequently, the generalizability of their findings to bereaved people in general and to PTS symptoms as defined in *DSM-IV* is limited.

The current study sought to examine the degree to which prior findings regarding classes of PTS symptoms following various potential traumatic life events were generalizable to samples exclusively composed of bereaved people. Because deaths of loved ones are known risk factors for PTSD (de Vries & Olff, 2009; Keyes et al., 2014), it is important to identify unique profiles of PTSD symptomatology associated with bereavement. Moreover, identifying distinct PTS symptom classes may inform the development of methods for the identification and treatment of bereaved subgroups with different symptom profiles. Detecting possible subgroups characterized by subclinical PTSD is particularly relevant, taking into account the potentially distressing and disabling health consequences of subclinical PTSD (Brancu et al., 2016; Pacella, Hruska, & Delahanty, 2013). The current study aimed to expand our knowledge about the heterogeneity of PTS responses in different bereaved samples, including people confronted with unnatural/violent loss (homicide) as well as people confronted with losses caused by different modes of death. We therefore studied two different samples. The first sample constituted of people confronted with the death of a loved one, due to various causes. The second sample exclusively consisted of homicidally bereaved people. We examined *DSM-IV* PTS reactions, because *DSM-IV* was the leading framework in the Dutch mental health

care system when the data collection for the studies included in this article were initiated.

The aim of this study was twofold. Our first aim was to examine what classes could be distinguished based on the endorsement of PTS symptoms. In accord with previous findings (Breslau et al., 2005; Chung & Breslau, 2008; Glück, Knefel, Tran, & Lueger-Schuster, 2016; Murphy, Elklit, Dokkedahl, & Shevlin, 2016; Steenkamp et al., 2012), we expected that we would be able to identify three distinct classes in both samples, representing individuals with no disturbance, intermediate disturbance, and pervasive disturbance of PTS symptoms. The second aim of this study was to identify sociodemographic and loss-related factors that are associated with class membership. Based on prior research, examining correlates of PTS in different bereaved samples, we expected that being a woman (vs. man), more recently (vs. remotely) bereaved, more closely (vs. distantly) related to the deceased person, and having a lower (vs. higher) educational level were related to classes with more pervasive PTS in both samples (Atwoli et al., 2017; Boelen, de Keijser, & Smid, 2015; Mitchell & Terhorst, 2017; van Denderen, de Keijser, Huisman, & Boelen, 2016). In the sample of people whose relatives died of different causes, we also examined the association of class membership with dichotomized cause of loss (categorized as natural vs. unnatural [i.e., due to homicide, suicide, or accident]) and the subjectively perceived “unexpectedness” of the loss. Previous studies examining the impact of cause and unexpectedness of death on PTS yielded inconclusive results. Some studies showed that the unnatural/violent nature of the death rather than its suddenness was related to increased PTS (Kaltman & Bonanno, 2003; Kloep, Lancaster, & Rodriguez, 2014). Other studies found perceived unexpectedness to be associated with more severe PTS (Boelen, 2015; Breslau et al., 1998). In light of these contrasting findings, no hypotheses were formulated regarding the linkage of cause and unexpectedness with PTS class membership.

Method

Participants

Table 1 summarizes sociodemographic and loss-related characteristics of the participants in both samples. The first sample included 509 people confronted with the death of a loved one, due to various causes. They were enrolled in an ongoing study among Dutch adult bereaved people (henceforth referred to as “Sample 1”) through announcements on websites informing about loss and grief. Participants were mostly women (84.3%), aged 52.9 ($SD = 12.4$) on average, and had a college or university degree (43.8%). Most of the participants had lost a spouse, on average 14.1 ($SD = 14.8$) months earlier.

Data of homicidally bereaved people ($n = 331$, henceforth referred to as “Sample 2”) were collected during a research project examining correlates and treatment of psychopathology following homicidal loss (Boelen, van Denderen, & de Keijser, 2016; van Denderen, de Keijser, Gerlsma, Huisman, & Boelen, 2014; van Denderen et al., 2016; van Denderen, de Keijser, Stewart, & Boelen, 2018). Participants were recruited through Dutch peer support organization (52.0%), Victim Support (i.e., a nongovernmental support organization, 41.1%), or other sources (e.g., website of the research project or media attention, 6.9%). Participants

Table 1
Characteristics of the Participants

	Bereaved people (Sample 1; <i>n</i> = 509)	Homicidally bereaved people (Sample 2; <i>n</i> = 331)
Gender, <i>n</i> (%)		
Man	80 (15.7)	113 (34.1)
Woman	429 (84.3)	218 (65.9)
Age (years), <i>M</i> (<i>SD</i>)	52.9 (12.4)	52.7 (15.4)
Educational level, <i>n</i> (%)		
Low to moderate	230 (45.2)	—
High	279 (54.8)	—
Deceased relative is, <i>n</i> (%)		
Spouse	205 (40.3)	25 (7.8)
Child	44 (8.6)	157 (48.8)
Parent	203 (39.9)	41 (12.7)
Sibling	28 (5.5)	52 (16.1)
Other	29 (5.7)	47 (14.6)
Time since loss, <i>M</i> (<i>SD</i>)	14.1 (14.8) months	6.9 (6.5) years
Cause of loss, <i>n</i> (%)		
Natural, nonviolent	459 (90.2)	n.a.
Unnatural, violent (due to homicide, accident, or suicide)	50 (9.8)	n.a.
Unexpectedness of the loss, <i>M</i> (<i>SD</i>)	2.87 (1.58)	—
PSS-SR, <i>M</i> (<i>SD</i>)	13.83 (9.63)	19.17 (12.64)

Note. — = data were not available; n.a. = not applicable; PSS-SR = PTSD Symptom Scale–Self-Report; PTSD = posttraumatic stress disorder.

were mostly women (65.9%) and aged 52.7 (*SD* = 15.4) on average. About half of the participants had lost a child. The mean time since loss was 6.9 (*SD* = 6.5) years. In some cases, multiple relatives of the same homicide victim completed questionnaires. In total, the 331 participants represented 254 (76.7%) unique homicide cases. Local ethical review boards approved the studies.

Measures

In accord with the *DSM-IV* criteria (American Psychiatric Association, 1994), PTS was assessed with the PTSD Symptom Scale–Self-Report (Foa, Riggs, Dancu, & Rothbaum, 1993). Participants were instructed to rate to what extent they experienced 17 PTS symptoms during the preceding month on scales ranging from 0 to 3. Example items are: “Having bad dreams or nightmares about the traumatic event” and “Feeling irritable or having fits of anger.” Scores of 0 (*not at all*) and 1 (*once a week*) were considered as symptom absence. Scores of 2 (*2 to 4 times a week*) and 3 (*five or more times per week*) were considered as symptom presence. Following the diagnostic scoring rule of the *DSM-IV* (American Psychiatric Association, 1994), presence of at least one of five reexperiencing, three of seven avoidance, and two of five hyperarousal symptoms indicated “probable PTSD.” This frequently used PTSD measure has adequate psychometric properties (Foa et al., 1993). Cronbach’s α s of the scale were high for Sample 1 (α = .91) and Sample 2 (α = .93).

We examined the following sociodemographic and loss-related variables: gender (coded as 0 = man, 1 = woman), kinship to the deceased (coded as 0 = loss of relative other than child or spouse, 1 = loss of child/spouse), and time since loss (in months for Sample 1 and in years for Sample 2). For Sample 1, we also considered educational level (coded as 0 = high, 1 = low to moderate), cause of loss (coded as 0 = natural, 1 = homicide/suicide/accident), and unexpectedness of the loss. Unexpectedness

was rated on a 5-points scale (1 = *not at all unexpected*, 5 = *totally unexpected*) using the following item: “To what extent did you experience this death as unexpected?”

Statistical Analyses

The LCAs were performed for each sample separately using the three-step approach in Latent Gold Version 5.0 (Vermunt, 2010). In the first step, the 17 binary PTS symptoms were included as indicators in the LCAs. First, the most parsimonious one-class model was modeled, followed by a two-, three-, and four-class model. Based on the fit indices, class sizes, and consistency with previous research the most optimal class solution was chosen (Nylund, Asparouhov, & Muthén, 2007). We relied on the following log likelihood fit statistics: (a) the (sample-size adjusted) Bayesian information criterion (BIC and SA-BIC) and Akaike’s information criterion (AIC; i.e., lower values indicate better fit), of which the BIC seems to be the best indicator of the number of classes (Nylund et al., 2007), (b) the *p* value of the bootstrap likelihood ratio test (BLRT; *p* < .05 indicates that the fit of the current model is significantly improved compared with the model with one less class; Nylund et al., 2007), and (c) the entropy *R*² (values closer to 1 indicate better separation of the classes; Caragher, Adamson, Bunting, & McCann, 2009). In Step 2 of our analyses, the participants were assigned to the classes based on the optimal class solution. In Step 3, sociodemographic and loss-related were simultaneously included in the multinomial logistic regression model to examine differences between the classes with respect to these variables while taking into account the classification error (Vermunt, 2010). The 95% confidence intervals (CIs) of the odds ratios and regression coefficients were calculated. Differences between a specific class and the reference class was considered significant when zero was not included in the 95% CIs for the regression coefficients. Less than

8% of the data was missing per item in each sample. Participants who completed all PTSD items were compared with participants with missing items in terms of sociodemographic and loss-related variables, using χ^2 and t tests. Nonsignificant differences were found in Sample 1. For Sample 2, nonsignificant differences were found in a previous study using the same study sample (van Denderen et al., 2016). Missing data were handled using full maximum likelihood estimation in the LCAs.

Results

Latent Class Analyses

Table 2 shows the fit indices of the one- to four-class solutions. For Sample 1, the two- and three-class solution yielded higher entropy R^2 values than the four-class solution. The significant p value of the BLRT of the two-class solution indicated that this solution yielded a better fit compared with the one-class solution. Although the four-class solution had the lowest SA-BIC and AIC values, these values were only marginally lower compared with the three-class solution. In addition, the fourth class was not clearly distinguishable from the other three classes. Furthermore, the BIC value was the lowest in the three-class solution, and this solution was consistent with previous LCA studies examining PTS (Steenkamp et al., 2012). Based on all this, we chose the three-class solution as optimal solution.

For Sample 2, similar patterns of results were found. Consequently, again, the three-class solution was chosen as optimal solution.

Three-Class Solution for Sample 1

For Sample 1, the conditional probability estimates are displayed in Figure 1 and summarized in Table 3. These estimates represent the probability of the presence of a PTS symptom in a specific class. For instance, the symptom "Intrusions" was present among 5%, 60%, and 92% of the participants in Class 1, Class 2, and Class 3, respectively. In line with previous research (Burstein et al., 2012; Lenferink, de Keijser, Smid, Djelantik, & Boelen, 2017; Nickerson et al., 2014), probability rates of $<.15$ were considered to represent "low" proba-

bility, .15 through .59 "moderate" probability, and $\geq .60$ "high" probability of symptom endorsement.

Class 1 consisted of 208 participants (40.9%) and was characterized by low probability of presence of PTS symptoms and therefor denoted as "No disturbance class." Class 2 included 219 participants (43.0%) and was characterized by moderate probability of endorsement of most PTS symptoms. This class was labeled as "Intermediate disturbance class." The third class consisted of 82 participants (16.1%) and was characterized by high probability of the majority of PTS symptoms and consequently termed "Pervasive disturbance class."

The mean number of endorsed PTS symptoms was 0.34 ($SE = 0.04$), 4.48 ($SE = 0.11$), and 10.59 ($SE = 0.23$) in the No disturbance, Intermediate, and Pervasive disturbance classes, respectively. The differences in mean number of endorsed PTS symptoms differed significantly between the classes when taking the classification error into account (all $ps < .05$). None of the participants fulfilled criteria for "probable PTSD" in the No disturbance class, 10 participants (4.6%) fulfilled these criteria in the Intermediate disturbance class, and 67 (81.7%) in the Pervasive disturbance class.

Three-Class Solution for Sample 2

For Sample 2, the conditional probability estimates are displayed in Figure 1 and summarized in Table 4. Class 1 included 115 participants (34.7%) and was denoted as "No disturbance class." Class 2 constituted of 132 participants (39.9%) and was labeled as "Intermediate disturbance class." The third class consisted of 84 participants (25.4%) and was termed "Pervasive disturbance class."

The mean number of endorsed PTS symptoms was 0.72 ($SE = 0.09$), 6.08 ($SE = 0.18$), and 12.83 ($SE = 0.27$) in the No disturbance, Intermediate, and Pervasive disturbance classes, respectively, and differed significantly between the classes when taking the classification error into account (all $ps < .05$). None of the participants fulfilled criteria for "probable PTSD" in the No disturbance class, 29 participants (24.0%) fulfilled these criteria in the Intermediate disturbance class, and 75 (89.3%) in the Pervasive disturbance class.

Table 2

Goodness-of-Fit Statistics for the One- to Four-Class Solutions for Sample 1 ($n = 509$) and Sample 2 ($N = 331$)

Model	LL	BIC	SA-BIC	AIC	BLRT (p value)	Entropy R^2	Smallest class size ^a (%)
Bereaved people (Sample 1)							
1 Class	-4,264.51	8,634.98	8,581.02	8,563.03			
2 Class	-3,567.20	7,352.54	7,241.44	7,204.40	.02	.87	44.5
3 Class	-3,412.61	7,155.53	6,987.31	6,931.21	.27	.86	16.5
4 Class	-3,360.12	7,162.75	6,937.39	6,862.25	.29	.81	15.9
Homicidally bereaved people (Sample 2)							
1 Class	-3,295.25	6,689.14	6,635.22	6,624.51			
2 Class	-2,576.05	5,355.18	5,244.16	5,222.11	$<.001$	.88	45.3
3 Class	-2,434.32	5,176.14	5,008.03	4,974.63	.23	.86	26.5
4 Class	-2,394.27	5,200.50	4,975.28	4,930.54	.20	.84	14.7

Note. LL = loglikelihood; BIC = Bayesian information criterion; SA-BIC = sample-size adjusted BIC; AIC = Akaike's information criterion; BLRT = bootstrap likelihood ratio test.

^aClass size while taking into account the classification error.

Figure 1. Probability estimates for the three-class solution for Sample 1 ($n = 509$) and Sample 2 ($n = 331$).

Correlates of Class Membership for Sample 1 and Sample 2

Table 5 shows the estimates of the sociodemographic and loss-related variables when entered simultaneously into the model as correlates of class membership. For Sample 1, participants in the Intermediate and in the Pervasive disturbance class were more likely to be a woman, the spouse or parent of the deceased, more recently bereaved, and experienced the loss as more unexpected compared with the participants in the No disturbance class. Furthermore, participants in the Intermediate disturbance class were more likely to have a lower educational level compared with the participants in the No disturbance class. Cause of loss was unrelated to class-membership.¹ The participants in the Pervasive and Intermediate disturbance classes did not significantly differ with respect to the sociodemographic and loss-related variables.

For Sample 2, participants in the Intermediate and in the Pervasive disturbance classes were more recently bereaved compared with the participants in the No disturbance class. Participants in the Pervasive disturbance class were more likely to be a woman compared with the No disturbance and Intermediate disturbance classes. Furthermore, participants in the Pervasive disturbance class were more likely to be the spouse or parent of the deceased compared with participants in the No disturbance class.

Discussion

The first aim of the current study was to examine latent classes of PTS symptoms among people confronted with the death of a significant other due to various causes (Sample 1) and homicidally bereaved people (Sample 2). Because the current study relied on different samples (i.e., people confronted with losses caused by different modes of death 1 year earlier on average and people confronted with homicidal loss an average of 7 years earlier), we

analyzed the samples separately. As expected, we identified three PTS symptom classes in both samples, representing individuals with No disturbance (40.9%/34.7%), Intermediate disturbance (43.0%/39.9%), and Pervasive disturbance (16.1%/25.4%), respectively, in Sample 1 and Sample 2. This accords with previous LCA studies that identified three similar PTS classes among people exposed to various potential traumatic events (Breslau et al., 2005; Chung & Breslau, 2008; Elklit et al., 2014; Glück et al., 2016; Murphy et al., 2016; Steenkamp et al., 2012). Together, these studies indicate that subgroups can be distinguished that vary in terms of the severity of PTS symptoms. This supports previous empirical and theoretical work about individual differences in responses to potential traumatic events (cf. Bonanno, 2004; Elhai, Naifeh, Forbes, Ractliffe, & Tamburrino, 2011; Forbes et al., 2016; Galatzer-Levy & Bryant, 2013). Furthermore, the consistency within our findings across the two bereaved samples and between our findings and previous LCA studies using different trauma samples supports the generalizability of latent classes of PTS across people exposed to different adverse life events, including individuals exposed to different types of loss.

¹ Because violent death is often confounded with suddenness of the death (Kloep et al., 2014), we repeated the multinomial logistic regression analysis with either cause of loss or unexpectedness as independent variable, while taking the other sociodemographic and loss-related variables into account. This yielded similar results regarding the association between unexpectedness of the loss and class membership. However, without taking the unexpectedness into account, the cause of loss was related to class membership. Participants in the Pervasive disturbance class were more likely to experience a violent death compared with participants in the No disturbance class ($B = 1.22$, $SE = 0.47$, 95% CI [0.30, 2.14]), and there were no significant differences in cause of loss between the Intermediate and No disturbance class ($B = 0.52$, $SE = 0.46$, 95% CI [-0.38, 1.42]) and between the Pervasive and Intermediate disturbance class.

Table 3

Probability of Item Endorsement for Posttraumatic Stress Symptoms for the Three-Class Solution for Sample 1 (n = 509)

Symptom	Overall symptom frequency		No disturbance class (40.9%)		Intermediate disturbance class (43.0%)		Pervasive disturbance class (16.1%)	
	<i>N</i>	%	Prob.	<i>SE</i>	Prob.	<i>SE</i>	Prob.	<i>SE</i>
Intrusions	217	43.1	.05	.02	.60	.04	.92	.04
Nightmares	57	11.2	.00	.00	.11	.02	.40	.06
Flashbacks	136	26.8	.02	.01	.37	.04	.62	.06
Emotionally distressed	163	32.1	.02	.01	.48	.04	.67	.06
Physically distressed	84	16.7	.00	.00	.15	.03	.61	.06
Avoid thoughts	78	15.4	.00	.00	.15	.03	.54	.06
Avoid activities	33	6.5	.00	.01	.04	.01	.28	.05
Amnesia	57	11.3	.01	.01	.13	.02	.33	.05
Loss of interest	136	26.9	.01	.01	.28	.03	.87	.05
Feeling detached	113	22.6	.01	.01	.21	.03	.80	.06
Restricted affect	79	15.7	.00	.00	.15	.03	.56	.06
Foreshortened future	142	28.1	.05	.02	.37	.04	.61	.06
Insomnia	232	45.8	.12	.03	.63	.04	.85	.04
Irritability	82	16.3	.01	.01	.17	.03	.51	.06
Difficulty concentrating	167	33.2	.02	.01	.41	.04	.89	.04
Hypervigilance	94	18.5	.03	.01	.17	.03	.60	.06
Startle response	52	10.3	.00	.00	.08	.02	.43	.06

Note. Prob. = probability estimate.

Remarkably, participants who endorsed intermediate levels of PTS formed the largest classes in Sample 1 (43.0%) and Sample 2 (39.9%). By comparison, some previous research indicated that most people (about 50% to 65%) exposed to potential traumatic events were assigned to a No disturbance class (Elklit et al., 2014; Steenkamp et al., 2012). Across both of our samples, the vast majority of the participants in the Intermediate disturbance class did not endorse all diagnostic symptom criteria for PTSD (as per *DSM-IV*) but reported significantly more symptoms than the participants in the No disturbance class. These participants can be considered as experiencing subthreshold PTSD (also termed sub-

clinical, partial, or subsyndromal PTSD). Importantly, such subthreshold PTSD has been associated with a host of negative outcomes, such as elevated depressive symptoms, heightened risk of suicide, substance abuse, increased use of health care utilization, and reduced social and occupational functioning (see for an overview Brancu et al., 2016). Furthermore, subthreshold PTSD has shown to be longstanding and may result in delayed-onset PTSD (Cukor, Wyka, Jayasinghe, & Difede, 2010; Smid, Mooren, van der Mast, Gersons, & Kleber, 2009). Compared with “full-blown” PTSD, less attention has been paid to assessment and treatment of subthreshold PTSD (Brancu et al., 2016; Steenkamp et al., 2012).

Table 4

Probability of Item Endorsement for Posttraumatic Stress Symptoms for the Three-Class Solution for Sample 2 (n = 331)

Symptom	Overall symptom frequency		No disturbance class (34.7%)		Intermediate disturbance class (39.9%)		Pervasive disturbance class (25.4%)	
	<i>N</i>	%	Prob.	<i>SE</i>	Prob.	<i>SE</i>	Prob.	<i>SE</i>
Intrusions	183	59.2	.15	.04	.72	.04	.99	.01
Nightmares	69	22.0	.00	.00	.16	.04	.60	.06
Flashbacks	109	35.3	.02	.01	.33	.05	.83	.04
Emotionally distressed	130	41.9	.06	.03	.41	.05	.90	.04
Physically distressed	103	33.2	.01	.01	.30	.05	.80	.05
Avoid thoughts	101	32.9	.08	.03	.35	.05	.63	.06
Avoid activities	55	17.6	.00	.00	.15	.03	.45	.06
Amnesia	52	17.0	.00	.00	.11	.03	.50	.06
Loss of interest	140	44.6	.02	.02	.55	.05	.85	.04
Feeling detached	108	35.0	.00	.01	.34	.05	.85	.05
Restricted affect	99	31.8	.02	.02	.33	.05	.70	.05
Foreshortened future	123	39.2	.02	.01	.40	.05	.89	.04
Insomnia	175	56.1	.16	.04	.66	.05	.96	.02
Irritability	114	36.3	.05	.02	.36	.05	.80	.05
Difficulty concentrating	154	49.0	.06	.03	.59	.05	.92	.03
Hypervigilance	103	32.9	.09	.03	.25	.04	.77	.05
Startle response	79	25.1	.02	.01	.14	.03	.72	.05

Note. Prob. = probability estimate.

Table 5
Parameter Estimates for the Latent Class Model With Covariates for Sample 1 ($n = 509$) and Sample 2 ($n = 319^a$)

Covariates	No vs. Intermediate disturbance class				No vs. Pervasive disturbance class				Intermediate vs. Pervasive disturbance class			
	B	SE (B)	95% CI	OR (95% CI)	B	SE (B)	95% CI	OR (95% CI)	B	SE (B)	95% CI	OR (95% CI)
Bereaved people (Sample 1)												
Gender (man vs. woman)	1.44	0.36	[0.73, 2.15]	2.58 [1.50, 4.43]	1.42	0.43	[0.58, 2.26]	2.46 [1.15, 5.23]	-0.02	0.46	[-0.92, 0.88]	0.95 [0.42, 2.14]
Kinship to the deceased												
(other vs. child/spouse)	0.91	0.24	[0.44, 1.38]	2.27 [1.20, 2.60]	0.63	0.31	[0.02, 1.24]	1.71 [1.02, 2.85]	-0.28	0.30	[-0.87, 0.31]	0.97 [0.59, 1.60]
Time since loss (in months)	-0.04	0.01	[-0.06, -0.02]	0.96 [0.94, 0.98]	-0.06	0.01	[-0.08, -0.04]	0.94 [0.92, 0.97]	-0.02	0.01	[-0.04, 0.00]	0.98 [0.95, 1.01]
Educational level (university/college vs. other)	0.57	0.24	[0.10, 1.04]	1.76 [1.20, 2.60]	0.58	0.30	[-0.01, 1.17]	1.71 [1.02, 2.85]	0.02	0.29	[-0.55, 0.59]	0.97 [0.59, 1.60]
Cause of loss (natural vs. homicide/suicide/accident)	0.11	0.50	[-0.87, 1.09]	2.27 [1.07, 4.81]	0.64	0.51	[-0.36, 1.64]	4.25 [1.86, 9.72]	0.53	0.40	[-0.25, 1.31]	1.87 [0.94, 3.75]
Unexpectedness	0.36	0.09	[0.18, 0.54]	1.43 [1.26, 1.60]	0.49	0.10	[0.29, 0.69]	1.63 [1.44, 1.82]	0.13	0.09	[-0.05, 0.31]	1.14 [0.96, 1.32]
Homicidally bereaved people (Sample 2)												
Gender (man vs. woman)	0.63	0.31	[0.02, 1.24]	1.87 [1.10, 3.16]	1.44	0.40	[0.66, 2.22]	4.26 [2.17, 8.36]	0.81	0.40	[0.03, 1.59]	2.27 [1.15, 4.47]
Kinship to the deceased												
(other vs. child/spouse)	0.43	0.30	[-0.16, 1.02]	1.22 [0.73, 2.04]	0.85	0.39	[0.09, 1.61]	1.58 [0.88, 2.83]	0.42	0.36	[-0.29, 1.13]	1.30 [0.73, 2.30]
Time since loss (in years)	-0.08	0.02	[-0.12, -0.04]	-93 [0.88, 0.98]	-0.14	0.05	[-0.24, -0.04]	0.87 [0.78, 0.97]	-0.06	0.05	[-0.16, 0.04]	0.94 [0.85, 1.03]

Note. CI = confidence interval; OR = odds ratio. Differences between a specific class and the reference class was considered significant ($p < .05$) when zero was not included in the 95% CIs for the regression coefficients (B).

^a Because of missing data on the correlates of class membership, the sample size is not $n = 331$ but $n = 319$.

The second aim of the study was to examine sociodemographic and loss-related correlates of class membership. As expected, in both samples, we identified several characteristics that significantly distinguished the classes with intermediate and/or pervasive PTS disturbance from no PTS disturbance (i.e., being a woman [vs. man], more closely [vs. distantly] related to the deceased person, more recently [vs. remotely] bereaved, and in Sample 1 only, having a lower [vs. higher] educational level, and experiencing the loss as more unexpected [vs. expected]). Previous research also suggests that women reported more pervasive PTS compared with men (Tolin & Foa, 2006). This might be explained by, among others, differences in emotion regulations strategies (e.g., women tend to ruminate more than men; Nolen-Hoeksema, 2012) and neurobiological responses to stress (Bangasser & Wicks, 2017). The death of a partner or child (vs. some other relative) is a frequently reported risk factor for psychopathology following loss. The reason for this may be that a spouse and/or child played the most prominent role in the daily lives of the bereaved and their death is therefore more difficult to adjust to. It has also been frequently shown that as time goes by, people adapt to the loss (Galatzer-Levy & Bonanno, 2012; Mancini, Bonanno, & Clark, 2011). Having a lower educational level was also related to more pervasive levels of PTS. There are at least two explanations for this finding. First, persons with a lower educational level may experience more difficulties with performing cognitive tasks. In cognitive-behavioral theories, cognitive processes (e.g., integration of the traumatic event into autobiographical knowledge) are considered critical for recovery (Boelen, van den Hout, & van den Bout, 2006; Ehlers & Clark, 2000). Second, previous studies have shown that a higher educational level is associated with higher levels of resilience; see for an overview of the literature Agaibi and Wilson (2005). Thus, those who are higher educated seem to be more capable of processing the deleterious consequences of a high-impact event.

In Sample 1 (people confronted with losses due to different causes), we explored whether cause and unexpectedness of the loss were related to class membership. We found that increased perceived unexpectedness seems to be more strongly associated with elevated PTS than the loss being unnatural/violent. This contrast with two earlier studies (Kaltman & Bonanno, 2003; Kloepe et al., 2014) but accords with other work showing that subjective unexpectedness of losses predict the severity of distress in their aftermath (Boelen, 2015; Valdimarsdóttir, Helgason, Fürst, Adolfsson, & Steineck, 2004). However, the small number of people exposed to unnatural/violent loss in Sample 1 (10%) may have limited the statistical power needed to find differences between classes with respect to cause of loss.

Noteworthy is that the Intermediate and Pervasive disturbance classes did not differ in terms of sociodemographic or loss-related variables that we examined, except for gender in Sample 2. This suggests that other variables than the ones we assessed in the current investigation account for differences between these two groups. For instance, cognitive-behavioral variables may be distinguishing features of the Intermediate and Pervasive disturbance class (cf. Boelen, Reijntjes, Djelantik, & Smid, 2016).

There are several limitations that should be taken into account while interpreting our findings. To start with, we used a cross-sectional design, which preclude us to draw conclusions about the stability of PTSD classes over time. Longitudinal assessment of

heterogeneity in emotional distress following trauma exposure, using latent transition analysis (see Forbes et al., 2016) or latent class growth analysis (Galatzer-Levy & Bonanno, 2012), could enhance meaningful insights into the nature and correlates of transitions/trajectories over time. In addition, a transdiagnostic approach, for instance by examining levels of general distress, quality of life, well-being, or functional impairment may also be valuable for examining similarities and differences in individual responses to potential stressful life events (cf. Infurna & Luthar, 2017). Furthermore, adding indicators of related constructs, for example, depression and prolonged grief (Armour et al., 2015; Boelen, Reijntjes, et al., 2016; Lenferink, de Keijser, et al., 2017), could be used to examine the differences and similarities in psychological symptoms following loss. Unlike other LCA studies among trauma samples (cf. Breslau et al., 2005), we did not use clinical interviews but a self-report measure to assess PTSD. It would be useful for future research to use clinical interviews to examine latent classes of PTS following loss, given that clinical interviews provide more accurate assessment of symptoms and estimates of PTSD prevalence rates (Engelhard et al., 2007). Second, for Sample 2, the PTSD measure did not specifically refer to the homicidal loss; instead participants were asked to write down the most upsetting event they were bothered by during the past month. Two-hundred-four people wrote down an event, of which 169 described a homicide-related event. Previous studies using the same sample indicated that only including this subgroup ($n = 169$) did not yield meaningful differences in the results (Boelen, van Denderen, et al., 2016; Lenferink, van Denderen, de Keijser, Wessel, & Boelen, 2017). Third, we used community samples. Our results may therefore not be generalizable to all (homicidally) bereaved people. Lastly, we assessed PTS in accordance with *DSM-IV* criteria; because the PTSD criteria were modified in the *DSM-5* (American Psychiatric Association, 2000, 2013), our results may not generalize to studies using *DSM-5* PTSD criteria. Also another change in the *DSM-5* has been made regarding the event criterion of PTSD. More specifically, being confronted with an event that involved the actual death of others and resulted in "intense fear, helplessness, or horror" (pp. 467), is considered a traumatic event that could lead to PTSD, according to the *DSM-IV-TR* (American Psychiatric Association, 2000). The fifth edition of the *DSM* narrowed this description by no longer qualifying the death of a loved one as potentially traumatic, unless the death was caused by violence or an accident (American Psychiatric Association, 2013). Bereaved people whose loved one did not die due to violence or accident (i.e., 90% of Sample 1) would formally therefore not meet the *DSM-5* PTSD criteria.

Notwithstanding these limitations, our findings may have several treatment implications. Current treatments for bereavement-related distress mostly focus on prolonged grief symptoms, but are often not specifically developed to target PTSD symptoms (Smid et al., 2015). Our finding that 16% of the participants in Sample 1 and 25% of Sample 2 were assigned to the Pervasive disturbance class, supports the efforts of developing treatments to target both prolonged grief and comorbid PTSD symptoms in bereaved people (Smid et al., 2015; van Denderen et al., 2018). Furthermore, our finding that intermediate PTS levels are the modal response following loss, indicates that it is useful to develop interventions that could prevent the escalation of subthreshold PTSD to full-blown PTSD. For example, previous studies among traumatized and

bereaved samples with subthreshold and above threshold PTSD have shown that engagement in an online cognitive-behavioral therapy led to significantly greater reduction in PTSD, but also in depression and anxiety levels, compared with getting no treatment (Knaevelsrud & Maercker, 2007; Wagner, Knaevelsrud, & Maercker, 2006). These effects seemed to sustain 18 months posttreatment (Knaevelsrud & Maercker, 2010; Wagner & Maercker, 2007). Although the interventions evaluated in these trials were not particularly developed to reduce subthreshold PTSD levels, it seems fruitful to further examine the effectiveness of online treatment for subthreshold PTSD in bereaved people.

In sum, in line with previous LCA studies among trauma samples, our findings support the heterogeneity in PTS among people exposed to the loss of a loved one. In the sample of bereaved people as well as in the sample of homicidally bereaved people, the LCA revealed three classes that are distinguishable with respect to severity of PTS. Furthermore, our findings indicate that membership of classes with more pervasive disturbances in PTS can be predicted based on sociodemographic and loss-related characteristics. There is evidence that subclinical PTSD is associated with negative outcomes. Because this seems to be a relative large group in the current study, it is useful to further our knowledge about underlying variables and treatment of subclinical PTSD disturbance.

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