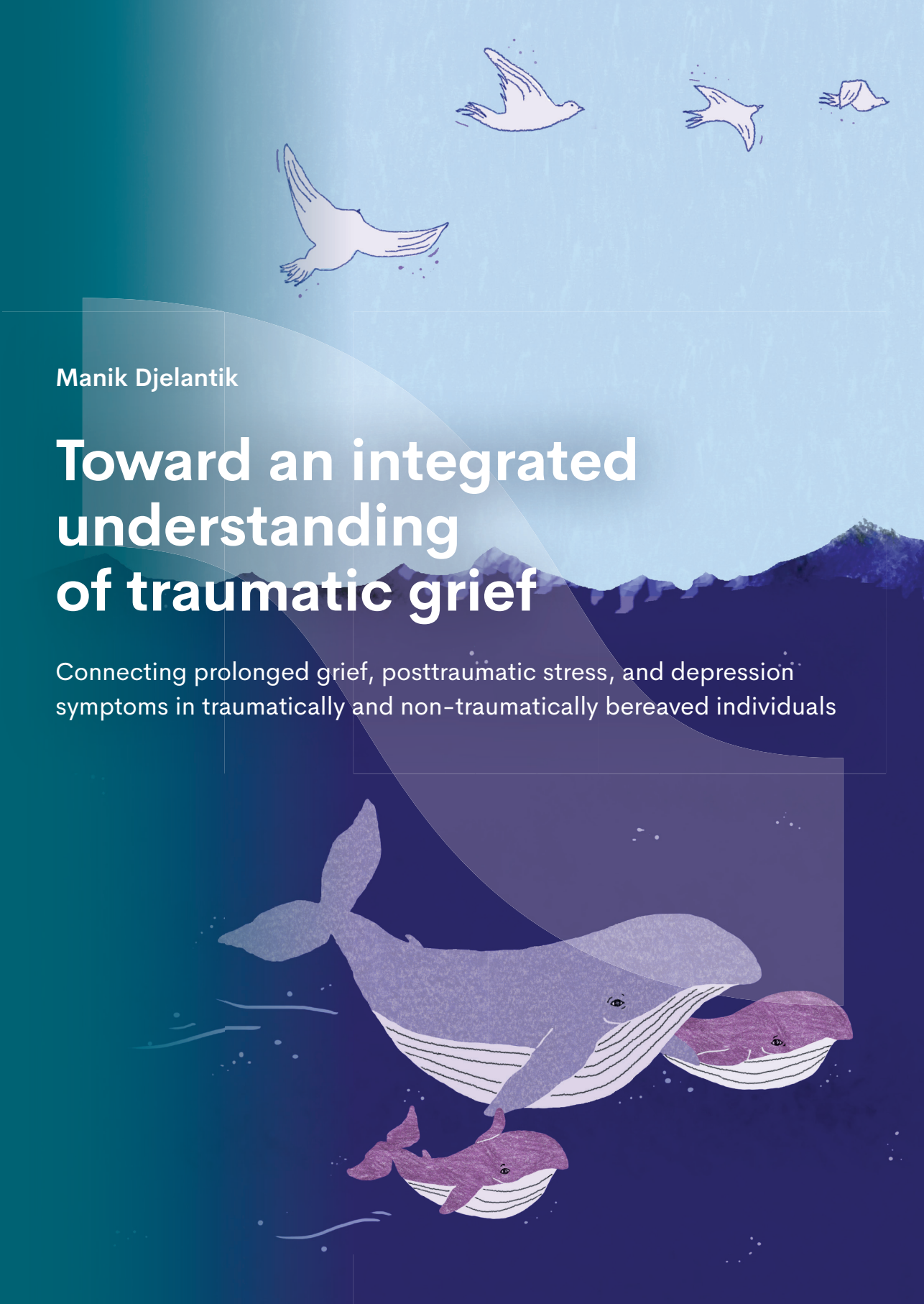
Manik Djelantik

Toward an integrated understanding of traumatic grief

Connecting prolonged grief, posttraumatic stress, and depression symptoms in traumatically and non-traumatically bereaved individuals



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Manik Djelantik

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Traumatic grief:
Connecting prolonged grief, posttraumatic stress, and depression symptoms in traumatically and non-traumatically bereaved individuals

Traumatische rouw:
De samenhang tussen symptomen van gecompliceerde rouw, posttraumatische stress en depressie bij nabestaanden na traumatische en niet-traumatische verliezen
(met een Nederlandse samenvatting)

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Voor mijn dochters

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Chapter 1

General introduction

General introduction

A historical event: The Cocoanut Grove fire

It was a lively Saturday night 28 November 1942. More than a thousand people were enjoying a deserved night out in one of Boston's hottest clubs, which was decorated in a tropical theme with palm trees. In the middle of the party, a fire started and the club quickly became filled with flames and toxic gasses. Guests panicked and tried to escape. Unfortunately, the emergency exits were locked and many guests died in their attempt to get out. In the following days, news spread that this disaster had cost 492 lives. Many of the survivors had lost a loved one in the fire (Boston Fire Historical Society, 2016; Frumkin & Robinaugh, 2018)

Problem definition: Grief or traumatic stress?

Historical perspective

Psychiatrist Erich Lindemann, based at the Massachusetts General Hospital (MGH) in Boston, became interested in how people would cope with such a shocking experience. He initiated a study in which he interviewed survivors who had lost a loved one in the fire and asked them about their psychological symptoms. He found a surprisingly common reaction of distress among the participants, characterised by 'intense emotional pain', 'preoccupation with thoughts about the death', 'avoidance of grief-related emotions', and 'feelings of guilt and social isolation' (Lindemann, 1944). The publication of his findings has been the starting point for further studies. The reaction he described has been found in many other bereaved populations. Also, theories, have been derived to explain the development of this reaction e.g., Bowlby (1980) and Parkes (1965). Over the decades, this has resulted in a scientific discussion about the existence of a disorder characterized by complicated grief symptoms such as 'prolonged yearning', 'avoidance of reminders of the loss', 'difficulty accepting the death', and functional impairment (Prigerson, Shear, et al., 1999; Shear, Ghesquiere, & Glickman, 2013). Currently, the criteria sets of symptoms that have been included under the name of prolonged grief disorder (PGD) in the International Classification of Diseases 11th Revision (ICD-11) and persistent complex bereavement disorder (PCBD) in the fifth edition of the Diagnostic and Statistical Manual (DSM-5) show strong similarities with the descriptions in the study of Lindemann (American Psychiatric Association, 2013; Killikelly & Maercker, 2017; World Health Organization, 2018).

At the same time and independent from Erich Lindemann, a second psychiatrist named Alexandra Adler also started a mental health research among the survivors of the Cocoanut Grove Disaster. She interviewed more than 100 survivors who were treated at the Boston City Hospital. Half of them had lost a loved one in the fire. Like Lindemann, she found a common psychological reaction among the survivors. However, unlike the psychological reaction of disturbed grief postulated by Lindemann, the reaction she described was characterised by 'traumatic distress and anxiety', 'terrifying nightmares', 'preoccupying thoughts about the event', 'irritability', 'depressed mood' and 'feelings of guilt' (Adler, 1943). Her work was also highly influential for further research. It is known as one of the first studies systematically describing the symptoms of the later developed diagnosis of posttraumatic stress disorder (PTSD) in a civilian population (American Psychiatric Association, 1980).

The disturbances described by Lindemann and Adler include partly the same symptoms, but also seem to reflect two different perspectives on psychological distress following war, disaster or violence, and loss; the first perspective focused on loss (and consequently grief and separation distress) and the second perspective focused on the confrontation with extreme stress (trauma). Since then, many more scientists have written about the relationship between grief and posttraumatic distress. In the 1970s, Mardi Horowitz, introduced the theory of stress response syndromes (Horowitz, 1976). In this theory, he stated that a stressor on itself may evoke mental health issues, regardless of pre-existing factors like personality features or prior mental health issues. Remarkably, Horowitz initially mentioned loss of a loved one as one type of stressor which could cause this general stress response syndrome without specifying grief as a distinct form of traumatic distress. Later, he developed criteria for pathological grief as a distinct syndrome (Horowitz, 1986; Horowitz, Bonanno, & Holen, 1993).

Several scholars (Raphael & Martinek, 1997; van den Bout & Kleber, 2013) have argued that trauma and bereavement are in nature related events with relatively similar psychological reactions, while other researchers, e.g., Stroebe and Schut (1999), have emphasised the differences between the two phenomena. However, in the case of loss due to war, disaster and other extreme experiences, researchers found evidence that a mixture of pathological grief and traumatic distress may occur (Green, 2000; Rando, 2000). Stroebe, Schut, and Finkenauer (2001) introduced a conceptual framework and research agenda to conduct empirical studies to define the differences and similarities between PTSD and normal and pathological grief considering different characteristics such as the type of event, the impact intensity, the disturbances, and assessment. Recently, Frumkin and Robinaugh (2018) published an elaborate overview of reviews written

about the intersection of grief and trauma. They concluded that a comprehensive understanding for this intersection was not yet available and made a call for more research on this subject.

In addition, other researchers and clinicians have considered the disturbances after traumatic and non-traumatic losses in terms of major depressive disorder, e.g., Galatzer-Levy and Bonanno (2012), Clayton (1990) and Hensley (2006). This seems logical, because depression symptoms like 'depressed mood', 'feeling worthless', and 'suicidal ideation' are also commonly present in the bereaved individual in the first period after losing a loved one (Prigerson, Frank, et al., 1995).

While reading about this scientific debate, the following questions arose in our minds. How do posttraumatic and prolonged grief influence each other over time? And how are depressive symptoms connected with these two types of distress? Is a traumatic loss the only risk factor to develop both types of distress? Is it possible to identify bereaved individuals at risk for psychopathology? And what does this mean for clinicians and researchers working with individuals affected by bereavement and trauma? Should psychological assessment and treatment focus more on grief or on posttraumatic stress or on depression? In this dissertation, empirical findings towards answering these questions are presented. Furthermore, in so doing, we will try to establish a more integrated understanding of the similarities and differences between the types of serious distress following bereavement.

The disorder of disturbed grief is currently known under several different names, among others, 'prolonged grief disorder' (World Health Organization, 2018), 'persistent complex bereavement disorder' (American Psychiatric Association, 2013). 'complicated grief' (Shear, 2015), 'pathological grief' (Stroebe et al., 2000) and 'traumatic grief' (Prigerson, Shear, et al., 1999). For clarity and consistency in this dissertation, we will refer to all conceptualizations of disturbed grief as prolonged grief disorder (PGD) and to the full spectrum of psychopathology following bereavement (including PGD, PTSD, and depression) as traumatic grief. Furthermore, in the scientific literature: 'traumatic loss', 'unnatural cause of death', and/or 'violent loss' are mostly used interchangeably when trauma and loss events are discussed. We have chosen to refer to 'traumatic loss'; when we discuss the broad spectrum of all unnatural and/or violent death causes in the introduction and general discussion. Additionally, we will explain the term and definition of traumatic loss used in each chapter separately.

A clinical case example: Hanna

Hanna is 29 years old. She lives with her boyfriend and works as a freelance journalist. Hanna's brother, Peter, died a few years ago under difficult circumstances. Peter was working as a social worker in a forensic rehabilitation institution in a disadvantaged neighborhood. One day, one of his clients, while possibly having a psychotic episode, stabbed him and ran over his body with a car. Hanna has had much difficulty accepting her brother's death. Peter was a great support and Hanna longs for him every minute of the day. Hanna blames herself for not having prevented the murder by being more forceful in convincing him to change jobs. She even feels that she may be partly responsible. Hanna has horrific images of the moments Peter died – especially the moment when, possibly still alive, he was run over by the car. Hannah rationally knows that Peter will never return but, emotionally, cannot accept that she will never see him again. Hanna avoids looking at pictures of her brother and constantly ruminates about 'why this had to happen'. She has difficulties sleeping and has nightmares almost every night. This makes her feel depressed and tired almost every day. She is irritable and fights often with her boyfriend. Ever since Peter died, life has lost its meaning and Hanna hardly engages in social and work-related activities. Her boyfriend has asked her to marry him, but she feels she is not able to make plans or decisions for the future.

Before the death of her brother, Hanna did not have a history of mental health issues and did not have any other medical conditions. Hanna and Peter had a strong bond, especially because their parents divorced when they were young and they had been supporting each other through this difficult period. There are no other childhood traumas. In the last two years since his death, she exhibited behaviours consistent with burnout and was diagnosed with posttraumatic stress disorder (PTSD) by her general practitioner. She received eye movement desensitizing and reprocessing (EMDR) treatment in a private psychology practice and took citalopram for one year prescribed by the general practitioner. These interventions worked insufficiently.

Note. This case is a composite of several cases the author encountered in the clinical training to become a psychiatrist and inspired her to start studying traumatic grief.

Clinical perspective

In this clinical case description, one may recognise symptoms of PGD, PTSD, and major depressive disorder (MDD) (Table 1). The symptoms of PGD include 'preoccupation with the deceased', 'preoccupation with the circumstances of the death', 'avoidance of death-related reminders', 'persistent yearning/longing for the deceased', 'intense sorrow and emotional pain', 'self-blame', 'difficulty to pursue interests since the loss or to plan for the future', 'feeling that life is meaningless or empty without the deceased', 'confusion about one's role in life', 'difficulty accepting the death'. The symptoms of PTSD include 'recurrent, involuntary, and intrusive distressing memories of the trauma', 'recurrent distressing dreams', 'intense or prolonged psychological distress at exposure to reminders of the trauma', 'avoidance of trauma-related reminders', 'the persistent negative state of emotions', 'loss of interest in significant activities', 'distorted cognitions that lead to blaming oneself or others', 'persistent negative beliefs or expectations about oneself, others or the world', 'irritability', and 'difficulty sleeping'. The symptoms of MDD include 'depressed mood', 'diminished interest in activities', 'feelings of excessive guilt', 'sleeping problems', 'fatigue', and 'indecisiveness'.

Clinicians are used to first diagnosing a patient and, subsequently, deciding on the most suitable treatment. However, if one began by diagnosing this patient following the guidelines of the DSM-5, one would encounter the following contradictions. In the criteria for PCBD (American Psychiatric Association, 2013), it is explicitly mentioned that, in order to be diagnosed with this disorder, the individual is not allowed to be diagnosed with PTSD at the same time. Simple or natural bereavement does not serve as a criterion for PTSD (American Psychiatric Association, 1980, 2000, 2013). In the chapter about MDD, the DSM-5 states that a significant loss (i.e., loss of a loved one, financial loss, loss of employment, etc.) may produce symptoms that could look like a depression and that a diagnosis of MDD next to a normal reaction to grief must be considered only with great care (American Psychiatric Association, 2013). When we follow the guidelines of the DSM-5 (American Psychiatric Association, 2013) we would possibly diagnose our case example with PTSD, even though – in terms of severity – the PCBD symptoms seem to be higher compared to the PTSD symptoms. Actually, the psychopathologies described above, although considered as emanating from three disparate disorders, seem to fall under the single rubric of a condition one might term 'general post-loss syndrome'. There is relatively scarce research aimed at providing guidelines for clinicians about how to understand, assess and treat severely distressed and grieving patients, who present with symptoms that do not fall clearly into the classifications of PGD, PTSD, or depression.

Table 1. Symptoms of prolonged grief disorder, posttraumatic stress disorder and major depressive disorder as enumerated in the DSM-5

	Prolonged grief disorder	Posttraumatic stress disorder	Major depressive disorder
Emotion and mood	Persistent yearning/longing for the deceased. Intense sorrow and emotional pain. Bitterness or anger related to the loss. [Disbelief or] emotional numbness over the loss.	Persistent negative emotional state. Loss of interest in significant activities. Persistent inability to experience positive emotions.	Depressed mood most of the day, nearly every day. Markedly diminished interest or pleasure in all, or almost all, activities.
Memories and thoughts related to the death and the deceased	Preoccupation with the deceased. Preoccupation with the circumstances of the death. Difficulty with positive reminiscing about the deceased.	Recurrent, involuntary, and intrusive distressing memories of the trauma. Recurrent distressing dreams related to the trauma. Dissociative reactions (e.g., flashbacks). Intense or prolonged psychological distress at exposure to reminders of the trauma. Marked physiological reactions to reminders of the trauma. Inability to remember important aspects of the trauma.	
Avoidance	Excessive avoidance of reminders of the loss (e.g., individuals, places, or situations associated with the deceased).	Avoidance or efforts to avoid distressing memories, thoughts, or feelings related to the trauma. Avoidance or efforts to avoid external reminders (people, places, situations).	
Thoughts and beliefs about oneself, one's future, or the world	Maladaptive appraisals about oneself (e.g., self-blame). Difficulty or reluctance to pursue interests since the loss or to plan for the future. Feeling that life is meaningless or empty without the deceased, or the belief that one cannot function without the deceased. Confusion about one's role in life, or a diminished sense of identity.	Distorted cognitions that lead to blaming oneself or others. Persistent and exaggerated negative beliefs or expectations about oneself, others, or the world.	Feelings of worthlessness or excessive or inappropriate guilt.

Alterations in arousal and reactivity		Verbal or physical aggression. Reckless or self-destructive behavior. Hypervigilance. Exaggerated startle response. Problems concentrating. Difficulty sleeping.	Diminished ability to think or concentrate, or indecisiveness. Fatigue or loss of energy. Insomnia / hypersomnia.
Difficulty accepting the loss	Marked difficulty accepting the death. Disbelief [or emotional numbness] over the loss.		
Suicidal thoughts	A desire to die in order to be with the deceased.		Recurrent thoughts of death, recurrent suicidal ideations, suicide attempts.
Social disconnection	Feeling alone or detached from others. Difficulty trusting others since the death.	Feeling detached or estranged from others.	
Physical symptoms			Significant weight loss or decrease or increase in appetite. A slowing down of thought and a reduction of physical movement.

Note. A prior version of this table (containing only the symptoms of PGD and PTSD) was published in Frumkin and Robinaugh (2018). We adapted the table with permission of the authors. Prolonged grief disorder is described in the DSM-5 under the name of persistent complex bereavement disorder. The categorisation of symptoms was done by the authors (i.e., Frumkin, Robinaugh and Djelantik) interpretation only and was not derived from statistical analyses.

Research gaps

In 2015, the time when this dissertation project started, most research on bereaved populations focused on one of the three disorders. And when studies examined the three disorders, research mostly focused the differences among PGD, PTSD, and depression in specific groups of bereaved individuals, rather than the co-occurrence and similarities of the symptoms in bereaved individuals (Boelen, van de Schoot, van den Hout, de Keijser, & van den Bout, 2010; Boelen & van den Bout, 2005; Boelen, van den Bout, & de Keijser, 2003; Lichtenthal, Cruess, & Prigerson, 2004; Maercker & Znoj, 2010; Prigerson, Frank, et al., 1995; Shear et al., 2011). We therefore have identified the following two broad research gaps, elaborated below, which we will address in this dissertation.

Consequences of traumatic loss

Most studies assessing psychopathology following unnatural losses have been carried out after specific events such as a large accident, e.g., Cardoso, Ferreira, Rocha, Leite, and Almeida (2017), a natural disaster, e.g., Hu, Li, Dou, and Li (2015), or a specific terrorism incident, e.g., Neria et al. (2007). If we were able to investigate the differences and similarities of prevalence rates and loss-related characteristics between studies assessing PGD following unnatural losses in a meta-analysis, we might be able to identify vulnerable groups of bereaved individuals. For example, it could be that a specific cause of unnatural death may yield a higher prevalence among its bereaved individuals.

In addition, there were some indications that PGD and PTSD symptoms may co-occur in traumatised refugees with multiple losses (Nickerson et al., 2014). Furthermore, Smid, Kleber, et al. (2015) had published a theoretical article about the treatment of psychopathology following traumatic losses. They argued that an unnatural or violent loss leads to comorbid PTSD and PGD in bereaved individuals. As far as we knew, this statement had not yet been tested in an empirical study. Furthermore, it was not yet known whether other sociodemographic and/or loss-related characteristics would predict a co-occurrence of PTSD and PGD symptoms in bereaved individuals as well. This knowledge could help clinicians to identify subgroups of bereaved individuals who will be more at risk to develop co-morbid mental health disorders and may be helpful to design tailored therapeutic interventions.

Traumatic grief: The co-occurrence and relationships of PGD, PTSD and depression symptoms in bereaved Individuals

At the time of the start of this dissertation, there was only limited information about the development of PGD symptoms over time and which symptoms, in the first year following loss, might predict a pervasive trajectory. There had been several studies investigating trajectories of symptom levels following bereavement, but they had been carried out in samples with children (Melhem, Porta, Walker Payne, & Brent, 2013) or had investigated depressive, as opposed to PGD, symptoms (Maccallum, Galatzer-Levy, & Bonanno, 2015). More detailed information regarding this matter could further help caregivers and policymakers design appropriate strategies for identifying and improving mental health in individuals following bereavement.

In the first decade of this century, factor-analytic studies (Boelen et al., 2010; Boelen & van den Bout, 2005; Boelen et al., 2003; Prigerson, Frank, et al., 1995) showed that symptoms of PGD, PTSD, and depression were distinguishable syndromes in bereaved individuals. Furthermore, it has been reported (Boelen

& Prigerson, 2007; Silverman et al., 2000) that PGD is more strongly associated with elevated impairment than it is with PTSD or depression, respectively. The prevalence of PGD following natural loss, such as diseases and older age was estimated to equal about 10% (Lundorff, Holmgren, Zachariae, Farver-Vestergaard, & O'Connor, 2017). The prevalence of PTSD following unexpected deaths, including violent deaths and/or sudden deaths, was estimated at approximately 5% (Atwoli et al., 2017) and the prevalence of depression following the death of a partner was found to be 20% at 2 months and 14% at 7 months (Zisook, Paulus, Shuchter, & Judd, 1997). There was not much information yet about the co-occurrence of symptoms in bereaved individuals or possible temporal and causal relationships between the symptoms.

Some authors have argued that PTSD symptoms could develop into PGD symptoms (Nakajima, Ito, Shirai, & Konishi, 2012; Raphael & Martinek, 1997). It makes intuitive sense that the presence of PTSD symptoms after loss may impair the processing of the loss itself, thereby prolonging grief symptoms. However, one other study (O'Connor, Nickerson, Aderka, & Bryant, 2015) found the opposite, namely that PGD symptoms may prelude PTSD symptoms over time. Studies in other samples are needed to further elucidate the relationships among PGD, PTSD, and depression.

Different specific treatments for, respectively, depression, PGD, and PTSD (Boelen, 2006; Zisook & Shear, 2009) have been developed, and there is evidence that treatments designed for depression are less effective in reducing PGD than are those that specifically target PGD (Shear et al., 2014). Smid, Kleber, et al. (2015) suggested that the following processes may contribute to the development of PGD with comorbid PTSD and depression following unnatural losses: inadequately integrating the memory of the traumatic loss, negative appraisal of the traumatic loss, sensitivity to matching triggers and new stressors, and attempting to avoid distress. Based on existing evidence-based treatment interventions, they developed a treatment targeting these processes, called brief eclectic psychotherapy for traumatic grief (BEP-TG), which was found to be feasible in a sample of 16 refugees for PTSD symptoms (de Heus et al., 2017). However, this treatment was not further evaluated yet within refugee populations.

Adaptation to loss and trauma does not occur in a vacuum. It is very likely that this is affected by the cultural context (Kleber, 1995). Most research on the development of psychopathology following bereavement had been carried out in samples of western participants or in western societies. This made it relevant to investigate the prevalence rate and occurrence of PGD, PTSD and depression symptoms more closely in a society with different notions and rituals around loss and bereavement and examine probable associations.

Methodology

While designing and conducting these studies, we became increasingly aware of the importance of an overarching more theoretical question: What would be a suitable view or approach to psychopathology to better understand the similarities and differences of symptoms connected to PGD, PTSD, and depression better? We are aware that there are many approaches to understanding psychopathology, some more statistical, others more conceptual. It is beyond the goal of the dissertation to present them all (Borsboom, 2008; Insel et al., 2010; Wakefield, 1992a, 1992b). However, in the following section, we briefly summarize the approaches to psychopathology that we use in this dissertation.

The latent construct approach: categorical view

This approach is the most common understanding of mental disorders in current psychiatry. The latent construct approach assumes that a latent disease entity is responsible for a specific group of symptoms. A well-known example is the symptom 'spitting blood' in a patient with a lung tumor. In this example the lung tumor is the underlying reason for and the latent disease entity behind the fact that the patient spits blood (Borsboom, 2008; Borsboom & Cramer, 2013). In the case of PGD, symptoms like 'persistent yearning', 'emotional pain' and 'grief-related avoidance' are considered to serve as indicators of the underlying disease/disorder PGD. The latent PGD entity is the common cause that these symptoms (i.e., 'yearning', 'emotional pain', and 'grief-related avoidance') are seen in a patient as a coherent syndrome (Robinaugh, LeBlanc, Vuletich, & McNally, 2014).

The classification of mental disorders by the American Psychiatric Association in the Diagnostic and Statistical Manual of Mental Disorders uses this latent construct approach. In clinical research, the approach is used in the following ways. First, one can study the existence of the latent disease entities or disorders. This means that you divide a study population in participants who do experience the full disorder and those who do not experience the disorder. Following this, you could investigate which predictor is more common in one of the groups, for example: Dyregrov, Nordanger, and Dyregrov (2003); Saavedra Pérez et al. (2017). Secondly, one may study the separate symptoms and their correlation to the latent disease entity. This could be useful when examining the representativeness of a symptom for the latent disease entity, for example when validating a questionnaire or trying to define the cluster of symptoms that may represent the latent disease entity, for example: Boelen and van den Bout (2005); Prigerson et al. (2009).

The latent construct approach: dimensional view

Some patients may experience a mental disorder like PGD or PTSD with a high severity of symptoms and others with a low severity of symptoms. The dimensional view takes these differences into account and considers mental disorders along a continuum from low severity to high severity of symptoms. It assumes that the nature of symptoms connected to a latent disorder entity can be seen in healthy and well-functioning individuals and that the severity level of these symptoms increases in mental health care patients. When researchers use the dimensional view of psychopathology, they are able to investigate how predictors or interventions influence the symptom level or sum score of a specific disorder (Borsboom, 2008). This approach is quite common in clinical psychological research. Clinical researchers often use cut-off scores of the sum-score to be able to distinguish whether or not a patient critically suffers from a given mental health disorder (Boelen, Djelantik, de Keijser, Lenferink, & Smid, 2018; Holland, Neimeyer, Boelen, & Prigerson, 2009).

The latent grouping approach or person-centered approach

This statistical approach assumes an underlying grouping variable (i.e., latent class variable). This latent grouping variable cannot be observed but it can be inferred from the combination of symptoms an individual endorses. This will result in subgroups (or so called 'classes') of individuals sharing similar sets of symptoms. These classes may differ in the severity of symptoms, the nature of symptoms, or both the severity and nature of symptoms (Collins & Lanza, 2010; Lanza, Savage, & Birch, 2010; Lanza, Tan, & Bray, 2013).

Among the first researchers using this technique within the context of grief were Nickerson et al. (2014). They identified three classes of traumatised resettled refugees in Australia. There was a class with individuals with endorsement of both PTSD/PGD symptoms (16%), a predominantly PTSD class (25%), a predominantly PGD class (16%), and a resilient class (43%). The experience of multiple losses predicted membership of the co-morbid subgroup. This suggests that a trauma and loss experience might be a risk factor to develop both PGD and PTSD symptoms.

Causal systems

With this approach, mental disorders are seen as a network of mutually reinforcing symptoms that arise together in individuals with distress. The symptoms do not cohere as a result of an underlying cause but because each symptom influences the other symptom directly. A mental health disorder may consist of several central symptoms, i.e., symptoms with multiple and strong relationships with other

symptoms, and feedback loops, i.e., a group of symptoms that are more connected to each other than other symptoms in the network (Borsboom & Cramer, 2013; McNally et al., 2015). In the first network analysis of PGD, 'emotional pain' and 'thoughts of the death' were identified as central symptoms (Robinaugh et al., 2014). Furthermore, a positive feedback loop was found between the symptoms 'emotional pain', 'thoughts about the death' and 'grief-related avoidance'. This could be interpreted in the following way: thoughts about the death may cause emotional pain which, in turn, activates grief-related avoidance (Robinaugh et al., 2014). This approach does not require a latent entity or conceptualisation of a mental health disorder.

Aims of this thesis

This dissertation aims to increase our understanding of the development and treatment of psychopathology following bereavement in several explorative studies. We will first focus on traumatic loss and then will conduct a series of studies taking into account the probable co-morbidity of disturbed grief, posttraumatic stress disturbances and depression. Throughout this thesis we will use all four approaches to psychopathology described above.

In the second chapter of this thesis we will attempt to estimate a pooled prevalence of PGD in individuals bereaved due to unnatural causes. Therefore, we perform a literature search to summarise all published scientific evidence. Additionally, we will attempt to explain heterogeneity with a multivariate meta-regression analysis.

In Chapter 3, we will investigate which symptoms of PGD, PTSD, and depression are likely to co-occur in individuals following bereavement in a Dutch community sample with latent class analyses. Additionally, we will investigate whether or not bereaved individuals following a violent loss are more likely to endorse a more co-morbid profile of PGD, PTSD and depression.

In Chapter 4, the aim is to find trajectories of PGD symptoms along the first two years following bereavement and to explore which symptoms are especially important for the prediction of the development of adverse trajectories. We therefore will conduct latent class analyses to identify classes of bereaved individuals with similar trajectories of PGD symptoms. Next, we will use Receiver Operating Characteristic (ROC) analyses to examine which symptoms at baseline best predicted membership of classes with problematic grief trajectories.

Subsequently, in Chapter 5, we will examine the temporal relationship between PGD and PTSD symptoms more closely. We will examine whether PGD and PTSD

symptoms occur simultaneously over time or, alternatively, that one cluster of symptoms may precede the other cluster of symptoms with a cross-lagged analysis.

In Chapter 6, we explore the co-occurrence of symptoms in a clinical sample. We will examine the present psychopathology both with latent-class analyses and network analyses to closely investigate the relationships between the symptoms of PGD, PTSD, and depression and examine the influence of loss-related variables on specific symptoms. In this way, we hope to detect novel mechanisms that could be used in psychological treatments.

In Chapter 7, we will evaluate a treatment that explicitly deals with grief and posttraumatic stress symptoms in bereaved refugees at the same time (Smid, Kleber, et al., 2015). Furthermore, because refugees may endorse many social challenges following their migration to the Netherlands, we analyse the relations between symptom change and post-migration stressors.

In Chapter 8, we will explore the endorsement of PGD, PTSD, and depressive symptoms among a sample of Balinese families bereaved by traffic accidents. We are especially interested to determine if there are similar occurrences of symptoms, as well as classes of bereaved individuals, as we found in Chapter 5 in the Dutch community. Further, we will explore cultural and religious factors that may influence the endorsement of symptoms.

Finally, in the discussion, we will make an effort to combine all insights and present a hypothesised, integrated understanding of the development, possible mechanisms of persistence, and treatment and decline of psychopathology over time in bereaved patients, taking into account PGD, PTSD, and depression symptoms.

Traumatic loss

Chapter 2

The prevalence of prolonged grief disorder in bereaved individuals following unnatural losses: Systematic review and meta-regression analysis

Djelantik, A. A. A. M. J., Smid, G. E., Mroz, A., Kleber, R. J., & Boelen, P. A. (2020). The prevalence of prolonged grief disorder in bereaved individuals following unnatural losses: Systematic review and meta-regression analysis.

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Abstract

Background
Previous research has indicated that one out of ten naturally bereaved individuals develops prolonged grief disorder (PGD). Less is known about the prevalence of PGD following unnatural deaths, such as accidents, disasters, suicides, or homicides. The aim of this study was to compute the pooled prevalence of PGD and to determine possible causes of its varied estimates.

Methods
A literature search was conducted in PsycINFO, Ovid Medline, PILOTS, Embase, Web of Science, and CINAHL. A meta-analysis using random effects models was performed to calculate the pooled prevalence rate of PGD. Multivariate meta-regression was used to explore heterogeneity among the studies.

Results
Twenty-five articles met eligibility criteria. The random-effects pooled prevalence was 49%, 95% CI [33.6, 65.4]. Death of only child, violent killings and non-western study location were associated with a higher PGD prevalence. A longer time since loss and a loss in a natural disaster were associated with a lower PGD prevalence.

Limitations
These findings should be interpreted with caution, because of the heterogeneity in study methodology.

Conclusions
This first meta-analysis of PGD following unnatural losses indicated that nearly half of the bereaved adults experienced PGD. This illustrates the importance of assessing PGD in individuals affected by loss and trauma.

Keywords
• prolonged grief • PGD, prevalence • bereavement • violent • disorder • trauma • traumatic • humans • meta-analysis

Highlights of this article

- This first meta-analysis of PGD following unnatural losses showed that nearly half of the bereaved adults experienced PGD.
- Death of only child, violent killings and non-western study location were associated with a higher PGD prevalence.
- A longer time since loss and a loss in a natural disaster were associated with a lower PGD prevalence.
- This illustrates the importance of assessing PGD in individuals affected by loss and trauma.

Introduction

Unnatural deaths include sudden and violent deaths, caused by accidents, suicides, homicides, as well as disasters, terror and war (Kristensen, Weisaeth, & Heir, 2012). In 2016, these causes of death approximately resulted in 2.7 million losses globally (Ritchie & Roser, 2018), leaving behind millions of bereaved family members and close friends. Several studies have indicated that unnatural deaths yield a larger risk for mental disorders in bereaved individuals than non-violent losses, such as prolonged grief disorder (PGD), posttraumatic stress disorder (PTSD) and major depressive disorder (MDD), e.g., Djelantik, Smid, Kleber, and Boelen (2017b); Farberow, Gallagher-Thompson, Gilewski, and Thompson (1992); Figley, Bride, and Mazza (1997); Kaltman and Bonanno (2003); Murphy et al. (1999).

Theoretically, unnatural losses may cause more mental health difficulties because of the disruption of positive and self-evident assumptions about the world (i.e., 'the world is a safe place') and due to more intrusive and negative memories. Both explanations indicate that unnatural deaths lead to difficulties in integrating the loss in the autobiographical memory of the bereaved individual (Boelen, Reijntjes, Djelantik, & Smid, 2016; Boelen, Van Den Hout, & Van Den Bout, 2006). PGD is known to be more strongly associated with impairment in daily life than bereavement-related PTSD or MDD (Boelen & Prigerson, 2007; Silverman et al., 2000). Furthermore, in comparison with existing treatments for MDD and PTSD, PGD appears uniquely responsive to grief-specific treatments (Shear, Frank, Houck, & Reynolds, 2005; Zisook & Shear, 2009). These findings underline even more the need to establish the prevalence of the condition in at-risk circumstances such as unnatural death. A recent meta-analysis by Lundorff et al. (2017) showed that one out of ten bereaved adults following a non-violent loss is at risk of developing PGD. Importantly, a meta-analysis of the prevalence of PGD following an unnatural loss has not yet been performed.

The core underlying characteristic of PGD is 'yearning for the deceased', whereas 'anxiousness' and 'depressed mood' are central to PTSD or MDD (Maercker & Znoj, 2010; Shear, 2015). Other core symptoms of PGD include 'avoidance of reminders of the death', 'difficulties accepting the loss', and 'significant impairment of daily functioning' (Boelen & Prigerson, 2007; Silverman et al., 2000). There is some debate about the time duration of symptoms before grief turns into disturbed grief. Recently, PGD has been included in the *International Classification of Diseases, 11th revision (ICD-11)* (Killikelly & Maercker, 2017; Prigerson et al., 2009; World Health Organization, 2018) with a time criterium of 6 months following bereavement. Similar concepts with slightly different criteria are called persistent complex

bereavement disorder (PCBD), included in the Fifth Edition of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) (American Psychiatric Association, 2013) and complicated grief (Shear, 2015) and include time criteria of 12 and 6 months following bereavement, respectively. There is also an ongoing discussion about which criteria best describe the phenomenon of pathological grief (Boelen, Lenferink, Nickerson, & Smid, 2018; Cozza et al., 2019; Maciejewski, Maercker, Boelen, & Prigerson, 2016; Mauro et al., 2017). For consistency, we will use the term PGD for all conceptualizations of disordered grief in this paper.

Investigating the heterogeneity of the studies in a meta-analysis, such as the degree to which the prevalence is influenced by the precise cause of death, can help to identify the most vulnerable group of bereaved individuals. Studies investigating PGD prevalence after unnatural losses have mostly been conducted in homogeneous samples, such as individuals who lost loved ones in a large accident, e.g., Cardoso et al. (2017), a natural disaster, e.g., Hu et al. (2015), or a specific terrorism incident, e.g., Neria et al. (2007). However, substantial heterogeneity in PGD prevalence rates can be expected across studies due to differences in study methodology, sample demographic features, and loss-related characteristics.

Several reviews have discussed predictors and correlates of PGD in both non-violent and unnatural bereaved populations (Boelen, Lenferink, et al., 2018; Hibberd, Elwood, & Galovski, 2010; Kristensen, Weisaeth, et al., 2012; Lobb et al., 2010). In one of the most recent reviews about correlates of PGD following a violent loss, a meta-analysis was conducted in which significant effect sizes were found with regard to the following correlates: comorbid psychopathology, suicidality, rumination, the relationship with the deceased, exposure to earlier traumatic events, age and prior history of counselling (Heeke, Kampisiou, Niemeyer, & Knaevelsrud, 2019). However, because each reviewed study assessed different sets of correlates, only univariate analyses were possible. More knowledge about predictors for PGD in unnatural bereaved populations may improve decision-making regarding the development of appropriate strategies for identifying and improving mental health problems after unnatural loss.

The purpose of this meta-analysis was to estimate a pooled-prevalence of PGD in individuals bereaved due to unnatural causes. Therefore, we performed a literature search to summarize all published scientific evidence. Additionally, we explained heterogeneity with a multivariate meta-regression analysis.

Methods

Literature search strategy

The meta-analysis was performed and reported in accordance with the PRISMA guidelines for systematic reviews and meta-analyses (Moher, Liberati, Tetzlaff, & Altman, 2010). The protocol was registered in PROSPERO – an international prospective register for review protocols – in January 2018 (registration number CRD42018084631).

The literature search was conducted using the following databases: PsycINFO, Ovid Medline, PILOTS, Embase, Web of Science, and CINAHL, and was completed on December 5, 2017. The search strategy was designed in accordance with the Population, Intervention/Interest, and Outcome (PIO) principles (WHO, 2014). The following PIO was formulated: population: *adults*; intervention/interest: *bereavement due to unnatural loss*; outcome: *prevalence of PGD*. Subsequently, synonyms for the keywords *PGD*, *unnatural loss*, and *prevalence* were combined in the full search strategy (Supplementary Material A).

The abstracts of all the articles were imported to the online software Covidence (Covidence, 2016). Then, the eligibility of both the abstracts and full-text articles were independently reviewed by MD and AM using this software. After the records were screened based on the titles and abstracts, the abstracts of potentially eligible articles were reviewed by both reviewers and were excluded if both reviewers agreed that the eligibility criteria were not met. Thereafter, potentially eligible articles were full-text screened and reviewed to determine final eligibility. Subsequently, the 'related articles' function in PubMed was used to further explore the literature. In addition, all the articles that cited the included articles were screened using Scopus, and all reference lists were searched by hand in order to ascertain that no relevant articles were missed. Duplicates were excluded using Covidence.

Following both the title and abstract screening as well as the full-text screening, the interrater agreement was evaluated using Cohen's Kappa statistic, κ (McHugh, 2012). During the title and abstract screening, the researchers disagreed on 326 (9%) papers yielding an interrater reliability of $\kappa = 0.64$ ($p < .001$), indicating substantial agreement. During the full-text screening, the researchers disagreed on 18 (5%) papers yielding an interrater reliability of $\kappa = 0.89$ ($p < .001$), indicating almost perfect agreement. All disagreements were discussed until both researchers agreed about the in- or exclusion.

Selection criteria

All original articles written in English examining the prevalence of PGD in bereaved individuals following unnatural losses were retrieved. To be eligible for inclusion, published studies had to be conducted on humans, and the participants' age had to be 18 years or older. As we were exclusively interested in bereaved individuals following unnatural losses, participants had to have suffered the loss of a loved one due to unnatural death causes. The PGD diagnosis had to be established using a standardized psychometric instrument or clinical interview based on the criteria of a PGD conceptualization (see Table 1 for the assessment tools we have found for PGD in the included studies of this meta-analysis). Finally, because we were specifically interested in the prevalence of the disorder, the studies had to provide a prevalence estimate of PGD or other data that could be used to calculate prevalence estimates.

We excluded the following studies: studies with participants below 18 years of age, studies including patients/mental health service users, and studies focusing on other forms of loss than bereavement due to unnatural loss. Studies including both natural and unnatural deaths or other mixed groups were only included if data about the outcome of interest could be retrieved. All intervention studies and non-empirical studies (e.g., reviews and commentaries) were also excluded.

Table 1. Assessment tools used in the included articles

Assessment instrument	Author (year)	Number of items	Recommended cut-off score	Time criterion	Outcome
PG-13	Prigerson et al. (2008)	13	Criteria-based	6 months	Prolonged grief disorder
ICG	Prigerson et al. (1995)	19	>25	6 months	Complicated grief
ICG-R	Prigerson et al. (2001)	34	Criteria-based	6 months	Prolonged grief disorder
Criteria set for diagnosing complicated grief	Prigerson et al. (2004)	9	Criteria-based	6 months	Complicated grief
BGQ	Ito et al. (2012)	5	>8	12 months	Complicated grief

Note. BGQ: Brief Grief Questionnaire; ICG: Inventory of Complicated Grief; ICG-R: Inventory of Complicated Grief Revised; PG-13: Prolonged Grief-13.

Quality assessment and risk of bias

To assess the included studies for possible risk of bias (RoB) and to rate the quality of evidence and study limitations, we used the risk of bias tool specifically developed for population-based prevalence studies (Hoy et al., 2012; Lundorff et

al., 2017). Using this tool helped us determine the overall strength of the evidence included in the meta-analysis. Each study was scored for potential risk of bias based on the number of criteria from the tool that were met. Studies with scores of 9-10 were considered to have low RoB, studies with scores of 7-8 were considered to have moderate RoB, and studies with scores of 6 or less were considered to have high RoB (Hoy et al., 2012). The risk of bias was evaluated and double-checked independently by MD and AM.

Data extraction

Information extracted from each eligible article included: the year of publication, country in which the study was conducted, sample size, number of bereaved individuals following unnatural losses eligible for the analysis, the diagnostic instrument used and the mean score, cut-off values used by the authors, terminology of the grief investigated, the age range and mean age of participants, cause of death, relationship to the deceased, years of education, time since loss, number of female participants, recruitment method, response rate, and the RoB score. The data-extraction was performed and double-checked independently by MD and AM.

Statistical analysis

First, the raw data were converted into event rates (ER), which are defined as the proportion of the occurrence of PGD in a certain study. The ERs were calculated with 95% confidence interval (CI) for each study. A random effects model was used, because of expected heterogeneity between the studies (Borenstein, Hedges, Higgins, & Rothstein, 2011; Egger, Davey-Smith, & Altman, 2008). When the included studies showed no events of PGD, thus when the outcome proportions were 0, 0.5 was added to both the ER and the sample size cell before applying the logit transformation (Harrer, Cuijpers, Furukawa, & Ebert, 2019; Smid, Mooren, van der Mast, Gersons, & Kleber, 2009).

Heterogeneity was assessed with the Cochran Q statistics for each analysis, where higher values suggest larger heterogeneity. In addition, the between-study heterogeneity was assessed by I2 statistics (Higgins, Thompson, Deeks, & Altman, 2003). To gain insight into potential causes of heterogeneity, we originally planned to conduct a subgroup analysis in the pre-registration. A subgroup analysis is a theory-driven approach in which correlates are assessed that are not necessarily present in all studies. However, the primary aim of our study was to gain insight into potential causes of heterogeneity of the prevalence rates and not to perform a comprehensive review about effect sizes of all possible correlates. Therefore,

shortly after the pre-registration we decided to change our additional analysis into a more data-driven multivariate meta-regression analysis. This approach would give us the possibility to explore the heterogeneity of the studies, while taking into account shared explained variance of the predictors (Smid et al., 2009). Only variables that were evaluated in all studies could be included using this approach. These variables were: months since loss, use of the Inventory of Complicated Grief (ICG; vs. other instruments), interview (vs. self-report questionnaire), female (vs. male) gender, sample mean age, high-income country (as defined as membership of the Organisation for Economic Co-operation and Development (OECD) vs non-members), cause of death in 4 categories (suicide, natural disaster, or intentional killing vs. accident), and death of only child (vs. all kinds of other relationships). Highly correlated predictors (i.e., $r \geq 0.8$) may cause overfitting of our meta regression model to our data. Therefore, before we included these predictors in the meta-regression analysis, we assessed the multicollinearity with an intercorrelation matrix (Harrer et al., 2019).

There is a chance that studies might exist that were not published because of the inadequate size and/or the lack of significance of the prevalence estimates. If this is the case, a meta-analysis of the published literature might be misleading. Therefore, to examine the publication bias, Egger's t statistics was used (Egger, Smith, Schneider, & Minder, 1997).

Finally, we tested the robustness of our findings with a permutation test in 1000 iterations. In this test, resampling methods are used to assess our meta regression model in slightly different datasets each time. After this, it recalculates the p-values of the predictors taking into account all iterations (Higgins & Thompson, 2004). All analyses were conducted using Rstudio (version 1.1.463) (RStudio Team, 2015) with the packages meta (G. Schwarzer, 2007), metafor (Viechtbauer, 2010) and dmetar (Harrer et al., 2019).

Results

Search results

The initial search identified 643 records in PsycINFO, 744 records in Ovid Medline, 425 records in PILOTS, 2078 records in Embase, 687 records in Web of Science, and 321 records in CINAHL. After exclusion of duplicates, 3556 records were screened based on the titles and abstracts. Thereafter, 375 studies were reviewed full-text for the inclusion or exclusion criteria. The screening process and the number of studies at each stage of the search are detailed in Figure 1. Eighty-five studies were excluded after the full-text review and 32 studies were finally considered for inclusion in the meta-analysis.

Subsequently, two articles were excluded because it was not possible to estimate the prevalence of PGD from the presented data (Boelen et al., 2016; Keesee, Currier, & Neimeyer, 2008). Another five articles were excluded from the main analysis because of sharing the same sample population with other articles (Huh, Huh, Lee, & Chae, 2017; Kristensen, Dyregrov, Dyregrov, & Heir, 2016; Kristensen, Weisæth, & Heir, 2009, 2010; Lenferink, van Denderen, de Keijser, Wessel, & Boelen, 2017; Seirmarco et al., 2012). In such cases, the studies with the highest number of bereaved individuals or studies providing the most relevant data were included. The characteristics of all 25 included studies can be found in Table 2 (Bartik, Maple, Edwards, & Kiernan, 2013; Cardoso et al., 2017; Dyregrov, Dyregrov, & Kristensen, 2015; Dyregrov et al., 2003; Harms et al., 2015; Hu et al., 2015; Kristensen, Heir, Herlofsen, Langsrud, & Weisæth, 2012; Kristensen, Weisæth, Hussain, & Heir, 2015; J. Li, Chow, Shi, & Chan, 2015; McDevitt-Murphy, Neimeyer, Burke, Williams, & Lawson, 2012; Mitchell, Kim, Prigerson, & Mortimer-Stephens, 2004; Morina & Emmelkamp, 2012; Morina, Rudari, Bleichhardt, & Prigerson, 2010; Morina, Von Lersner, & Prigerson, 2011; Neria et al., 2007; Prigerson, Bridge, et al., 1999; Schaal, Elbert, & Neuner, 2009; Shear, Jackson, Essock, Donahue, & Felton, 2006; Spooren, Henderick, & Jannes, 2001; Stammel et al., 2013; Tsutsui, Hasegawa, Hiraga, Ishiki, & Asukai, 2014; van Denderen, de Keijser, Huisman, & Boelen, 2016; Williams & Rheingold, 2015; Xu, Herrman, Bentley, Tsutsumi, & Fisher, 2014; Yun, Huh, Han, Huh, & Chae, 2018).

Study characteristics

The included studies were published between 1999 and December 2017. These studies comprised a total of 4774 participants (range n = 10 to 803) of whom 2296 (48%) were identified as PGD cases. Of the study participants 68% was female. The mean age of the included samples ranged from 20 (Morina et al., 2011) to 72 years (Kristensen, Heir, et al., 2012). Seventeen studies were performed in OECD membership countries: six in North America (USA), four in Norway, one in the Netherlands, one in Belgium, one in Portugal, one in Korea, one in Japan, and two in Australia. Eight studies were performed in non-OECD membership countries: three in Kosovo, three in China, one in Cambodia, and one in Rwanda. The studies assessed PGD using either the Prolonged Grief-13 (PG-13), the Inventory of Complicated Grief (ICG) or the Inventory of Complicated Grief-Revised (ICG-R) (Table 1 and 2). Two studies (Neria et al., 2007; Shear et al., 2006) used self-constructed questionnaires based on criteria of PGD. The mean time post-loss in the studies varied from less than 1 month (Mitchell et al., 2004) to 30 years (Stammel et al., 2013) (Table 2).

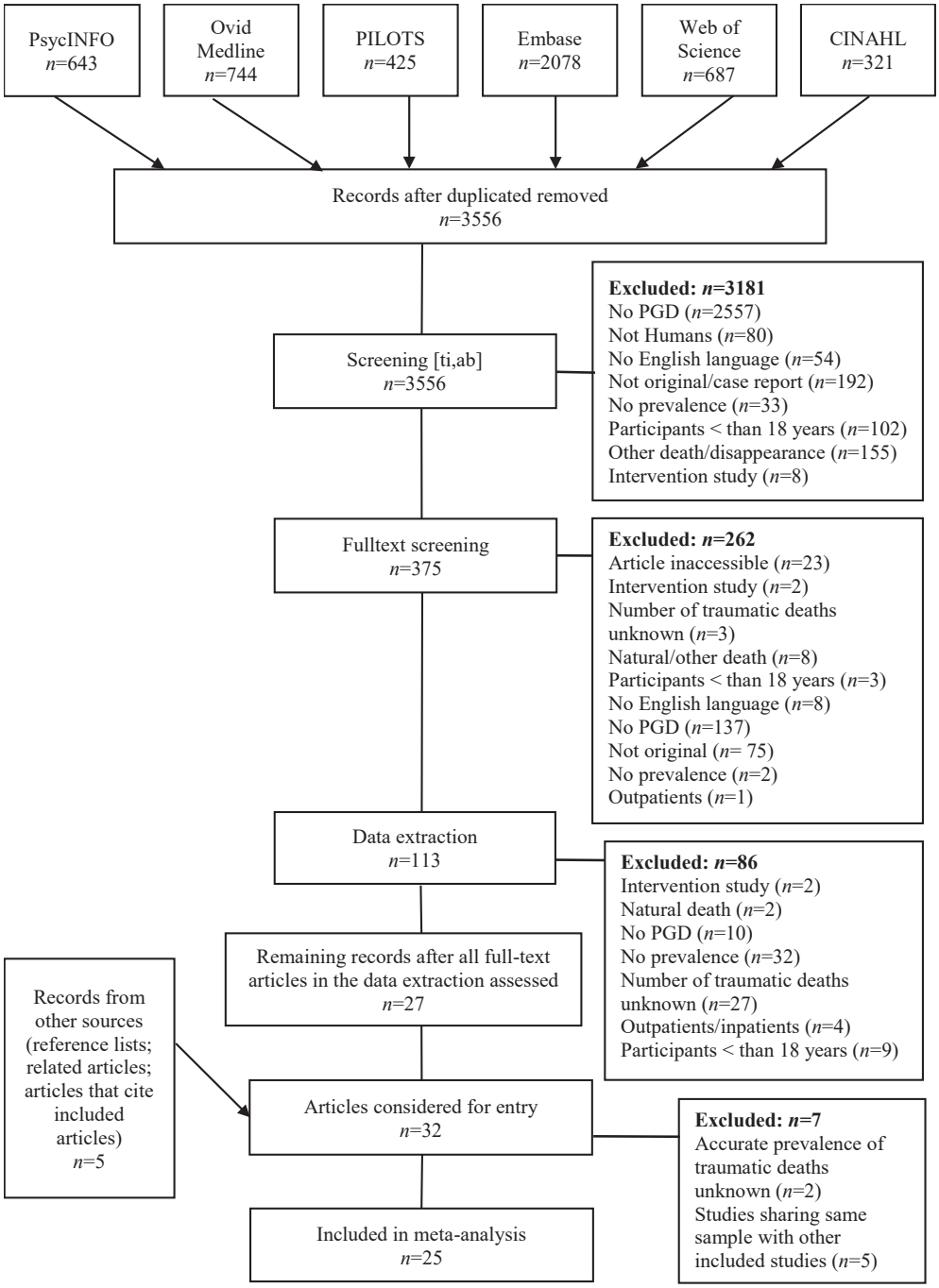

Figure 1. PRISMA flowchart for the selection of studies

Table 2. Characteristics of the included studies

Author (year)	Study setting	Assessment instrument	Cutoff value	Interview	Assessment score, *M* (SD)	Sample recruitment and characteristics	Sample size	Bereaved individuals eligible for the analysis (*n*)	Cause of death	% female	Mean age (SD)	Mean time post- loss (months)	Relation to the deceased	Risk of bias
Bartik et al. (2013)	Australia	PG-13	N/A	self-report	N/A	Advertisement in local and regional media.	10	10	Suicide	80%	24	56.4	Friends and family members	High
Cardoso et al. (2017)	Portugal	ICG	≥30	self report	36.1 (11.5)	Recruitment via Associação dos Familiares das Vítimas de Entre-os-Rios	40	20 (road accident victims)	Road accident	80%	46.3 (18.1)	120[b]	Immediate family members	Moderate
Dyregrov et al. (2015);	Norway	ICG	≥25	self-report	36.0 (11.1)	National Population Register.	103	67 (parents)	Terrorism (Utoya)	55%	Mothers: 51.0 (6.9), Fathers: 52.0 (6.3)	18	Friends and family members	Moderate
Dyregrov et al. (2003)	Norway	ICG	>25	self-report	Suicide: 35.3 (13.5), accident 38.0 (SD: 15.0)	National police register	232	196 (suicide: 128, accident: 68)	Suicide, Accident	65%	47.2	Suicide: 15, accident: 14	Parents	Moderate
Harms et al. (2015)	Australia	ICG	N/A	self-report	N/A	Part of the Beyond Bushfires study	294	278	Natural Disaster (Black Saturday disaster)	40%	52.5	25.5	Immediate family; extended family; family connections; friends; community members	Moderate
Hu et al. (2015)	China	ICG	≥25	self-report	52.77 (10.00).	Recruitment from three of the hardest hit areas by convenience sampling.	271	271	Natural disaster (Earthquake)	55%	44.9	18	Lineal relatives within three generations.	Moderate
Kristensen et al. (2012)	Norway	ICG	>25	self-report	N/A	Participants were contacted by the Brigade psychiatrist as part of the early intervention and research program	32	16 (assessed with ICG)	Natural disaster (snow avalanche)	50%	Mothers: 70.6, fathers: 73.4	276[b]	Parents	Moderate

Kristensen et al. (2015)	Norway	ICG	>25	self-report	N/A	A list of the deceased was obtained from the Norwegian Police Directorate and the next of kin identified through the Norwegian National Population Register.	94	94	Natural disaster (tsunami)	40%	49.2	24	Adult children; parents; siblings; spouses / cohabitants	Moderate
Li et al. (2015)	China	ICG	≥26	self report	N/A	The survey was conducted in a temporary shelter community	803	803	Natural disaster (Earthquake)	63%	46.7 (15.5)	12.2[b]	Child; spouse; other family; friend	Moderate
McDevitt-Murphy (2010)	USA	ICG-R	≥30	self-report	32.46 (15.34)	Participants were recruited with the victim advocate organization Victims to Victory (VTV)	137	54	Homocide	89%	48.61	21.58	Family members	High
Mitchell et al. (2004)	USA	ICG	>25	self-report	37.44 (14.16)	Local coroner's offices, funeral homes, community mental health centers, and other social services	60	60	Suicide	72%	43.3 (13.7)	0.5[b]	Spouses; parents; children; siblings; in-laws, aunts/ uncles; nieces/ nephews; friends or coworkers	High
Morina et al. (2012)	Kosovo	PG-13	N/A	interview	N/A	Lists of families with war-related loss were provided by communal authorities.	206	100 (lone mothers)	War	100%	50.1 (7.9)	120[b]	Spouses	Low
Morina et al. (2010)	Kosovo	ICG-R	N/A	self-report	28.7 (7.2)	List of people killed during the war in 1998/1999 was provided by communal services.	60	60	War	33%	40.6 (10.9)	90[b]	Children; siblings, parents, spouses	Low
Morina et al. (2011)	Kosovo	PG-13	N/A	interview	N/A	Lists of all families who had lost relatives during the war were provided by communal authorities.	179	179	War	58%	20.3 (3.7)	120[b]	Young adults who lost their father during war	Low

Continued Table 2

Author (year)	Study setting	Assessment instrument	Cutoff value	Interview	Assessment score, *M* (SD)	Sample recruitment and characteristics	Sample size	Bereaved individuals eligible for the analysis (*n*)	Cause of death	% female	Mean age (SD)	Mean time post- loss (months)	Relation to the deceased	Risk of bias
Neria et al. (2007)	USA	Criteria set for diagnosing complicated grief	N/A	self-report	N/A	A convenience sample was recruited using an online invitation through Web sites of 9/11 family organizations or sent to the members of such organizations.	704	704	Terrorism (9/11)	79%	45.1 (11.5)	36[b]	Child; Spouse; Parent; Other family member; Non-family Member	High
Prigerson et al. (1999)	USA	ICG	Upper 20 % on the measure	self-report	N/A	Family members nominated peers whom they considered closest to the victim.	76	76	Suicide	58%	23.8 (1.8)	6.3 (0.6)	Friends	Moderate
Schaal et al. (2009)	Rwanda	PG-13	N/A	interview	14.90 (8.10)	The sample was selected by the African Evangelistic Enterprise, the Methodist Church, and the Baptist Church.	40	40	Genocide	100%	49.9 (9.0)	156[b]	Wives	High
Shear et al. (2006)	USA	BCQ	N/A	interview	N/A	Project Liberty counselors invited service recipients to provide feedback on services.	149	70	Natural disaster (tsunami)	69%	45.8 (14.7)	18	Child; spouse; sibling; other relative; friend; acquaintance	High
Spooren et al. (2000)	Belgium	ICG	>37	self-report	44.7 (15.1)	Recruitment via the organization 'Parents of Children who died in road traffic accidents', a self-help group	85	84	Accidents (Road accident)	61%	48 (N/A)	4.0 (38.0)	Parents	High
Stammel et al. (2013)	Cambodia	ICG-R	N/A	interview	21.0 (7.4).	Recruitment with help of local legal non-governmental organizations	775	775	Genocide	64%	56.7 (10.3)	360[b]	Spouses; children; parents; siblings; distant relative	High

Tsutsui et al. (2014)	Japan	ICG	≥26	self-report	10.5 (10.1)	Questionnaires were sent to all 88 hospital employees,	82	82	Natural disaster (Tsunami/ earthquake)	82%	45.8 (10.3)	8	E.g., family members, relatives, friends, colleagues, or neighbors	Moderate
van Denderen et al. (2016)	Netherlands	ICG	>25	self-report	N/A	Recruitment via support organizations for homicidally bereaved individuals / case managers of a GO	312	312	Homicide	65%	53.4 (15.5)	Casema-nager group 3.1; support group: 9.4	Spouses; child; parent; sibling; other family; friends	High
Williams et al. (2015)	USA	ICG	N/A	interview	N/A	Contact information for the bereaved family members was provided to project staff by local law enforcement victim advocates offices.	47	47	Homicide	79%	50.8 (11.1)	25[b]	Parents; children; siblings; spouses; grandparent; grandchild	Moderate
Xu et al. (2014)	China	ICG	≥25	interview	N/A	Community based recruitment: the bureau sent invitation letters with response forms to each woman meeting the inclusion criteria.	226	226	Natural disaster (earthquake)	100%	Women with. subsequent child: 39.4; women with. no subsequent child 40.3	32[b]	mothers	Low
Yun et al. (2018)	Korea	ICG	≥25	self-report	52.3 (14.647)	Participants were recruited with the cooperation of the Ansan Mental Health Trauma Center.	56	56	Accident (Sewol ferry accident)	61%	46.0 (8.4)	18 (1)	Parents; siblings; grandparents; aunt; wife who lived with the victims	Moderate

Note. CGA = Complicated Grief Assessment; ICG = Inventory of Complicated Grief; ICG-R = Inventory of Complicated Grief Revised; N/A = Not Available; PG-13 = Prolonged Grief-13.

According to the quality assessment scores, four studies scored low (score = 9-10), twelve studies scored moderate (score = 7-8), and nine studies scored high (score = 6 or less), on Risk of Bias (See Supplementary Material B for the detailed scores for the RoB of each study).

Meta-analysis

In total, twenty-five articles with thirty prevalence estimates were included in the overall meta-analysis. The pooled prevalence rate of PGD was 49%, 95% CI [33.6, 65.4]. Effects of the individual studies showed a high level of heterogeneity (Q = 1090.2, df = 29, I^2 = 97.3%, p < .001). Egger's t-test did not indicate publication bias (intercept = -0.104, SE = 1.93, 95% CI [-362, 3.82], t = 0.054, df = 28, p = .95).

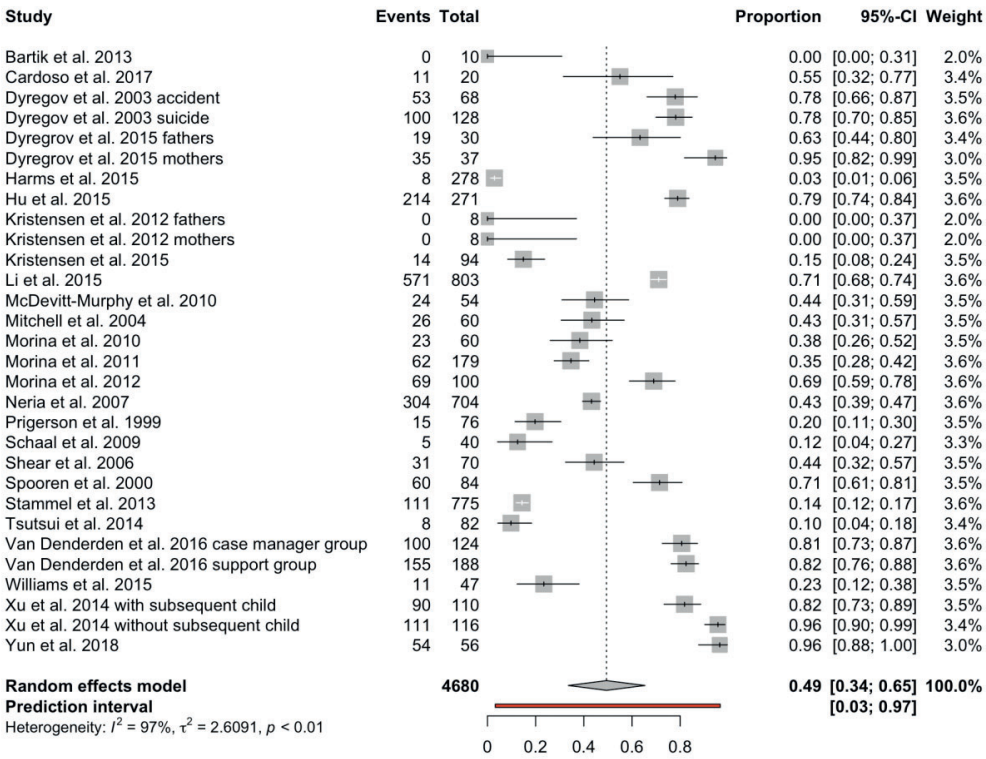

Figure 2. Forest plot and the prevalence estimates of prolonged grief disorder following traumatic bereavement

Multivariate meta-regression analysis

In the correlation matrix we did not find correlations of more than 0.8 and all predictors could be included in the meta-regression analysis (Supplementary Materials C). The meta-regression, shown in Table 4, explained 56% of the between study variance in PGD prevalence. Use of the ICG as diagnostic instrument and death of only child were associated with a higher PGD prevalence. Conversely, longer time since the loss, high-income country, and a natural disaster causing the death (vs. accidental death) were associated with a lower PGD prevalence. The meta-regression model itself was significant (Q_m (10) = 34.6, p = .0001).

In the permutation test, the predictors longer time since loss and a natural disaster were considered as robust predictors (i.e., $p < .05$), the use of the ICG and high-income country were considered robust trends (i.e., $p < .10$) and the loss of only child was not considered as a robust predictor (i.e., $p > .10$) (Supplementary Materials D).

Table 3. Meta-regression Analysis (N = 30 Samples)

	β	SE	*p*	95%CI		Significance
Study methodology						
Months since loss	-0.1	0.00	< .001	-0.02	0.00	**
Interview	-0.53	0.73	.47	-1.95	0.89	
ICG	1.71	0.69	.01	0.36	3.07	*
Demographic features						
Female	0.01	0.01	.21	-0.01	0.03	
Age	0.02	0.03	.50	-0.04	0.09	
High-income country	-1.51	0.68	.03	-2.84	-0.19	*
Event-related characteristics						
Suicide	-1.16	0.80	.15	-2.72	0.40	
Natural disaster	-2.24	0.72	< .001	-3.65	-0.83	**
Intentional killing	0.07	0.78	.93	-1.46	1.60	
Death of only child	2.93	1.38	.03	0.22	5.65	*

Note. β = regression coefficient; CI = Confidence Intervals; *p* = p-value; SE = standard error ;
* $p < .05$, ** $p < .01$, *** $p < .001$.

Discussion

We performed a meta-analysis on the prevalence of PGD in individuals bereaved due to unnatural death causes. The meta-analysis data were based on twenty-five studies and a population of 4774 participants. A pooled prevalence of nearly 50% of individuals screened positive for PGD was found. This result suggests that

five out of ten unnaturally bereaved individuals developed PGD. This indicates a much higher prevalence of disturbed grief than the earlier reported prevalence of 10% by Lundorff et al. (2017), who investigated PGD in individuals bereaved due to non-violent death causes. Therefore, our results support the assumption that bereavement due to unnatural loss leads to more disturbances that are indicative of a diagnosis of PGD than bereavement due to non-violent loss (Boelen et al., 2006; Djelantik et al., 2017b; Farberow et al., 1992; Figley et al., 1997; Kaltman & Bonanno, 2003; Murphy et al., 1999).

Our meta-analysis also revealed a high amount of variability (I^2 = 97.3%) in the prevalence estimates among the studies. Therefore, we conducted a multivariate meta-regression analysis to investigate the influence of potential variables and study characteristics on the pooled prevalence.

Longer time since loss was robustly associated with lower PGD prevalence rates. This finding accords with previous research which showed that grief symptoms normally decrease over time, and that most bereaved individuals eventually adjust to the loss and thereby return to adaptive functioning (Bonanno, 2004; Kristensen, Weisaeth, et al., 2012). However, as has been shown in the study of Stammel et al. (2013), bereaved individuals may experience symptoms of PGD even more than three decades following the unnatural loss of their loved one. According to Prigerson et al. (2009), the PGD diagnosis can be set after 6 months' post-bereavement. However, several other researchers argue that the 6-month time frame is too short and may lead to over-inclusion of the recently bereaved (Rubin, Malkinson, & Witztum, 2008). In the present meta-analysis, only two studies included participants in the first year after loss (Mitchell et al., 2004; Tsutsui et al., 2014), so we were not able to compare PGD rates between 0-6, 6-12 and more than 12 months after the loss. Further research is needed to clarify this further.

With regard to *the nature of traumatic events*, we found that suicide, intentional killing, and accidents were not significant predictors for PGD. Furthermore, in the studies among bereaved survivors of natural disasters, lower prevalence rates of PGD were found compared to other causes of unnatural losses. We could think of two reasons to explain this finding. In case of a natural disaster, there are most of the time multiple victims in the same area, which could result in a collective feeling that victims need to support each other in this shared trauma. In several meta-analyses social support has been proven to be a protective factor after a traumatic event (Brewin, Andrews, & Valentine, 2000; Ozer, Best, Lipsey, & Weiss, 2003). In a prior study, we have found that acceptance in the first year of the loss predicted a more favorable grief trajectory across the second year (Djelantik, Smid, Kleber, & Boelen, 2017a). It could be that in a natural disaster, it is easier for the bereaved

individual to accept the unnatural loss of the loved one, compared to for instance, intentional killings.

Our multivariate meta-regression showed that PGD prevalence rates found in studies performed in low- and middle-income countries were significantly higher than in *high-income countries*. However, findings with regard to cross-national and cross-cultural differences should be interpreted with caution, since a diagnosis of PGD implies that the grief responses exceed the norms for behavior considered normal for a culture. To avoid inappropriate diagnosis of PGD, it is important for clinicians to examine cultural ways of dealing with bereavement and grief in a diversity of settings, in particular outside the western world (Killikelly, Bauer, & Maercker, 2018; Rosenblatt, 2008; Smid, Groen, de la Rie, Kooper, & Boelen, 2018; Tay, Rees, Chen, Kareth, & Silove, 2016). Furthermore, disasters and wars in low- and middle-income countries tend to be more devastating in terms of casualties and damage of (social) infrastructure.

Death of only child was a strong predictor for experiencing PGD in our model. However, this predictor was not considered robust in the permutation test, most likely because this predictor was only assessed in one included study (Xu et al., 2014). Previous research has clearly shown that the experience of losing a child is one of the most painful and stressful events that an adult can experience as well (Keesee et al., 2008; Rubin & Malkinson, 2001; Wijngaards-de Meij et al., 2005). More research is needed to validate this finding.

Limitations

Several limitations were found at review level. First, generalization of our pooled prevalence estimate needs to be conducted with caution. Although our analysis did not show any publication bias, the quality assessment revealed that most of the included studies exhibited some methodological limitations. Many studies were not accurate representations of the target population (e.g., many studies used small sample sizes, and the recruitment was often performed through advertisement on the internet) and used other sampling methods than a random procedure. This could have resulted in a higher prevalence rate because people with disturbances were disproportionally sampled.

Furthermore, we found that the prevalence rate was higher in studies using the Inventory of Complicated Grief (ICG) than in studies using other *measurement instruments*. This could be explained by the slightly different criteria between these tools and/or calculation methods used by the authors, as well as score differences possibly due to translations to other languages or adaptations (Table 1 and 2). As suggested by Lundorff et al. (2017), it would be highly preferable to develop one standardized assessment tool for PGD, with high specificity and sensitivity.

Thirdly, it is important to keep in mind that in most included studies the prevalence rates were based on self-report questionnaires. Scoring above a clinical cut-off of a self-report questionnaire should be recognized as an indication of disorder. A structured clinical interview is needed for a formal diagnosis.

We used a multivariate approach to explore the heterogeneity of our meta-analysis to assess predictors while taking into account their possible shared variance. A limitation of this meta-regression analysis is that we only could include predictors of which information was present in all included papers. Furthermore, our search syntax was aimed to finding studies with a reported prevalence for PGD and not to finding all possible correlates for PGD. Therefore, the amount of significant correlates is less than in the recent meta-analysis with univariate analyses by Heeke et al. (2019). Our study therefore provides preliminary insights in a multivariate assessment of risk factors for PGD. Further and more elaborate multivariate exploration of risk factors for developing PGD after unnatural losses is warranted.

Conclusions

This study indicates that unnatural losses are associated with a considerably higher reported rate of PGD than non-violent losses. Globally approximately half of the bereaved individuals might develop symptoms which meet the diagnostic criteria for PGD following unnatural losses. Our results imply that bereaved parents who lost their only child, and bereaved individuals following violent killings such as suicide, accidents, homicide, and war-related deaths are most vulnerable for developing PGD. Because of the limitations on review level due to varying sample sizes, sets of criteria and sampling bias in the included studies, future studies on the prevalence of PGD are highly recommended. They should ensure representativeness by, for example, using random sampling and an assessment tool for PGD with high sensitivity and specificity. Fundamentally, our findings strongly suggest that policy makers, public health doctors, researchers and clinicians working with people confronted with trauma and unnatural loss should be aware of bereavement and PGD symptoms.

Conflict of interest and funding
The authors declare that they have no conflict of interest to report. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors

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Author contributions
MD was responsible for the design of the study. MD and AM were responsible for the systematic search. MD, AM and GS analyzed the data. PB and RK supervised MD. MD wrote the drafts of the manuscript. PB, GS, RK were involved in revising the draft versions critically and all authors approved the final version of the manuscript.

Supplementary materials

Supplementary material A

Table. Complete search syntax

Keywords *PGD* AND *UNNATURAL LOSS* AND *PREVALENCE*
((((pcbd or pgd or cg or ((Complex or complicated or prolonged or persist* or traumat* or pathological) adj2 (bereave* or grief or grieving or mourn*))).ti,ab. OR exp Bereavement/) AND ((((traumat* or multiple or unresolv* or ambiguous or sudden or unanticipated or violent or unnatural or catastophic or unexpected or Complex or complicated or criminal or crime) adj2 (loss or death)) or ((loss-related or death-related) adj2 trauma*)).ti,ab. or exp Death/ OR (((Violent or armed) adj2 conflict*) or war or warfare or "wartime death" or genocid* or holocaust or terror*).ti,ab. or exp "Warfare and Armed Conflicts"/ or exp Genocide/ or exp Terrorism/ OR ("deadly violence" or homicid* or murder* or assasination* or manslaughter).ti,ab. or exp Homicide/ OR suicid*.ti,ab. or exp Suicide/ OR (miscarriage* or "Spontaneous Abortion").ti,ab. or exp "Abortion, Spontaneous"/ OR euthanasia.ti,ab. or exp Euthanasia/ OR ("indirect victim*" or (survivor adj2 (death or loss))).ti,ab. or exp Crime Victims/ or exp Survivors/ OR (accident* or catastrophe* or emergencies or disaster* or ((natural or Geological or Hydro-meteorological or hydrological or meteorological or climatological or Biological or Extraterrestrial or Human-induced or Technological or Societal) adj1 (accident or accidents or hazard*)) or earthquake* or groundshaking* or tsunami* or "mass movement" or Liquefaction* or "Volcanic activit*" or volcano* or "ash fall" or lahar* or "pyroclastic flow*" or "lawa flow*" or flood* or landslide* or avalanche* or ((landslide* or avalanche*) and (snow* or mudflow* or debris or rockfall*)) or "wave action*" or "rogue wave*" or seiche* or storm* or "extra-tropical storm*" or "tropical storm*" or "convective storm" or surge or surges or tornado* or wind* or rain* or "winter storm*" or blizzard* or derecho* or lightening* or thunderstorm* or hail* or sand or sandstorm* or duststorm* or "extreme temperature*" or "heat wave*" or heatwave* or "cold wave*" or coldwave* or "severe winter condition*" or snow* or ice* or frost* or freeze* or dzud or drought* or wildfire* or "wild fire*" or landfire* or "land fire*" or (fire* and (brush* or bush* or pasture* or forest*)) or bushfire* or "forest fire*" or (glacial and outburst*) or "emerging disease*" or epidemic* or pandemic* or "insect infestation*" or grasshopper* or locust* or "foodborne" or "food borne" or (Extraterrestrial and impact) or airburst* or "space weather" or "energetic particles" or "geomagnetic storm*" or shockwave* or "Industrial hazard*" or "chemical spill*" or "gas leak*" or collapse* or explosion* or (industrial and fire*) or radiation or ((structural or building* or dam or dams or bridge*) adj1 (collapse* or failure*)) or ((transportation or air or road or rail or water) adj1 (accident* or crash*)) or "Air pollution*" or haze or "Power outage*" or "hazardous material*" or ((hazard* or pollution*) adj1 (biological or chemical or radiological)) or "food contamination*" or "armed conflict*" or war or warfare or "civil unrest" or terrorism or cbrn or cbrne or "chemical, biological, radiological, nuclear and explosive weapons" or "chemical, biological, radiological and nuclear" or "financial crisis" or hyperinflation or "currency crisis" or (crisis or crises or emergencies or Cyclone* or "Cyclonic Storm*" or hurricane* or fire* or "nuclear accident*" or "tidal wave*" or "volcanic eruption*" or Snowstorm* or massacre or bomb* or evacuation or "critical incident*")).ti,ab. or exp Disasters/) AND ((prevalence or Epidemiolog* or incidence or frequency or proportion or number* or amount* or percentage* or distribution*).ti,ab. OR exp Epidemiology/ or exp Morbidity/ or exp Survival Analysis/)) AND ((empirical or cohort or (case and (comparison or referent)) or risk or causation or causal or "odds ratio" or etiol* or aetiol* or "natural history" or predict* or prognos* or outcome or course or retrospect* or "clinical trial" or ((singl* or doubl* or trebl* or tripl*) and (mask* or blind*)) or "latin square" or placebo* or random* or control or controll* or prospectiv* or volunteer* or "research design" or ((comparative or evaluation or follow-up or prospective or cross-over) adj1 stud*) or (disability and evaluation*) or ((statistical or Probabilistic or Polynomial or "two parameter*" or "2 parameter*" or Binomial) and (model or models)) or (likelihood and (functions or function or estimat*)) or ((linear or loglinear or logistic) and (model or models or regression*)) or ((time or risk or risks) and (factor or factors)) or regression* or multivariate or (recover* and (function or functions)) or sensitivit* or "area under curve*" or auc or prognos* or placebo* or randomly or

randomi* or trial or ((singl* or doubl* or trebl* or tripl*) adj3 (blind* or mask* or dummy)) or (control* adj3 (trial* or study or studies or group*)) or factorial* or allocat* or assign* or volunteer* or crossover* or "cross over*" or (quasi adj5 (experimental or random*)) or groups).ti,ab. OR exp exp Treatment Outcome/ or exp "Clinical Trials as Topic"/ or (Clinical Trial or Phase I Clinical Trial or Phase II Clinical Trial or Phase III Clinical Trial or Phase IV Controlled Clinical Trial or Randomized Controlled Trial or Pragmatic Clinical Trial).pt. or Placebos/)) AND ((((pcbd or pgd or cg or ((Complex or complicated or prolonged or persist* or traumat* or pathological) adj2 (bereave* or grief or grieving or mourn*))).ti,ab. OR exp Bereavement/) AND ((((traumat* or multiple or unresolv* or ambiguous or sudden or unanticipated or violent or unnatural or catastophic or unexpected or Complex or complicated or criminal or crime) adj2 (loss or death)) or ((loss-related or death-related) adj2 trauma*)).ti,ab. or exp Death/ OR (((Violent or armed) adj2 conflict*) or war or warfare or "wartime death" or genocid* or holocaust or terror*).ti,ab. or exp "Warfare and Armed Conflicts"/ or exp Genocide/ or exp Terrorism/ OR ("deadly violence" or homicid* or murder* or assasination* or manslaughter).ti,ab. or exp Homicide/ OR suicid*.ti,ab. or exp Suicide/ OR (miscarriage* or "Spontaneous Abortion").ti,ab. or exp "Abortion, Spontaneous"/ OR euthanasia.ti,ab. or exp Euthanasia/ OR ("indirect victim*" or (survivor adj2 (death or loss))). ti,ab. or exp Crime Victims/ or exp Survivors/ OR (accident* or catastrophe* or emergencies or disaster* or ((natural or Geological or Hydro-meteorological or hydrological or meteorological or climatological or Biological or Extraterrestrial or Human-induced or Technological or Societal) adj1 (accident or accidents or hazard*)) or earthquake* or groundshaking* or tsunami* or "mass movement" or Liquefaction* or "Volcanic activit*" or volcano* or "ash fall" or lahar* or "pyroclastic flow*" or "lawa flow*" or flood* or landslide* or avalanche* or ((landslide* or avalanche*) and (snow* or mudflow* or debris or rockfall*)) or "wave action*" or "rogue wave*" or seiche* or storm* or "extra-tropical storm*" or "tropical storm*" or "convective storm" or surge or surges or tornado* or wind* or rain* or "winter storm*" or blizzard* or derecho* or lightening* or thunderstorm* or hail* or sand or sandstorm* or duststorm* or "extreme temperature*" or "heat wave*" or heatwave* or "cold wave*" or coldwave* or "severe winter condition*" or snow* or ice* or frost* or freeze* or dzud or drought* or wildfire* or "wild fire*" or landfire* or "land fire*" or (fire* and (brush* or bush* or pasture* or forest*)) or bushfire* or "forest fire*" or (glacial and outburst*) or "emerging disease*" or epidemic* or pandemic* or "insect infestation*" or grasshopper* or locust* or "foodborne" or "food borne" or (Extraterrestrial and impact) or airburst* or "space weather" or "energetic particles" or "geomagnetic storm*" or shockwave* or "Industrial hazard*" or "chemical spill*" or "gas leak*" or collapse* or explosion* or (industrial and fire*) or radiation or ((structural or building* or dam or dams or bridge*) adj1 (collapse* or failure*)) or ((transportation or air or road or rail or water) adj1 (accident* or crash*)) or "Air pollution*" or haze or "Power outage*" or "hazardous material*" or ((hazard* or pollution*) adj1 (biological or chemical or radiological)) or "food contamination*" or "armed conflict*" or war or warfare or "civil unrest" or terrorism or cbrn or cbrne or "chemical, biological, radiological, nuclear and explosive weapons" or "chemical, biological, radiological and nuclear" or "financial crisis" or hyperinflation or "currency crisis" or (crisis or crises or emergencies or Cyclone* or "Cyclonic Storm*" or hurricane* or fire* or "nuclear accident*" or "tidal wave*" or "volcanic eruption*" or Snowstorm* or massacre or bomb* or evacuation or "critical incident*")).ti,ab. or exp Disasters/) AND ((prevalence or Epidemiolog* or incidence or frequency or proportion or number* or amount* or percentage* or distribution*).ti,ab. OR exp Epidemiology/ or exp Morbidity/ or exp Survival Analysis/)) limited to (case reports or clinical study or clinical trial, all or clinical trial, phase i or clinical trial, phase ii or clinical trial, phase iii or clinical trial, phase iv or clinical trial or comparative study or controlled clinical trial or dataset or evaluation studies or multicenter study or observational study or pragmatic clinical trial or randomized controlled trial or twin study or validation studies))

Supplementary material B

Table. Risk of Bias assessment scores

Study	1. Was the study″s target population a close representation of the national population in relation to relevant variables, e.g. age, sex, occupation?	2. Was the sampling frame a true or close representation of the target population?	3. Was some form of random selection used to select the sample, OR, was a census undertaken?	4. Was the likelihood of non-response bias minimal?	5. Were data collected directly from the subjects (as opposed to a proxy)?	6. Was an acceptable case definition used in the study?	7. Was the study instrument that measured the parameter of interest (e.g. prevalence of low back pain) shown to have reliability and validity (if necessary)?	8. Was the same mode of data collection used for all subjects?	9. Was the length of the shortest prevalence period for the parameter of interest appropriate?	10. Were the numerator(s) and denominato r(s) for the parameter of interest appropriate?	Risk of Bias score
Bartik et al. (2013)	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	High
Cardoso et al. (2017)	No	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Moderate
Dyregov et al. (2015)	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Moderate
Dyregrov et al. (2003)	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Moderate
Harms et al. (2015)	No	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Moderate
Hu et al. (2015)	No	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Moderate
Kristensen et al (2012)	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Moderate
Kristensen et al (2015)	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Moderate
Li et al. (2015)	No	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Moderate
McDevitt-Murphy et al. (2010)	No	No	No	No	Yes	Yes	Yes	Yes	No	Yes	High
Mitchell et al. (2004)	No	No	No.	No	Yes	Yes	Yes	Yes	Yes	Yes	High
Morina et al. (2012)	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Low
Morina et al. (2010)	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Low
Morina et al. (2011)	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Low
Neria et al. (2007)	No	No	No	No	Yes	Yes	No	Yes	Yes	Yes	High
Prigerson et al. (1999)	No	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Moderate
Schaal et al. (2009)	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	High
Shear et al. (2006)	No	No	No	No	Yes	Yes	No	Yes	Yes	Yes	High
Spooren et al. (2000)	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	High
Stammel et al. (2013)	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	High
Tsuitsui etl a. (2014)	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Moderate
Van Denderen et al. (2016)	No	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	High
Williams et al. (2015)	No	Yes	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Moderate
Xu et al. (2014)	Yes	Yes	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Low
Yun et al. (2018)	No	Yes	No.	No	Yes	Yes	Yes	Yes	Yes	Yes	Moderate

Note. We have used the risk of bias tool developed by Hoy et al. (2012). Each Yes (low risk) is scored as 1, and each No (high risk) as 0, yielding a RoB total score for each study. RoB scores of 9-10 were considered to have low RoB, studies with scores of 7-8 were considered to have moderate RoB, and studies with scores of 6 or less were considered to have high RoB.

Supplementary material C

Table. The correlation matrix of the predictors

	Months since loss	Interview	ICG	Female	Age	High-income country	Suicide	Natural disaster	Intentional killing	Death only child
Months since loss	XX	0.24	-0.02	-0.08	0.45	-0.05	-0.16	0.04	0.10	-0.09
Interview	0.24	XX	-0.38	0.37	-0.14	-0.56	-0.24	-0.07	0.32	0.31
ICG	-0.02	-0.38	XX	-0.31	0.31	0.25	-0.02	0.36	-0.40	0.10
Female	-0.08	0.37	-0.31	XX	-0.14	-0.21	-0.02	0.00	0.16	0.24
Age	0.45	-0.14	0.31	-0.14	XX	0.30	-0.40	0.29	0.26	-0.12
Western	-0.05	-0.56	0.25	-0.21	0.30	XX	0.22	-0.15	0.09	-0.34
Suicide	-0.16	-0.24	-0.02	-0.02	-0.40	0.22	XX	-0.26	-0.30	-0.07
Natural disaster	0.04	-0.07	0.36	0.00	0.29	-0.15	-0.26	XX	-0.50	0.28
Intentional killing	0.10	0.32	-0.40	0.16	0.26	0.09	-0.30	-0.50	XX	-0.14
Death only child	-0.09	0.31	0.10	0.24	-0.12	-0.34	-0.07	0.28	-0.14	XX

Note. ICG = Inventory of Complicated Grief.

Supplementary material D

Table. The permutation test

	p	Significance
Study methodology		
Months since loss	.02	*
Interview	.60	
ICG	.05	.
Demographic features		
Female	.35	
Age	.60	
High-income country	.1	.
Event-related characteristics		
Suicide	.28	
Natural disaster	.02	*
Intentional killing	.94	
Death of only child	.11	

Note. ICG = Inventory of Complicated Grief; *p* = p-value.
. $p < .10$, * $p < .05$, ** $p < .01$, *** $p < .001$

Chapter 3

Symptoms of prolonged grief, posttraumatic stress, and depression after loss in a Dutch community sample: A latent class analysis

Djelantik, A. A. A. M. J., Smid, G. E., Kleber, R. J., & Boelen, P. A. (2017b). Symptoms of prolonged grief, posttraumatic stress, and depression after loss in a Dutch community sample: A latent class analysis.

Psychiatry Research, 247, 276-281. doi:10.1016/j.psychres.2016.11.023

Abstract

Background
Mental health problems following loss can manifest as heterogeneous symptomatology that may include symptoms of prolonged grief disorder (PGD), posttraumatic stress disorder (PTSD), and major depressive disorder (MDD). However, the co-occurrence of symptoms of these three disorders is still only partially explored. The aims of this study were to identify subgroups (i.e., classes) in a Dutch sample of bereaved individuals, based on severity and/or co-occurrence of symptoms and to identify predictors for these subgroups, taking into account all three disorders.

Methods
Using data from 496 participants who filled in questionnaires assessing PTSD, MDD and PGD, we conducted latent class analyses to identify different symptom classes. Predictors of these classes were identified using one-way ANOVA, Chi Square tests and multinomial regression analysis.

Results
We found three different classes: a resilient class, a PGD class and a combined PGD/PTSD class. Violent cause of death, loss of a child, and loss of a partner were associated with membership of the combined PGD/PTSD class.

Conclusions
This study increases our understanding of the predictability of symptomology outcome following bereavement. This is a first step towards designing assessment and intervention methods, specifically directed towards subgroups of individuals sharing characteristic symptomatology.

Keywords
• Prolonged grief disorder • posttraumatic stress disorder • depression • latent class analyses • persistent complex bereavement disorder • violent loss

Highlights of this article

- The co-occurrence of PGD, PTSD, and MDD in bereaved individuals is not well known.
- An LCA was employed including PGD, PTSD, and MDD symptoms in a community sample.
- Different classes of individuals emerged, which differed in nature of the symptoms.
- Loss of close kin was associated with membership to the PGD and PGD/PTSD class.
- Violent loss was associated with membership to the PGD/PTSD class.

Introduction

Much research in recent years has focused on the distinctiveness of prolonged grief disorder (PGD) from posttraumatic stress disorder (PTSD) and major depressive disorder (MDD) in bereaved persons. This distinctiveness has been shown in several bereaved populations (Boelen et al., 2016; Boelen & van den Bout, 2005; Lichtenthal et al., 2004; Maercker & Lalor, 2012; Prigerson, Frank, et al., 1995; Prigerson, Maciejewski, et al., 1995).

Prolonged grief disorder (PGD) will most likely be included in the forthcoming edition (11th) of the International Statistical Classification of Diseases and Related Health Problems (Maercker et al., 2013; Prigerson et al., 2009). The main distinctive feature of PGD is 'yearning for the deceased', instead of 'anxiety' and 'dysphoria' in PTSD and MDD, respectively (Maercker & Znoj, 2010; Prigerson, Shear, et al., 1999; Shear, 2015). Characteristic symptoms of PGD include frequent preoccupying thoughts and memories of the deceased person, a feeling of disbelief or an inability to accept the loss, and difficulty imagining a meaningful future without the deceased person, to such an extent that the person is impaired in daily functioning for at least 6 months (Shear, 2015). Treatments especially focused on PGD have been developed with proven efficacy (Maccallum & Bryant, 2013; Shear, 2015). Recently, a similar but slightly different conceptualization of PGD, named persistent complex bereavement disorder (PCBD) has been included in the Diagnostic and Statistical Manual of Mental Disorders, 5th edition (American Psychiatric Association, 2013) as a condition requiring further research. A recent study demonstrated that the ICD-11 and DSM-5 criteria sets of PGD and PCBD were roughly equivalent in terms of sensitivity, specificity and criterion validity (Maciejewski et al., 2016).

Research has shown that the death of a loved one can precipitate the development of different forms of psychopathology, including symptoms of all three related disorders, viz. PGD, PTSD and MDD (Bonanno & Kaltman, 2001; Kristensen, Weisaeth, et al., 2012; Momartin, Silove, Manicavasagar, & Steel, 2004; Morina et al., 2010; Nickerson et al., 2014; Pfefferbaum et al., 2001). How exactly these symptoms co-occur in bereaved individuals is still relatively unexplored.

Two studies investigated the co-occurrence of symptoms in individuals with latent class analyses (LCA) methods (Boelen et al., 2016; Nickerson et al., 2014). LCA identifies subgroups of individuals who share common characteristics and is therefore called a person-centred statistical technique (Lanza et al., 2010). In these studies, subgroups or so-called classes of bereaved individuals were identified, that differed in terms of the severity of symptoms, the nature of symptoms, or both the severity and nature of symptoms.

Boelen et al. (2016) sought to identify subgroups of bereaved individuals based on symptom levels of PGD and depression among people confronted with unnatural loss (e.g., suicide, accidents, homicide); they identified a resilient class, a PGD class, and a class with combined symptoms of PGD and depression. Nickerson et al. (2014) examined classes in a group of multi-traumatized refugees. They identified four symptom classes namely a resilient class, a PGD class, a PTSD class, and a combined PGD/PTSD class. Although these studies are important, they are limited. For example, Boelen et al. (2016) exclusively focused on victims of violent loss and did not examine PTSD; whereas the study of Nickerson et al. (2014) relied on a sample of refugees with a history of multiple traumas and did not examine classes based on depression scores. Therefore, more research is needed to examine whether subgroups of bereaved individuals can be identified following loss, across a variety of bereaved populations (i.e. other than bereaved by an unnatural cause), taking into account a variety of symptoms, including PGD, PTSD, and depression.

If we would be able to distinguish different subgroups of bereaved in symptomatology, a next step could be to specify predictors or risk factors for these subgroups. In the study of Nickerson et al. (2014) for example, gender, age, and the number of traumatic events and losses emerged as predictors of membership of the combined PTSD and PGD class. Such knowledge can be used to identify refugees at risk for developing PTSD and PGD symptoms in an early stage. In the study of Boelen et al. (2016) participants included in the combined PGD/MDD-class were more likely to endorse negative cognitions about the self and life, and to catastrophically misinterpret their grief-reactions. This knowledge helps to identify targets for cognitive behavioural therapeutic interventions.

The current study, conducted in the Netherlands, sought to extend prior work by examining classes of bereaved individuals, based on symptom levels of PGD, PTSD, and depression in a heterogeneous community sample of individuals, confronted with different types of losses (both natural and unnatural losses). Based on prior findings from Boelen et al. (2016) and Nickerson et al. (2014) we expected that different subgroups of bereaved individuals could be identified, including a class with combined PGD, PTSD and depression symptoms. We also expected that we would be able to identify predictors for each symptom class. We expected that individuals who had been confronted with violent losses or the loss of a close kin (i.e., partner or child) would have a different symptom profile or have more severe symptoms compared with individuals who experienced other types of losses (i.e., nonviolent loss and/or loss of friends). We examined several possible predictors of class membership, including age, time since loss, and education level.

Methods

Participants and procedure

Participants were recruited via professional and lay mental health care workers (e.g., grief counsellors, therapists, clergy). The research protocol was approved by a local review board and written informed consent was obtained from all participants. For this study we only selected participants who had experienced a loss fewer than 3 years earlier, in order to increase the homogeneity of our sample. These were 496 participants from the total number of 712 individuals enrolled in the research program. The mean age of participants was 54.6 (*SD* = 13.3) years. Most participants (*n* = 372; 75%) were women. 285 participants (58%) had followed primary or secondary education only, whereas 211 participants (42%) had been to college or university. With regard to loss related variables, 334 participants (67%) had lost a spouse/partner, 44 (9%) a child, and 118 (24%) some other loved one; 52 participants (11%) had lost a loved one due to a violent cause (i.e., accident, suicide, or homicide) and 444 participants (89%) lost a loved one due to a nonviolent cause (e.g., illness). Losses occurred on average 13.2 (*SD* = 8.8, range = 1-36 months) months earlier (see Table 1). In a prior study, the same data were used to examine the role of cognitive behavioural variables in mediating the impact of violent loss on bereavement outcomes (Boelen, de Keijser, & Smid, 2015).

Table 1. Socio-demographic and loss-related characteristics

	Total sample $n = 496$	Class 1: PGD $n = 238$ (48%)	Class 2: PGD/PTSD $n = 132$ (27%)	Class 3: Resilient $n = 126$ (25%)	Significance tests for differences between the groups
Socio-demographic variables					
Gender					χ^2 (2, $n = 496$) = 1.75
Men (%)	124 (25)	55 (23)	32 (24)	37 (29)	
Women (%)	372 (75)	183 (77)	100 (76)	89 (71)	
Age (M) (SD)	54.6 (13.3)	55.9 (14.1)	54.3 (12.5)	52.6 (12.7)	F (2, 493) = 2.56
Low level of education (primary or secondary school) (%)	285 (58)	137 (58)	87 (66)	61 (48)	χ^2 (2, $n = 496$) = 8.81*
Loss related variables					
Loss					χ^2 (4, $n = 496$) = 68.72***
Loss of a partner (%)	334 (67)	179 (75)	95 (72)	60 (48)	
Loss of a child (%)	44 (9)	19 (8)	21 (16)	4 (3)	
Loss of other (%)	118 (24)	40 (17)	16 (12)	62 (49)	
Time since loss (M) (SD)	13.2 (8.8)	13.8 (8.7)	13.0 (8.8)	12.1 (9.1)	F (2, 493) = 1.56
Violent cause (%)	52 (11)	21 (9)	26 (20)	5 (4)	χ^2 (2, $n = 496$) = 18.34***

Note. PGD = Prolonged grief disorder; PTSD = Posttraumatic Stress Disorder; SE = Standard Error; * $p < 0.5$. ** $p < 0.01$. *** $p < 0.001$

Measures

PGD scale. The PGD scale is based on the 19-item Inventory of Complicated Grief. It contains 11 items representing criteria for PGD (Prigerson et al., 2009). Accordingly, items represent one separation distress symptom, nine cognitive and emotional symptoms (including 'difficulties accepting the loss', 'avoidance', 'bitterness/anger'), and one functional impairment symptom. Participants are asked to rate how often symptoms occurred in the preceding month on 5-point scales (1 = never; 5 = always). Consistent with prior LCA-research, we dichotomized all items because LCA uses binary indicators to identify patterns of responses. We considered the ratings 1 and 2 as 'symptom absent' and 3, 4 and 5 as 'symptom present'. This is the same threshold used in comparable studies (Boelen et al., 2016; Nickerson et al., 2014). In this study, Cronbach's alpha of the PGD scale was .90.

PTSD Symptom Scale–Self-Report version (PSS-SR). The PSS-SR is a 17-item measure of PTSD symptoms, as defined in DSM-IV (American Psychiatric Association, 2000). Respondents are instructed to rate PTSD symptoms, on 4-point scales (0 = not at all; 4 = five or more times per week/almost always). We considered the ratings 0 and 1 as 'symptom absent' and 3 and 4 as 'symptom present'. The index event was defined as 'the death of your loved one' (e.g., 'How often did you have unpleasant dreams or nightmares about the death of your loved one?'). The English and Dutch versions have good psychometric properties (Engelhard, Arntz, & van den Hout, 2007). In the present sample, the alpha was .88.

Beck Depression Inventory (BDI). The BDI measures 21 depressive symptoms, formulated as 4 statements representing each symptom at increasing levels of severity (e.g., depressed mood; 0 = I do not feel sad; 1 = I feel sad; 2 = I am sad all the time and I can't snap out of it; 3 = I am so sad and unhappy that I can't stand it). We considered the ratings 0 and 1 as 'symptom absent' and 2 and 3 as 'symptom present'. The English and Dutch versions have adequate psychometric properties (Beck, Steer, & Brown, 1996; Beck, Steer, Brown, & Van der Does, 2002). The alpha in this sample was .91. Due to limitations of the number of items that could be included in the LCA, we decided to select 6 items (see Table 3) that correspond closely to DSM-IV criteria for major depression. We excluded items that were not part of these criteria (e.g., crying easily) and items that were deemed ambiguous in the light of subject's circumstances (e.g., thoughts of death).

Statistical analysis

LCA was used to model PGD, PTSD and depression symptoms, using Mplus version 7.31 (Muthén & Muthén, 1998-2017). We examined the following indices to find the optimal number of classes: Bayesian Information Criterion (BIC), Sample-

Size Adjusted Bayesian Information Criterion (SS-BIC), the Aikaike's Information Criterion (AIC), and entropy. Lower BIC and AIC values and higher entropy values indicate better fit.

To examine the associations of the class membership with predictors, we conducted one-way ANOVA and Chi Square analyses. First, we consecutively examined whether each of the possible predictor variables independently predicted subgroup membership. Next, we used multinomial regression to examine which of the variables emerging as significant predictors in the univariate analyses, predicted class membership when controlling for the overlap between the predictor variables. For these analyses, SPSS version 21 was used.

Results

Latent class analyses

The fit indices for the latent class solutions are presented in Table 2. Both the three-class solution and the four-class solution appeared adequate, based on the fit indices. However, based on the interpretability of outcomes, the three-class solution was retained. The three classes consisted of participants with mainly PGD symptoms (class 1), participants with a combination of symptoms of PGD and PTSD (class 2), and participants who were resilient, i.e. who were likely not to endorse symptoms (class 3). The distinct symptom prevalence rates in each of the three classes are reported in Table 3 and Figure 1. We considered values >.50 as a high probability of item endorsement.

In class 1 (comprising 48% of the sample) all PGD symptoms had a high probability except for 'mistrust' and 'avoidance'. Class 2 (27%) included participants with a high probability of endorsing all PGD symptoms, except 'avoidance', and several symptoms of PTSD. In class 3 (25%) none of the different symptoms of the PGD, PTSD and depression symptoms had a high probability, except for 'yearning for the deceased'. In none of the three classes, symptoms of depression had a high probability of being endorsed (Table 3 and Figure 1).

Table 2. Fit Indices for best fit model LCA

Model tested	Log likelihood	BIC	SS - BIC	AIC	Entropy
1 class	-7966.645	16138.107	16033.364	15999.290	
2 classes	-6856.798	14129.436	13916.776	13847.595	0.899
3 classes	-6572.241	13771.345	13450.768	13346.481	0.904
4 classes	-6471.947	13781.781	13353.287	13213.894	0.870

Note. AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion; SS-BIC = Sample Size Adjusted BIC.

Table 3. Probability of PGD symptom-items in the latent classes

Questionnaires	Overall symptom frequency	Class 1 (48%) PGD		Class 2 (27%) mixed PGD/PTSD		Class 3 (25%) resilient	
Description of symptoms	%	Probability	SE	Probability	SE	Probability	SE
PGD scale							
Criteria Prigerson et al. 2009							
Acceptance	59	**0.64**	0.04	**0.87**	0.03	0.17	0.04
Yearning	91	**0.97**	0.01	**1.00**	0.00	0.68	0.05
Stunned	57	**0.60**	0.04	**0.95**	0.03	0.10	0.03
Mistrust	25	0.21	0.03	**0.57**	0.05	0.01	0.01
Avoidance	16	0.15	0.03	0.30	0.05	0.05	0.02
Numbness	49	**0.52**	0.04	**0.90**	0.03	0.00	0.00
Bitterness or anger	49	**0.53**	0.04	**0.83**	0.04	0.07	0.03
Life is empty	52	0.59	0.04	**0.87**	0.04	0.02	0.02
Part of self died	65	**0.75**	0.03	**0.93**	0.03	0.19	0.04
Difficulty moving on	53	**0.55**	0.05	**0.94**	0.03	0.06	0.02
PSS-SR scale							
PTSD DSM-IV							
Recurrent and intrusive recollections of the event	39	0.37	0.04	**0.74**	0.05	0.05	0.02
Recurrent distressing dreams	9	0.06	0.02	0.23	0.04	0.00	0.00
Acting or feeling as if the loss was recurring	20	0.15	0.03	0.43	0.05	0.03	0.02
Intense psychological distress at exposure to cues that resemble the loss	31	0.27	0.03	**0.65**	0.05	0.04	0.02
Physiological reactivity on exposure to cures that resemble an aspect of the loss	17	0.11	0.02	0.43	0.05	0.02	0.01
Efforts to avoid thoughts, feelings or conversations about the loss	19	0.16	0.03	0.40	0.05	0.01	0.01
Efforts to avoid activities, places or people that arouse recollections of the loss	9	0.04	0.02	0.26	0.04	0.00	0.00
Inability to recall aspects of the loss	17	0.16	0.03	0.32	0.05	0.02	0.01

Diminished interest or participation in significant activities..	35	0.24	0.04	**0.81**	0.06	0.06	0.02
Feeling of estrangement of others	23	0.10	0.03	**0.65**	0.06	0.02	0.02
Restricted range of affect.	16	0.10	0.02	0.38	0.06	0.03	0.01
Sense of foreshortened future	43	0.41	0.04	0.83	0.05	0.05	0.02
Difficulty falling or staying asleep	50	**0.50**	0.04	**0.83**	0.04	0.13	0.03
Irritability or outburst of anger	14	0.07	0.02	0.36	0.06	0.02	0.01
Difficulty concentrating	37	0.34	0.04	**0.74**	0.06	0.05	0.02
Hyper vigilance	18	0.17	0.03	0.34	0.05	0.04	0.02
Exaggerated startle response	9	0.06	0.02	0.23	0.04	0.01	0.01
BDI scale							
Depression items							
Depressed mood	3	0.00	0.00	0.11	0.04	0.00	0.00
Feelings of worthlessness or excessive guilt	3	0.01	0.01	0.07	0.02	0.01	0.01
Diminished interest or pleasure	8	0.01	0.01	0.26	0.05	0.00	0.00
Feelings of worthlessness	5	0.02	0.01	0.14	0.03	0.01	0.01
Fatigue or loss of energy	20	0.15	0.03	0.44	0.05	0.03	0.02
Little appetite	9	0.04	0.02	0.23	0.05	0.02	0.01

Note. Probability greater than 0.5 are shown in boldface. BDI = Beck Depression Inventory; PGD = Prolonged grief disorder; PSS-SR = PTSD Symptom Scale–Self-Report; PTSD = Posttraumatic stress disorder; SE = Standard Error.

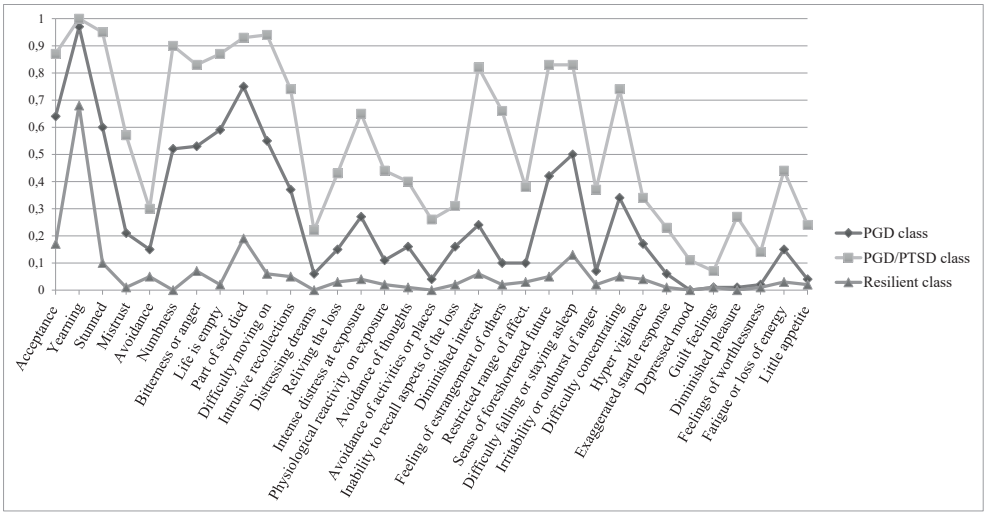

Figure 1. Estimated symptom prevalence for the three-class solution

Predictors of class membership

Table 1 shows socio-demographic and loss-related variables in all classes and outcomes of statistical tests testing for differences between classes. No significant differences between the classes were found in terms of age, time since loss, and gender. Kinship differed significantly between the classes such that both loss of a child (vs. other losses) and loss of a partner (vs. other losses) were associated with an elevated chance of inclusion in the PGD and PGD/PTSD class. A violent cause of death also distinguished between classes; participants in the PGD and PGD/PTSD class were more likely to have experienced a loss due to a violent cause. Furthermore, classes differed in terms of education level; both the PGD and the PGD/PTSD class included more participants with a low education level (Table 1).

We then conducted multinomial regression analysis to see which predictors were still associated with the classes when controlling for the shared variance between the predictor variables. We consecutively investigated the association of the predictors losing a child, losing a partner, violent cause and lower level of education both with inclusion in the PGD class and inclusion the PGD/PTSD class, respectively, using the resilient class as reference class. Subsequently, we calculated the odd's ratio's (OR) to estimate the strengths of these associations. As can be seen in Table 4, losing a partner or losing a child were both associated with membership of the PGD class (OR resp. 4.43 and 6.69) and the combined PGD/PTSD class (OR resp. 5.20 and 15.10). Furthermore, having lost a loved one due to a violent cause and a lower level of education were associated with membership of the PGD/PTSD class (OR resp. 5.12 and 1.93).

Table 4. Multinomial logistic regression predicting class membership and summary of the odds ratios of the different predictors per class

	β	SE	OR	95% CI	*p-value*
PGD class vs. resilient class					
Losing a partner	1.49	0.26	4.43	2.68-7.35	< .001
Losing a child	1.90	0.59	6.69	2.10-21.32	< .001
Violent cause	0.76	0.53	2.13	0.75-6.06	.16
Education	0.17	0.24	1.19	0.74-1.90	.48
PGD/PTSD class vs. resilient class					
Losing a partner	1.65	0.33	5.20	2.70-10.01	< .001
Losing a child	2.72	0.63	15.10	4.40-51.90	< .001
Violent cause	1.63	0.54	5.12	1.77-14.79	< .001
Education	0.66	0.28	1.93	1.11-3.37	< .001

Note. β= Beta coëfficient; CI = Confidence Interval; PGD = Prolonged grief disorder; PTSD = Posttraumatic stress disorder; OR = Odds Ratio; SE = Standard Error.

In conclusion, bereaved individuals in class 1 (PGD) were more likely to have lost a partner or a child. Bereaved individuals in class 2 (PGD/PTSD), besides having lost a partner or child, were more likely to have lost someone due to a violent cause and to have a lower level of education.

Discussion

We employed LCA in a heterogeneous sample of bereaved individuals and found different classes of PGD, PTSD and depression symptoms. These classes differed in the nature of symptoms; specifically, we found a class with PGD symptoms, a class with both PGD and PTSD symptoms and a resilient class. The classes did not differ in terms of depression symptoms. Therefore, our findings provide support for our first hypothesis, namely that there are different subgroups of bereaved individuals sharing characteristic symptomatology.

In line with previous research (Boelen et al., 2016; Nickerson et al., 2014), our findings indicate two main things. First, in people confronted with losses, subclasses exist that can be distinguished based by the dominance of particular symptom clusters rather than by graded severity of a more general post-loss response. Secondly, in all three studies, a class of combined symptomatology emerged, indicating that, in a subgroup of bereaved individuals, the death of a loved one precipitates a combination of symptoms of grief, traumatic stress, and depression.

We also found support for our second hypothesis, namely that symptomatology of bereaved individuals in different classes can be distinguished by particular

characteristics of their loss experience and socio-demographic variables. For instance, we found that individuals who lost a partner or child were more likely to be included in the PGD class and in the combined PGD/PTSD, whereas people who lost a loved one other than a partner or child were more likely to be included in the resilient class. These findings accord with prior evidence that losing a partner or child gives more serious reactions which is probably due to the stronger attachments with partners and children (Kristensen, Weisaeth, et al., 2012; Stroebe et al., 2007). However, our finding that losing a child or partner was associated with the combined PGD/PTSD class is novel. PGD has been described as a stress response syndrome (Shear et al., 2007). The stress is caused by the failure to integrate the reality of the loss into one's personal view of the world and/or in one's feeling of safety in life. One may speculate that this stress generates PTSD reactions in some bereaved individuals. Furthermore, we found that a confrontation with a violent loss was associated with membership of the combined PGD/PTSD class. This links up with prior evidence that confrontation with a loss due to unnatural, violent causes is associated with more pervasive distress (Boelen et al., 2015; Kristensen, Weisaeth, et al., 2012; Nickerson et al., 2014). A logical explanation for this association could be that a violent loss is a combination of a traumatic event that might result in PTSD symptoms and a loss that might result in PGD symptoms.

With regard to socio-demographic variables, we found lower levels of education to be associated with membership of the combined PGD/PTSD class; this finding also accords with prior research showing that lower education is a vulnerability factor for persistent distress following loss (Lobb et al., 2010) and trauma (Sareen, 2014).

Notably, in our study we focused on the co-occurrence of symptoms rather than the co-occurrence of disorders. For example, although our analyses revealed a subgroup of people endorsing both PGD and PTSD symptoms, we did not examine whether these people met formal criteria for diagnoses of PGD and PTSD. The reasons for this were twofold. Firstly, we aimed to compare our results with previous research of Nickerson et al. (2014) and Boelen et al. (2016) that also focused on symptoms rather than clinical diagnoses. Secondly, we sought to explore classes of symptoms in a non-clinical population in order to enhance knowledge about the nature of emotional responses to loss in the general population. However, it would be interesting to evaluate the co-occurrence or co-morbidity of the full disorders in future studies.

There are several other limitations to our study that should be kept in mind. Firstly, all data were based on self-report questionnaires. Associations between variables could therefore be inflated because of shared variance effects. Secondly,

it is important to note that some participants were bereaved less than 6 months. However, for a formal PGD diagnosis, symptoms need to be present more than 6 months after the loss (Prigerson et al., 2009). Although, as we noted, it was not our intention to assess formal diagnoses, it would be interesting for future studies to examine if symptom of PGD and PTSD differentiate themselves in more remotely bereaved individuals. Thirdly, our list of predictors was focused on socio-demographic and loss related variables. Further research is needed to examine to what extent other factors, including characteristics of the relationship such as dependency and personality variables such as attachment style are associated with different symptom patterns following loss. Therefore, our results can only be generalized to other populations with caution.

Notwithstanding these limitations, the current study is the first to identify subgroups of bereaved people based on symptom-levels of PGD, PTSD and depression. This was examined in a large general community sample confronted with a variety of losses. The findings suggest that bereaved individuals, who have experienced a violent loss or a loss of a close kin, have an elevated risk to develop combined symptomatology of PGD and PTSD. This implies that psychosocial support and screening methods are important to conduct after violent losses, for instance following traffic accidents, disaster, war and suicide-related losses, especially in close kin.

Furthermore, this research helps refining the proposed criteria for PGD in the forthcoming ICD-11. As shown, there is a high probability of the symptom 'yearning' and a low probability for 'avoidance' in all three classes. This accords with prior findings (Boelen & Hoijtink, 2009; Boelen et al., 2016; Prigerson, Shear, et al., 1999). Hence, these two symptoms are relatively less useful to detect psychopathology in bereaved individuals. Notably, mistrust was a discriminating symptom between the PGD and PGD/PTSD class in this study. Mistrust has been previously described as a pathway to higher PTSD levels in veterans (Schok, Kleber, Lensvelt-Mulders, Elands, & Weerts, 2011). This suggests that this symptom could be important in detecting co-morbid PTSD symptomatology in bereaved with PGD problems.

It would be interesting for future studies to employ latent class analyses in different subpopulations of bereaved individuals, like patients referred to mental health services. If in this subpopulation comparable classes of combined symptomatology would emerge, this could help in designing tailored intervention methods for specific symptom groups. For example, this study suggests that interventions for bereaved following a violent loss should possibly not only be focused on grief, but also on the PTSD symptoms.

In conclusion, we found three distinct classes of bereaved individuals confronted with natural and unnatural losses, based on the presence of PGD, MDD, and PTSD symptoms, namely a resilient, PGD, and a PGD/PTSD class. The loss of a child or a partner was associated with the PGD class. In addition, the loss of a child or a partner, a violent cause of the loss and a low level of education were associated with the PGD/PTSD class.

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Author contributions
MD and PB were responsible for the design of the study. PB was responsible for the data collection. MD analyzed the data. PB supervised MD. MD wrote the drafts of the manuscript. PB, GS, RK were involved in revising the draft versions critically and all authors approved the final version of the manuscript.

Traumatic grief

Chapter 4

Early indicators of problematic grief trajectories following bereavement

Djelantik, A. A. A. M. J., Smid, G. E., Kleber, R. J., & Boelen, P. A. (2017a). Early indicators of problematic grief trajectories following bereavement.

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Abstract

Background
Little is known about the development of prolonged grief disorder (PGD) symptoms over time in adults. For clinical purposes, it would be useful to have knowledge about early indicators of a problematic grief trajectory.

Objective
This study aimed to identify classes of bereaved individuals with similar trajectories of PGD symptoms and to design a provisional screening tool including symptoms predicting membership of classes with problematic grief trajectories.

Method
In a Dutch sample of 166 bereaved individuals, we conducted latent class analyses to identify classes of bereaved individuals with similar trajectories of PGD symptoms between two time points (mean of 6, and 18 months post-loss, respectively). Next, we used Receiver Operating Characteristic (ROC) analyses to examine which symptoms at baseline best predicted membership of classes with problematic grief trajectories.

Results
We found four different classes: a class including individuals with persistent high PGD symptoms (class 1, 6%), a class of individuals with persistent moderate PGD symptoms (class 2, 35%), a class of individuals with slightly decreasing moderate PGD symptoms (class 3, 33%) and a class of individuals with persistent low PGD symptoms (class 4, 26%). The endorsement of symptoms 'yearning', 'stunned', 'life is empty' and 'bitterness' as present 'often' during the preceding month at baseline best-predicted membership of class 1 or 2.

Conclusions
Two classes of individuals with problematic grief trajectories were identified. Four symptoms were found which could act as early indicators of these two classes in a provisional screening tool.

Keywords
• prolonged grief disorder • trajectories, screening • prevention
• latent class analyses.

Highlights of this article

- We found two classes with a problematic grief trajectory in adults over the first two years after a loss.
- The endorsement of symptoms 'yearning', 'stunned', 'life is empty' and 'bitterness' as present 'often' could act as early indicators of a problematic grief trajectory.

Introduction

Experiencing some form of grief is universal in individuals who have lost a loved one. However, a significant minority of bereaved individuals will develop prolonged grief disorder (PGD), i.e. persistent and debilitating grief reactions (Lundorff et al., 2017). Recently, PGD has been proposed for inclusion in the 11th edition of the International Statistical Classification of Diseases and Related Health Problems (Maercker et al., 2013; Prigerson et al., 2009). A slightly different conceptualization, named persistent complex bereavement disorder (PCBD), has been introduced in the 5th Diagnostic and Statistical Manual of Mental Disorders as a disorder requiring further research (American Psychiatric Association, 2013). PGD and PCBD strongly overlap in terms of symptoms, prevalence, and health correlates (Maciejewski et al., 2016).

Little is known about the development of PGD symptoms over time. In two subsequent studies (Melhem, Porta, Shamseddeen, Walker Payne, & Brent, 2011; Melhem et al., 2013), children who had lost a parent due to suicide, accident or sudden natural death, were followed up to 33 months after bereavement. Latent Class Growth Analysis (LCGA) was conducted to identify classes of children with similar grief trajectories. The researchers identified a class with high and sustained PGD symptoms (10%), a class with initially severe but rapidly declining PGD symptoms (31%), and a class with gradual decrease of PGD symptoms (59%). Next, the researchers identified a set of symptoms that were accurately related with membership of the high and sustained class using Receiver Operating Characteristic (ROC) analyses. This set included the following symptoms: 'Longing and yearning for the deceased', 'inability to accept the death', 'shock', 'disbelief', 'loneliness' and 'a changed worldview'. These items were subsequently put forth as items in a screening tool for disturbed grief in children.

To our knowledge, classes including individuals with different trajectories of PGD symptoms have not yet been examined among adults. It is also largely unclear what symptoms in the first year following loss, predict a pervasive trajectory. Such knowledge could help caregivers in their decisions regarding referrals for more extensive diagnostic evaluation and/or follow-up visits. This will make care for bereaved individuals more effective in terms of costs and organization.

The current study sought to extend existing knowledge on the development of PGD symptoms and early indicators among bereaved adults. Similar to Melhem et al. (2013), we first aimed to identify classes of bereaved individuals based on their grief trajectory. We expected that we would identify at least three classes. Next, we used ROC analyses to identify early indicators of the classes with a pervasive grief trajectory.

Methods

Participants and procedure

Data were gathered in the context of a larger study about grief (Djelantik et al., 2017b). Professional and lay mental health care workers handed out questionnaires to bereaved individuals; in our study, we included data from 269 participants who were bereaved less than one year ago. Participants gave written informed consent. The research program was approved by an ethical review board. 166 participants completed the same questionnaires one year later and were included for further analyses.

Most participants (n = 128; 77%) were women; 82 participants (49%) had been to college or university. Mean age of the participants was 54.5 (SD = 12.4) years. Losses were due to a natural cause in 150 (90%) cases and an unnatural cause (i.e., suicide, accident, homicide) in 16 (10%) cases. Twenty participants (12%) had lost a child, 103 (62%) a spouse/partner, and 43 (26%) a loved one other than a partner or child (e.g., friend, parent, sibling). Losses occurred on average 6 (SD = 3.2) months before completion of the first measures (Time 1 = T1). Table 1 summarizes analyses comparing participants who filled in questionnaires only at T1 (drop-outs) and participants who completed questionnaires on both time points (completers). There were no significant differences between the two groups.

Table 1. Differences between the participants dropping out between T1 and T2 (drop-outs) and those who continued to participate (completers)

	Drop-out (n = 103)	Completers (n = 166)	Significant differences between the groups
Gender, n (%)			$\chi^2(1, n = 269)$
Males	29 (28)	38 (23)	
Females	74 (72)	128 (77)	
Age (SD)	52.51 (13.98)	54.45 (12.43)	$t(267) = -1.15$
Education, n (%)			$\chi^2(1, n = 269) = 0.09$
Low level of education	54 (52)	84 (51)	
High level of education	49 (48)	82 (49)	
Violent cause, n (%)			$\chi^2(1, n = 269) = 1.51$
Yes	15 (15)	16 (10)	
No	88 (85)	150 (90)	
Kinship, n (%)			$\chi^2(2, n = 269) = 1.77$
Partner	56 (54)	103 (62)	
Child	13 (13)	20 (12)	
Someone other than partner/child	34 (33)	43 (26)	
Time since the loss in months (SD)	6.63 (3.48)	6.49 (3.28)	$t(267) = 0.33$
Mean total score of the PGD scale (SD)	29.18 (8.86)	27.86 (9.37)	$t(266) = 1.14$

Note. PGD = Prolonged grief disorder; SD = Standard deviation. There were no significant differences between the groups.

Measures

Prolonged Grief Disorder Scale (PGD Scale). The PGD scale contains 11 items representing criteria for PGD as proposed by (Prigerson et al., 2009). The endorsement of symptoms in the last month is rated on a Likert scale (5-point scale with anchors 1 = never to 5 = always). In the current sample, Cronbach's α was .91 at T1 and .93 at T2.

Statistical analyses

First, we conducted latent class analyses (LCA) using MPlus version 7.3.1 (Muthén & Muthén, 1998-2011) to identify classes of trajectories of PGD symptoms using the sum-score of the PGD-scale at T1 and T2. We started with a 1-class model and then increased the number of classes until we reached the best-fitting model using goodness-of-fit statistics.

Next, we conducted ROC analyses for each of the 11 symptoms to identify the early indicators of distress using SPSS version 23. We first considered the value of the Area Under the Curve (AUC). An AUC of more than 0.80 is an indication for a good diagnostic test (Cantor & Kattan, 2000). Second, we looked at the sensitivity and specificity of each distinct symptom. With regard to screening tools for mental disorders with a low prevalence in a population, like PGD, prior studies (i.e., (Smits, Smit, Cuijpers, & De Graaf, 2007), indicated that sensitivity is more important than specificity. Most screeners for PTSD have at least a sensitivity level of 0.80 (Mouthaan, Sijbrandij, Reitsma, Gersons, & Olff, 2014). Accordingly, we used a sensitivity level of 0.80 as the lower limit to identify early indicators. Third, we attempted to construct a provisional screening tool with these indicators. Therefore, we conducted ROC analyses on the sum-score of the identified early indicators and we chose a cut-off score based on a sensitivity above 0.80 and the highest possible specificity level. Applying a screening tool with a sensitivity of 0.80 to a group of 200 persons, given a prevalence of 10% of the disorder of interest (Lundorff et al., 2017), will result in 16 individuals who would be correctly identified as individuals at risk for the disorder and 4 individuals not identified as such. Subsequently, we calculated the positive predictive value (PPV) and the negative predictive value (NPV) for this set of items.

In the LCA, the 0.52% missing values were handled by Full Information Maximum Likelihood (FIML). For the ROC analysis, the missing values were handled by list-wise deletion.

Results

Latent class analyses

The fit indices for the latent class solutions are presented in Table 2. In the five-class solution, a very small sample size for one of the classes (n = 1) was found. Therefore, we did not consider the five-class solution and chose not to examine more classes. Among the remaining solutions, the four-class solution had the best combination of a low BIC (Bayesian Information Criterion), the lowest SS-BIC (Sample-Size Adjusted BIC), highest entropy, and suitable sample sizes. The four-class solution included a class of individuals with persistent high PGD symptoms (class 1; 6%, intercept 41.21, slope 6.14, p = .10), a class of individuals with persistent moderate PGD symptoms (class 2; 35%, intercept 35.03, slope 1.67, p = .11), a class of individuals with decreasing moderate PGD symptoms (class 3; 33%, intercept 26.77, slope -2.25, p = .01) and a class of individuals with persistent low PGD symptoms (class 4; 26%, intercept 16.16, slope -0.19, p = .81). See Figure 1.

Table 2. Goodness-of-fit statistics for 1 to 5 class solutions

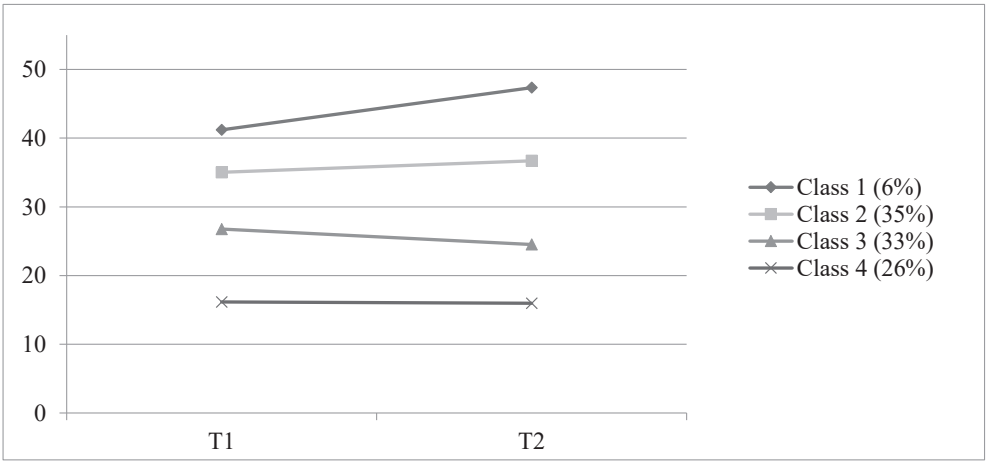
Classes	Log likelihood	AIC	BIC	SS-BIC	Entropy	BLRT	Smallest sample size (n)
1 class	-1233.824	2475.648	2488.096	2475.431			
2 class	-1170.968	2355.936	2377.720	2355.557	0.81	p = < .001	80
3 class	-1153.859	2327.718	2358.837	2327.177	0.78	p = < .001	47
4 class	-1146.935	2319.870	2360.326	2319.167	0.82	p = < .001	9
5 class	-1138.358	2308.716	2358.508	2307.850	0.86	p = < .001	1

Note. AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion; BLRT = bootstrapped likelihood ratio test; SS-BIC = Sample Size Adjusted BIC.

ROC analysis

Two classes emerging from the LCA were considered to represent problematic grief trajectories, namely class 1 with individuals with a persistent high sum score, and class 2 with a persistent moderate sum score. Therefore, we decided to run the analysis twice. First, we investigated the sensitivity and specificity of each item for inclusion in class 1, and secondly for inclusion in either class 1 or class 2.

With regard to class 1, the symptom items 'yearning', 'stunned', 'life is empty' and 'bitterness' scored with ≥ 4 could be selected (Table 3). With regard to the prediction of membership of class 1 or 2, there were no items with both an AUC above the 0.80 and sensitivity above 0.80 (Table 4). Therefore, we considered only the four symptoms we found in the first analysis as possible early indicators.



Note. T1 = mean of 6 months after loss; T2 = mean of 18 months after loss.

*Figure 1***.** Estimated grief classes for the four-class solution

Table 3. Sensitivity and specificity of items with a score ≥ 4 at T1 (Mean: 6 months after loss) for a positive outcome for persistent high PGD symptoms (class 1)

Symptoms	Frequency of ≥ 4 scores at T1 (%)	Sens	Spec	AUC	*p*
Non acceptance	19	0.556	0.825	0.562	.53
Yearning	**65**	**1.000**	**0.375**	**0.834**	**< .001**
Stunned	**27**	**0.889**	**0.635**	**0.843**	**< .001**
Mistrust	8	0.778	0.955	0.874	< .001
Life is empty	**31**	**0.889**	**0.726**	**0.870**	**< .001**
Numbness	15	0.778	0.885	0.871	< .001
Bitterness	**22**	**0.889**	**0.815**	**0.858**	**< .001**
Part of self-died	34	0.778	0.682	0.835	< .001
Functioning	22	0.556	0.796	0.705	.04
Difficulty moving on	25	0.667	0.771	0.797	< .001
Avoidance	4	0.222	0.680	0.615	.25

Note. Items in boldface type correspond to the items chosen for the screening tool. AUC = Area under the curve; Sens = sensitivity; Spec = specificity.

Table 4. Sensitivity and specificity of items with a score ≥ 4 at T1 (%) at T1 (Mean: 6 months after loss) for a positive outcome for a problematic grief trajectory (class 1 or 2)

Symptoms	Frequency of ≥ 4 scores at T1 (%)	Sens	Spec	AUC	*p*
Non acceptance	19	0.412	0.958	0.756	< .001
Yearning	65	0.882	0.495	0.789	< .001
Stunned	27	0.536	0.927	0.840	< .001
Mistrust	8	0.203	1.000	0.777	< .001
Life is empty	31	0.600	0.906	0.851	< .001
Numbness	15	0.300	0.958	0.859	< .001
Bitterness	22	0.457	0.948	0.803	< .001
Part of self-died	34	0.614	0.854	0.815	< .001
Functioning	22	0.400	0.906	0.750	< .001
Difficulty moving on	25	0.486	0.917	0.846	< .001
Avoidance	4	0.100	1.000	0.658	< .001

Note. AUC = Area under the curve; Sens = sensitivity; Spec = specificity.

Provisional screening tool for problematic grief trajectories

As a next step, we conducted ROC analyses on the sum-score of the four identified early indicators to detect the best cut-off score for our provisional screening tool for problematic grief trajectories. A sum-score ≥13 was found to be an optimal cut-off for membership of class 1 or 2 (i.e. persistent high or moderate PGD symptoms). The PPV was 0.84 and the NPV was 0.91 (AUC = 0.91, SE = 0.02, p = .00, sensitivity = 0.84, specificity = 0.80, prevalence class 1 = 6%, prevalence class 2 = 35%) . A PPV of 0.84 means that a positive result of this test (sum-score of ≥ 13) gives a probability of 0.84 that the individual will develop a problematic grief trajectory. A NPV of 0.91 means that a negative result of this test (sum-score of <13) gives a probability of 0.91 for the individual to not develop a problematic grief trajectory (Table 5).

Table 5. Provisional screening tool for problematic grief trajectories

Early indicators for distress	Score (1 = never, 2 = rarely, 3 = sometimes, 4 = often, 5 = always)
I feel myself longing and yearning for the deceased	1-2-3-4-5
I feel stunned, dazed or shocked over his/her death	1-2-3-4-5
I feel that life is empty or meaningless without the deceased	1-2-3-4-5
I feel bitter over his/her death	1-2-3-4-5
Total score	≥13 = indicative of a problematic grief trajectory

Discussion

We identified four classes of bereaved individuals with a similar trajectory of PGD symptoms. In the previous study of Melhem et al. (2011) in a sample of children, three classes were found. A possible explanation could be that the nature of the sample and losses differed between both studies. In the sample of Melhem et al. (2011) children who had experienced traumatic losses were examined, our sample consisted of adults confronted with various losses (i.e. traumatic, non-traumatic and different types of kinship). Children's grief reactions are strongly shaped by their developmental capacities, and may therefore be expressed differently than adult's reactions (Christ, Siegel, & Christ, 2002; Miller, 2009). Furthermore, it is known that the cause of death may influence bereavement outcome (Djelantik et al., 2017b).

Next, we examined early indicators of the classes with problematic grief trajectories. Experiencing symptoms 'yearning', 'stunned', 'life is empty' and 'bitterness' often during the past month at T1 predicted membership of classes with a problematic grief trajectory. The indicators found in our study are different from the symptoms selected in earlier studies examining early indicators of disturbed grief (Guldin, O'Connor, Sokolowski, Jensen, & Vedsted, 2011; Melhem et al., 2013; Shear et al., 2006). There could be several reasons for this. Firstly, the symptoms and criteria for a grief disorder are an ongoing subject of debate in scientific publications. All studies used different criteria to select their predictive grief symptoms (Horowitz et al., 2003; Prigerson, Maciejewski, et al., 1995). We only had data on 11 symptoms included in the PGD scale, while other symptoms like 'changed world view' were not included in our analyses. Furthermore, also the methodology differed. For instance, in the study of Shear et al. (2006), experts selected the screening items, while in other studies ROC-analyses were used.

The following limitations of our study need to be mentioned. Firstly, our study is based on self-report questionnaires. This means that we only could examine the levels of PGD symptoms, instead of PGD diagnoses. Secondly, the classes are based on two time points. To be able to make more detailed trajectories of grief symptoms, more measurement points are needed. Thirdly, our sample was a convenience sample, with a high heterogeneity of losses and an overrepresentation of women. Therefore, generalization should only be done with caution. In the future, predictive symptoms need to be examined in longitudinal studies with more measurement points, whereas PGD diagnosis should be confirmed by clinical interviews.

Notwithstanding these limitations, this study creates more insight into markers of disturbed grief. One could argue that because 'yearning' is so commonly experienced by bereaved individuals, it would not be suitable as a predictive symptom for disturbances (Djelantik et al., 2017b). However, an often experience of 'yearning' was identified as an early indicator of distress. Apparently, it does matter how often and how much time a bereaved individual yearns for his or her loved one in the first year. Surprisingly, the symptom 'non-acceptance of the loss' did not have a high sensitivity to predict membership of classes with problematic grief trajectories. However, the specificity of this symptom was high (Tables 3 and 4). So, if bereaved individuals do not accept the loss of their loved one in the first year after the loss, this is not highly predictive for a problematic grief trajectory. Meanwhile, if bereaved individuals accept the loss of their loved one, this is highly predictive for a more favorable course of grief reactions.

In conclusion, this first study about early indicators of problematic grief trajectories among adults will help caregivers to identify bereaved individuals at risk for developing psychopathology. Endorsement of the four early indicators with a cut-off score of ≥ 13 may be used as a screening tool to identify bereaved people at risk for problematic grief trajectories. This generates opportunities to be selective in referring bereaved individuals presenting at victim support organizations or healthcare centres for more extensive diagnostic evaluation and to offer follow-up visits only to those who need them most.

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Author contributions
PB was responsible for the data collection. MD and PB were responsible for the design of the study and interpretation of the data. MD analyzed the data. PB, RK and GS supervised MD. MD wrote the drafts of the manuscript. All authors were involved in revising the draft versions critically and all authors approved the final version of the manuscript.

Chapter 5

Do prolonged grief disorder symptoms predict posttraumatic stress disorder symptoms following bereavement? A cross-lagged analysis

Djelantik, A. A. A. M. J., Smid, G. E., Kleber, R. J., & Boelen, P. A. (2018). Do prolonged grief disorder symptoms predict post-traumatic stress disorder symptoms following bereavement? A cross-lagged analysis.

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Abstract

Background
Bereavement can precipitate different forms of psychopathology, including prolonged grief disorder (PGD) and posttraumatic stress disorder (PTSD) symptoms. How these symptoms influence each other is unclear. The aim of this study was to examine the temporal relationship of symptoms of PGD and PTSD following bereavement.

Methods
We included 204 individuals, confronted with the loss of a loved one within the past year, who completed self-report measures of PGD and PTSD and again completed these measures one year later. We conducted a cross-lagged analysis to explore cross-lagged and autoregressive relationships.

Results
A significant cross-lagged relationship was found between PGD symptoms at time point 1 (T1) and PTSD symptoms at time point 2 (T2) ($\beta = 0.270$, $p < .001$). Furthermore, PGD symptoms at T1 predicted PGD symptoms at T2 and PTSD symptoms at predicted PTSD symptoms at T2 ($\beta = 0.617$ and $\beta = 0.458$, ps $< .001$, respectively). In addition, PGD and PTSD symptoms were significantly correlated on both time points.

Conclusions
We found that PGD symptoms predict PTSD symptoms after a loss. Potentially, this could help to design new strategies and interventions for bereaved individuals. Additionally, PGD symptom levels predicted PGD symptom levels one year later, independently of the PTSD levels. This finding adds to the accumulating evidence that PGD is a distinct disorder.

Keywords:
• prolonged grief disorder • posttraumatic stress disorder • cross lagged analysis
• persistent complex bereavement disorder • temporal relationship.

Highlights of this article

- The temporal relationship of prolonged grief and posttraumatic stress is relatively unexplored.
- A cross-lagged analysis in a convenience sample out of the community was employed.
- We found that PGD symptoms may predict PTSD symptoms after a loss.
- PGD severity predicted PGD severity one year later, independently of PTSD severity.
- Findings could help to design new strategies and interventions for bereaved individuals.

Introduction

Following the death of a loved one, symptoms of both grief and posttraumatic stress can develop in bereaved individuals. In most people these symptoms decrease over time. However, in others they remain and spiral into symptoms of prolonged grief disorder (PGD) and/or posttraumatic stress disorder (PTSD) (Djelantik et al., 2017b; Lundorff et al., 2017). Characteristic symptoms of PGD include frequent preoccupying thoughts and memories of the deceased person, a feeling of disbelief or inability to accept the loss, and difficulty imagining a meaningful future without the deceased person, to such an extent that the person is impaired in daily functioning during at least 6 months after the loss. A key distinctive feature of PGD is 'yearning for the deceased', whereas 'fear' is the hallmark symptom of PTSD (Maercker & Znoj, 2010; Shear, 2015). PGD will likely be included in the forthcoming edition (11th) of the International Statistical Classification of Diseases and Related Health Problems (Maercker et al., 2013; Prigerson et al., 2009). Recently, persistent complex bereavement disorder (PCBD) has been included in the Diagnostic and Statistical Manual of Mental Disorders, 5th edition (American Psychiatric Association, 2013) as a condition requiring further research. Research has indicated that PGD and PCBD strongly overlap in terms of symptoms, prevalence, and health correlates (Maciejewski et al., 2016).

In several studies the co-occurrence of symptoms of PGD and PTSD has been examined. In these studies subgroups of bereaved individuals emerged, some including people with pre-dominantly PGD symptoms and other including people with a combination of PGD and PTSD symptoms (Djelantik et al., 2017b; Lenferink, de Keijser, Smid, Djelantik, & Boelen, 2017; Nickerson et al., 2014). Little is known about whether and how symptoms of both disorders influence each other over time. In other words, are bereaved individuals with PTSD symptoms at risk of developing PGD symptoms later in time, or are bereaved individuals with PGD symptoms at risk of developing PTSD symptoms later in time? Or are the two disorders so strongly related to each other that their symptoms tend to co-occur simultaneously in bereaved individuals over time?

PGD is characterized by separation distress and PTSD is characterized by traumatic distress, including intrusive memories and avoidance behaviours associated with the circumstances of the loss. Some have argued that PTSD symptoms could develop into PGD symptoms (Nakajima et al., 2012; Raphael & Martinek, 1997). It seems a commonly accepted notion that the presence of PTSD symptomatology after loss may impair the processing of the loss itself, thereby maintaining grief symptoms. Indeed, it makes intuitive sense that, in case

thoughts/memories of the loss elicit distressing images and fear, this may impair the processing of the implications and reality of the loss, which in turn will cause grief symptoms (i.e. separation distress) to persist.

Only one empirical study has yet tested this assumption (O'Connor et al., 2015). Surprisingly, in that study a relationship opposite to the commonly accepted notion was found. Specifically, O'Connor and her colleagues [13] examined correlations between changes in severity of PGD and PTSD symptoms over 4 years following old age spousal bereavement. Their study showed linear decreasing PGD and PTSD symptoms over time. Furthermore, using lower level mediation analysis, changes in PGD were found to mediate 83% of the relationship between time and PTSD, whereas changes in PTSD only mediated 17% of the relationship between time and PGD. This suggests that changes in symptom levels of PGD mediated changes in PTSD severity to a greater extent than vice versa.

Knowledge about the temporal relationship between PGD and PTSD symptoms could inform attempts to refine treatment strategies for bereaved individuals with elevated psychopathology. For instance, if PGD symptoms would be found to predict PTSD symptoms, targeting PGD symptoms early after bereavement could help to curb the exacerbation of PTSD symptoms later on.

The present study sought to extend prior work on the temporal order of symptoms of PGD and PTSD using a cross-lagged panel path model. Using data from participants who completed questionnaires tapping PGD and PTSD within the first years after their loss and again one year later, we examined to what extent PGD and PTSD levels at time point 1 (T1) predicted PGD and PTSD levels at time point 2 (T2).

We hypothesized that we could replicate the findings of O'Connor et al. (2015) and that we would find (1) a significant relationship between the symptom levels of PGD and PTSD on both time points and (2) a cross-lagged relationship between PGD and PTSD symptom levels over time, where the effects of PGD symptom levels at T1 on PTSD symptom levels at T2 would be stronger than the effects of PTSD symptoms levels at T1 on PGD symptoms levels at T2.

Methods

Participants and procedure

Data were collected in the context of two consecutive research programs on cognitive behavioral and memory processes in grief conducted at Utrecht University (in 2009-2011 and 2012-2016, respectively). The same recruitment methods and questionnaires were used in both research programs. Participants were recruited

via announcements on websites providing information about grief. Research programs were approved by a local ethical review board and type-written informed consent was obtained from all participants. A total number of 408 people, who were bereaved maximally one year ago entered the studies. They were all invited to complete questionnaires again, one year after inclusion in the study. The current study was based on data from the 204 participants who did so (see Footnote 1). On average, the participants were 52.68 (SD = 14.44) years old. The sample included 165 (81%) women and 39 (19%) men. As for education, 99 (49%) individuals had been to college or university, the remaining 105 participants had followed education lower than college or university. The majority of the participants (118; 58%) had lost a spouse/partner; 14 (7%) had lost a child and 72 (35%) lost a loved one other than a spouse or a child (e.g., parent, sibling, or friend). On average, losses had occurred 4.49 (SD = 2.83) months earlier and were due to a natural cause in 182 (89%) of the cases and due to an unnatural cause (i.e., suicide, accident, homicide) in 22 (11%) cases.

Measures

Prolonged Grief Disorder Scale (PGD Scale) The PGD scale is based on the Inventory of Complicated Grief (Prigerson et al., 2009). It contains 11 items representing the criteria for PGD as per Prigerson et al. (2009), a selection of which will be included in the forthcoming ICD-11 classification of PGD (Maciejewski et al., 2016). Accordingly, the scale includes one separation distress symptom, nine cognitive and emotional symptoms, and one functional impairment symptom. Participants rate how often symptoms occurred in the preceding month on a 5-point scale (1 = never, 5 = always). Prior research supported the internal consistency and concurrent validity of the measure (Boelen, Keijsers, & van den Hout, 2012). In the current sample, Cronbach's α was .91 at T1 and .93 at T2.

PTSD Symptom Scale Self-Report Version (PSS-SR) The PSS-SR is a 17-item measure of PTSD symptoms as defined in DSM-IV (American Psychiatric Association, 2000; Foa, Riggs, Dancu, & Rothbaum, 1993). Respondents rate the frequency of symptoms on a 4-point scale (0 = not at all, 4 = five or more times per week/almost always). The index event was defined as 'the death of your loved one' (e.g., 'How often did you have unpleasant dreams or nightmares about the death of your loved one?'). In this research, the Dutch version was used (Engelhard et al., 2007). In the current sample, Cronbach's α was .87 at T1 and .89 at T2.

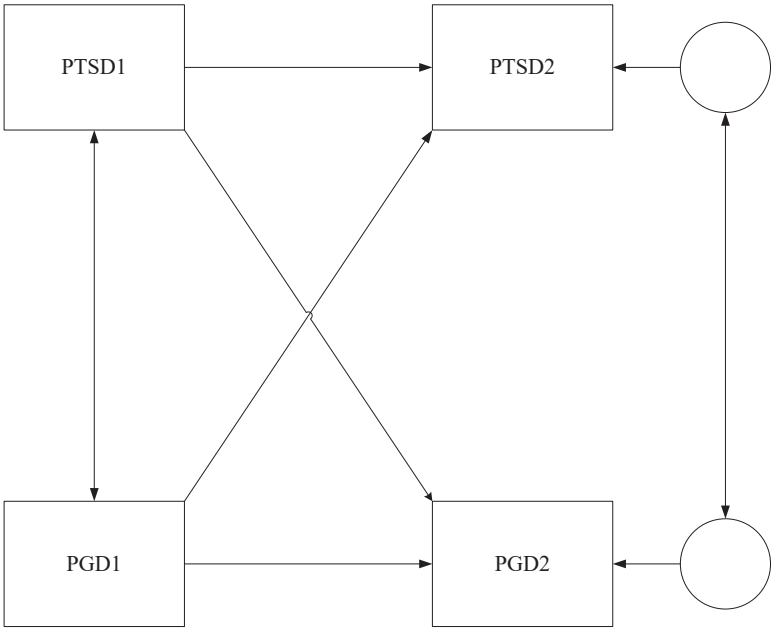
Statistical analysis

Firstly, we examined differences in demographic characteristics (age, gender, and level of education) and variables related to the loss (cause of the loss, kinship, and time since loss) between the participants dropping out between T1 and T2 (henceforth referred to as dropouts) and those who continued to participate (referred to as completers). We examined the differences with t-tests or chi-square tests using SPSS (version 24; IBM Corp., Armonk, NY, USA). Additionally, we explored the mean scores on the measures of PGD and PTSD and the number of people meeting criteria for probable caseness of PGD and PTSD at both time points. A score of 4 or 5 on the 'yearning'-symptom, a score of 4 or 5 on the 'impairment in functioning' item, and a score of 4 or 5 on at least 5 of the 9 'cognitive, emotional, and behavioral symptoms' was used as the criterion for probable PGD caseness. Based on the scoring rule put forth by Brewin et al. [18] probable PTSD caseness (as per DSM-IV) was defined as a score of at least 2 (i.e. two to four times a week/ half of the time) on at least one re-experiencing symptom, three avoidance symptoms, and two hyperarousal symptoms.

Subsequently, we constructed a cross-lagged panel path model in Mplus 7.3.1 (Muthén & Muthén, 1998-2017). In this model, we examined the relationships between the sum score of PGD and PTSD at T1 and the sum score of PGD and PTSD at T2. Because of our sample size, the number of parameters we could estimate was limited (Jackson, 2003). The 44 missing values (3% of the total number of values) in our dataset were handled using full information maximum likelihood (FIML) estimation.

In our cross-lagged panel path analysis autoregressive, correlated, and cross-lagged relationships were included in one single model (Geiser, 2012). The autoregressive relationships accounted for the stability over time for both the PGD sum score and the PTSD sum scores. Additionally, we included the correlations between the sum score of PGD and PTSD at T1 and T2, taking into account that the two constructs are moderately to strongly associated (Boelen et al., 2016; Djelantik et al., 2017b; Nickerson et al., 2014). Hence, the cross-lagged effects can be interpreted as the predictive effects of (1) the sum scores of PGD at T1 on PTSD at T2 and (2) the sum scores of PTSD at T1 on PGD at T2. The model is depicted in Figure 1.

The data collection of the first measurement took place in the first year after the loss. However, some participants filled in questionnaires only a few weeks to months after their loss, others filled in questionnaires almost 1 year after their loss. To evaluate whether time passed since loss influenced the results of our primary model, we ran a second model in which we included time since loss as a covariate to all four sum scores.



Note. PGD1 = Prolonged grief disorder sum score at time point 1; PGD2 = Prolonged grief disorder sum score at time point 2; PTSD1 = Posttraumatic stress disorder sum score at time point 1; PTSD2 = Posttraumatic stress disorder sum score at time point 2.

Figure 1. The cross-lagged panel path model without the covariate time passed since loss

Both models were saturated models with zero degrees of freedom and a comparative fit index (CFI = 1) indicating perfect fit.

Results

Drop-out analyses and characteristics of PGD and PTSD

Results of the drop-out analyses are presented in Table 1. From the 408 participants at T1, 204 participated at T2 as well. These completers were more likely to have lost a partner than the dropouts. There were no statistically significant differences between the completers and the dropouts in terms of demographic characteristics (age, gender, and level of education) and the other loss-related variables at T1.

Table 1. Differences between the participants dropping out between T1 and T2 (dropouts) and those who continued to participate (completers)

	Dropouts (n = 204)	Completers (n = 204)	Significance tests for differences between the groups
Gender, *n* (%)			$\chi^2(1, n = 408) = 1.449$
Males	48 (24)	39 (19)	
Females	155 (76)	165 (81)	
Age, *M* (SD)	50.06 (14.09)	52.68 (14.44)	$t(406) = -1.849$
Education, *n* (%)			$\chi^2(1, n = 408) = 0.000$
College/ university-level education	99 (49)	99 (49)	
Other education	105 (51)	105 (51)	
Violent cause, *n* (%)			$\chi^2(1, n = 408) = 0.026$
Yes	21 (10)	22 (11)	
No	183 (90)	182 (89)	
Kinship, *n* (%)			$\chi^2(2, n = 408) = 8.459^*$
Partner	89 (44)	118 (58)	
Child	16 (8)	14 (7)	
Other	99 (49)	72 (35)	
Time since the loss in months, *M* (SD)	4.49 (3.01)	4.49 (2.83)	$t(406) = -0.017$
Mean PGD total score, *M* (*SD*)	29.06 (8.91)	29.81 (9.37)	$t(389) = -0.446$
Mean PTSD total score, *M* (SD)	32.71 (10.56)	33.36 (8.97)	$t(353) = -0.623$

Note. PGD = Prolonged grief disorder; PTSD = Posttraumatic stress disorder; SD = Standard Deviation; * $p < .05$; ** $p < .01$; *** $p < .001$.

Both the mean scores of PGD and PTSD and the percentages of people meeting criteria for probable PGD and probable PTSD caseness declined from T1 to T2, see Table 2.

Table 2. PGD and PTSD characteristics at both time points

Characteristics	T1	T2
PGD sum score M (SD)	29.81 (9.37)	24.41 (9.50)
Persons scoring above cut-off point PGD scale, *n* (%)	26 (13)	11 (5)
PTSD sum score M (SD)	33.36 (8.97)	29.15 (8.07)
Persons scoring above cut-off point PTSD scale, *n* (%)	44 (22)	19 (9)

Note. PGD = Prolonged grief disorder; PTSD = Posttraumatic stress disorder; SE = Standard Error; T1 = time point 1; T2 = time point 2.

Predictive effects of PGD and PTSD symptoms over time

Table 3 summarizes results of the cross-lagged analysis. PGD symptoms at T1 significantly predicted PTSD symptoms at T2 (β = 0.279, $p < .001$). This indicates that for every one-point increase of the PGD sum score at T1, the PTSD sum score at T2 will be 0.279 points higher on the standardized scale, when controlling for the other parameters in the model. PTSD symptoms at T1 did not predict PGD symptoms at T2 (β = 0.120, $p = .122$).

As for the auto-regressive relationships, PGD symptom scores at T2 were significantly associated with PGD symptom scores at T1 (β = 0.617, $p < .001$). Similarly, PTSD scores at T2 were significantly associated with PTSD symptom scores at T1 (β = 0.597, $p < .001$).

PGD symptoms and PTSD symptoms were significantly correlated at both time points. At T1 there was a correlation of β = 0.753, $p < .001$. At T2 there was a correlation of β = 0.733, $p < .001$. The inclusion of the covariate time passed since loss had a small effect on all β but did not alter the number and type of the significant effects.

Table 3. Standardized results of the model with and without covariate time passed since loss

Parameters	Model without covariate β (SE)	Model with covariate β (SE)
Autoregressive effects		
PGD1 to PGD2	0.617 (0.071)***	(0.072)***
PTSD1 to PTSD2	0.458 (0.079)***	0.481 (0.078)***
Cross-lagged effects		
PGD1 to PTSD2	0.270 (0.081)**	(0.081)**
PTSD1 to PGD2	0.120 (0.078)	0.136 (0.078)
Correlations		
PTSD1 with PGD1	0.758 (0.031)***	0.763 (0.031)***
PTSD2 with PGD2	0.733 (0.035)***	0.729 (0.035)***

Note. β = standardized regression coefficient; PGD1 = Prolonged grief disorder at time point 1; PGD2 = Prolonged grief disorder at time point 2; PTSD1 = Posttraumatic stress disorder at time point 1; PTSD2 = Posttraumatic stress disorder at time point; SE = Standard Error; * $p < .05$; ** $p < .01$; *** $p < .001$.

Discussion

Relationship of the findings with prior work

In this study, we sought to further our knowledge about the temporal relationships between PGD and PTSD symptoms. We found a significant relationship between symptom levels of PGD and PTSD on both time points and a cross-lagged relationship between PGD symptoms at T1 and PTSD symptoms at T2. With regard to the interpretation of the values of the predictive relationships between PGD and PTSD our findings indicate that the sum score of PGD at T1 predicts both the sum scores of PGD and PTSD at T2, but the prediction for the sum score of PGD at T2 is stronger than for the sum score of PTSD at T2. The PTSD sum score at T1 only predicts the PTSD sum score at T2 and does not predict the PGD sum score at T2. This indicates that a higher score on PGD symptoms in the first year following bereavement is associated with a higher score on PTSD symptoms one year later, even when controlling for the stability of symptom levels of PGD and PTSD over time and correlations between symptom levels.

The temporal relationship between PGD symptoms and PTSD symptoms has been previously examined by O'Connor et al. (2015); that study relied on a different type of sample, included more than two time measurements, and used a different statistical approach. The fact that we have found the same temporal relationship between PGD and PTSD symptoms, although we took into account more relationships simultaneously, used different time lags and assessed it in a different sample, contributes to the evidence that PGD symptoms early after bereavement may contribute to the exacerbation and maintenance of PTSD symptoms over time.

Our second finding, namely that PGD symptoms are strongly associated with PGD scores at T2, independently of the sum score of PTSD symptoms one year later, lends support to the accumulating evidence that PGD and PTSD are different symptom constructs. This has been previously shown in several bereaved populations and already resulted in the proposed inclusion of a grief disorder in the DSM 5 and ICD-11 (Boelen & van den Bout, 2005; Djelantik et al., 2017b; Lichtenthal et al., 2004; Maercker & Lalor, 2012).

Lastly, adding the covariate time passed since loss did not alter the significant pathways. This suggests that symptoms experienced by participants, who filled in the first questionnaires early in the first year of bereavement, followed the same temporal path as symptoms experienced by participants, who filled in the first questionnaire at the end of the first year. These findings are reminiscent of findings from other studies showing that time since loss has a limited impact on psychopathology after loss (Boelen et al., 2016; Djelantik et al., 2017b).

Theoretical and clinical implications

Our finding that PGD symptoms predict PTSD symptoms after bereavement is contrary to the clinical notion that fear, stress and intrusive memories of the loss might impair the grieving process (Nakajima et al., 2012; Raphael & Martinek, 1997). Therefore, we may need to re-examine our notions about the development of and relationship between PGD and PTSD symptoms in bereaved individuals. There are several possible explanations for why elevated PGD symptoms could contribute to PTSD symptomatology.

For example, in the cognitive behavioral theoretical framework of PGD three processes have been described to add to PGD symptomatology. These three processes are 1) anxious and depressive avoidance strategies in experiencing grief reactions, 2) negative global beliefs and misinterpretations of grief reactions and 3) a poor integration of the memory of the loss in the autobiographical knowledge of the bereaved individual (Boelen et al., 2006). The outcome of these processes is elevated bereavement-related distress and fear of experiencing grief reactions. In this perspective, one could argue that 'avoidance of reminders of the loss of the loved one' could gradually develop in 'avoidance of reminders of the (traumatic) event of the loss'. For instance, one could start with avoiding pictures of the deceased and this could in turn develop into avoiding pictures related to the event of the loss.

Another perspective is the stress sensitization theory. According to this theory, individuals who have experienced a major life event are more vulnerable for developing PTSD symptoms in response to subsequent stressful events (Antelman & Yehuda, 1994; McFarlane, 2010; Smid, Kleber, et al., 2015; Smid, van Zuiden, et al., 2015). Accordingly, bereaved individuals with elevated PGD symptoms could be considered to be prone to developing PTSD-like symptoms when confronted with subsequent stressors in the period after the loss of a loved one.

A further perspective is that one could argue that the death of a loved one influences the social support for the bereaved individual. In many studies social support is mentioned as an important resource available after the experience of a trauma and has been consistently associated with positive mental and physical health (Maercker & Horn, 2013). A note that has to be taken into account is that actual and perceived social support can be interpreted differently by the affected individual. For instance, when a person providing social support is being perceived as unresponsive, it could also have negative effects on the traumatized individual (R. Schwarzer & Knoll, 2007). A bereaved individual may perceive a lack of social support for several reasons. First, logically, a loved one, an important resource which could be the one able to provide social support to the bereaved individual,

has died and is therefore not available. Second, one could argue that other possible providers of social support, like family members or close friends, are mourning themselves and therefore less available to support the individual who is coping with PGD symptoms. Third, characteristic symptoms of PGD include 'feeling distant to others' and 'difficulty trusting people'. Intuitively, these feelings influence the way social support is perceived by the bereaved individual. A lack of perceived social support could enhance the development of PTSD symptoms. This could therefore be a mechanism towards experiencing more PTSD symptoms after experiencing PGD symptoms in bereaved individuals.

Pending future studies replicating the current findings, our results may have clinical implications. In case of PGD symptoms leading to PTSD symptoms, it could mean that reductions in PGD symptoms in an early stage after the loss of a loved one may protect bereaved individuals from developing intense PTSD symptoms later on. This may guide the development of preventive interventions for bereaved individuals in the first year after bereavement. For example, counselling after bereavement could focus first on the acceptance of the loss before targeting the circumstances around the death. Furthermore, our results indicate that symptoms of psychopathology after loss are, to some extent, stable over time. This comprises presumptive evidence that individuals at risk for mental health problems could be identified early after bereavement and that PGD and PTSD symptoms are important to be assessed separately following a loss of a loved one.

Limitations

There are several limitations to the current study, which have to be considered. Firstly, this study has been carried out in a community-dwelling sample and included relatively many female widowers. Therefore, generalization can only be done with caution. Also, we did not add variables that could have influenced the temporal relationship between PGD and PTSD such as depression, other traumatic events, other losses, and use of psychosocial or medication treatment. The degree to which these and other variables moderate the association of symptoms of PGD and PTSD over time remains to be studied. A further limitation is that self-report questionnaires rather than clinical interviews were used to assess symptoms of PGD and PTSD. Thus, we were unable to examine true prevalence rates of full blown PGD and PTSD in our sample. Finally, because this study relied on a community sample, the degree of distress was relatively low. It would be interesting to further examine the relationship between PGD and PTSD in clinical samples.

Conclusions

Notwithstanding the limitations, this study suggests that PGD symptoms in the first year after a loss of loved one affect PTSD symptoms more strongly than vice versa. This might be beneficial in developing new strategies in the care of bereaved individuals. Potentially, targeting PGD symptoms in the first year after the loss, may prevent further psychopathology one year later. Furthermore, our findings suggest that PGD symptom levels were able to predict PGD symptom levels a year later independently of the PTSD symptom levels. This finding lends support to the validation of PGD as a separate construct and the inclusion of PGD and PCBD in the ICD-11 and the DSM-5.

Conflict of interest and funding

The authors declare that they have no conflict of interest to report. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

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Author contributions

PB was responsible for the data-collection. MD was responsible for the design of the study, data-analysis, and interpretation of the data. PB, RK and GS supervised MD. MD wrote the drafts of the manuscript. All authors were involved in revising the draft versions critically and all authors approved the final version of the manuscript.

[1] The two samples did not differ in terms of sociodemographic variables, except for age and gender. We therefore examined whether age and gender affected the results of our analyses when including these variables as covariates to all four sum scores in our analysis. This was not case.

Chapter 6

Symptomatology following loss and trauma: Latent class and network analyses of prolonged grief disorder, posttraumatic stress disorder, and depression in a treatment-seeking trauma-exposed sample

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Depression and Anxiety. doi:10.1002/da.22880

Abstract

Background
Although bereavement is likely a common stressor among patients referred to a psychotrauma clinic, no study has yet examined the co-occurrence and relationships between symptoms of prolonged grief disorder (PGD), posttraumatic stress disorder (PTSD), and major depressive disorder (MDD) symptoms in this population.

Methods
In a sample of patients seeking treatment following psychological trauma (N = 458), we used latent class analyses to identify classes of patients sharing the same profile of PGD, PTSD, and depression symptoms. We then used network analysis to investigate the relationships among these symptoms and with loss-related variables.

Results
Most participants (65%) were members of a class that exhibited elevated endorsement of PGD symptoms. PGD, PTSD, and depression symptoms hung together as highly overlapping but distinguishable communities of symptoms. Symptoms related to social isolation and diminished sense of self bridged these communities. Violent loss was associated with 'more difficulty accepting the loss'. The loss of close kin was most strongly associated with 'difficulty moving on in life'.

Conclusions
PGD symptoms are common in trauma-exposed bereaved adults and closely associated with symptoms of PTSD and depression, illustrating the importance of assessing bereavement and PGD symptoms in those seeking treatment following trauma.

Keywords
• bereavement • trauma • prolonged grief disorder • posttraumatic stress disorder • depression • latent class analyses • network analysis.

Highlights of this article

- PGD symptoms are common in trauma-exposed bereaved adults.
- PGD, PTSD, and depression symptoms are highly overlapping but distinguishable communities of symptoms.
- Symptoms related to social isolation and diminished sense of self bridged the PGD, PTSD and depression communities.
- Violent loss was associated with more difficulty accepting the loss. The loss of close kin was most strongly associated with difficulty moving on in life.
- It is important to assess bereavement and PGD symptoms in those seeking treatment following trauma.

Introduction

Nearly half of all patients receiving treatment for posttraumatic stress disorder (PTSD) fail to recover (Bradley, Greene, Russ, Dutra, & Westen, 2005). In groups that have experienced multiple traumas, recovery-rates are even lower (Green et al., 2000; Nosè et al., 2017; Steenkamp, Litz, Hoge, & Marmar, 2015). Although PTSD is the disorder most commonly associated with trauma (de Vries & Olff, 2009; Foa, Stein, & McFarlane, 2006), trauma-exposed patients frequently present with additional co-occurring disorders (Brady, Killeen, Brewerton, & Lucerini, 2000; Foa et al., 2006). To improve the efficacy of treatments for trauma-related psychopathology, it is critical to assess the full breadth of the complex clinical picture presented by these patients.

Bereavement is a potent stressor frequently experienced by those exposed to war, violence, disaster, accidents, and other traumatic events. It is a commonly reported index event among those with PTSD (Breslau, Chilcoat, Kessler, & Davis, 1999; Kessler et al., 1999), frequently precipitates depression (Cole & Dendukuri, 2003), and confers risk for many other mental disorders (Keyes et al., 2014; Simon et al., 2007). Recently, researchers have also examined a bereavement-specific syndrome characterized by prolonged and impairing grief. This syndrome, which we will refer to as prolonged grief disorder (PGD), is listed as a diagnosis in need of further study in the 5th edition of the Diagnostic and Statistical Manual (American Psychiatric Association, 2013) (under the name persistent complex bereavement disorder) and included in the 11th edition of the International Classification of Diseases (ICD) (Maercker et al., 2013; Prigerson et al., 2009). An estimated 10% of bereaved adults confronted with natural loss will develop PGD (Lundorff et al., 2017) and there is some evidence that those experiencing violent loss are especially vulnerable to PGD as well as PTSD and depression (Djelantik et al., 2017b; Kristensen, Weisaeth, et al., 2012; van Denderen, de Keijser, Kleen, & Boelen, 2015). Among bereaved adults, PGD is more strongly associated with elevated impairment than PTSD or depression (Boelen & Prigerson, 2007; Silverman et al., 2000). Consequently, failure to assess PGD may neglect an important part of the clinical picture presented by these patients. This is especially important, because adequate treatments for depression, PGD, and PTSD differ (Boelen, 2006; Zisook & Shear, 2009) and there is evidence that treatments designed for depression are less effective in reducing PGD than are treatments that specifically target PGD (Shear et al., 2014).

In this study, we investigated whether bereavement and PGD are an important part of the clinical picture presented by individuals seeking treatment for trauma-related distress by examining rates of bereavement and symptoms from three

syndromes that commonly accompany bereavement: PGD, PTSD, and depression. We focused our examination at the level of the symptom and investigated three primary aims.

First, we used latent class analyses (LCA), a person-centered analytic approach, to identify subgroups of patients sharing the same symptoms. In a prior study investigating PGD, PTSD, and depression symptoms in a bereaved community sample, three classes were identified: a resilient class with minimal symptoms, a class endorsing only PGD symptoms, and a class endorsing both PGD and PTSD symptoms (Djelantik et al., 2017b). Given the treatment-seeking nature of our sample, we did not expect to observe a resilient class. We were principally interested in whether we would again observe classes characterized by elevated PGD symptoms **(Aim 1)**.

Second, we investigated the structure of relationships among the symptoms of PGD and their relationships to symptoms of PTSD and depression with network analyses. Interest in inter-symptom relationships has grown in recent years with some researchers proposing that causal relationships among symptoms of a disorder may contribute to their tendency to cohere as a syndrome (Borsboom & Cramer, 2013). From this perspective, PGD symptoms are not passive indicators of an underlying disorder, but components of a causal system capable of affecting and sustaining one another (Maccallum, Malgaroli, & Bonanno, 2017; Robinaugh et al., 2014), a possibility according with theories of PGD (Boelen et al., 2006). Moreover, the high co-morbidity observed among psychiatric disorders, such as PGD, PTSD, and depression may be attributable to causal relationships among their constitutive symptoms (Cramer, Waldorp, van der Maas, & Borsboom, 2010; Maccallum et al., 2017; Malgaroli, Maccallum, & Bonanno, 2018; Robinaugh et al., 2014). However, no study has jointly examined the network structure of relationships among PGD, PTSD, and depression symptoms. In this study, we address this need by investigating the inter-symptom relationships that bridge these syndromes and, thus, potentially contribute to their tendency to co-occur **(Aim 2)**.

There is evidence that a symptom-level approach may provide new insights into how external factors relate to mental disorders. For example, research in depression has shown that individual symptoms exhibit distinct patterns of association with risk factors, neurobiological activity, and psychosocial impairment (Fried et al., 2015). These symptom-specific associations provide clues to the paths by which these factors affect or are affected by the broader syndrome. Here, we used this approach to investigate the relation of two types of bereavement (violent loss and the loss of a partner or child) with the clinical picture presented by this population. We did so by (a) investigating the general symptom network structure in those with

and without the factor, (b) comparing mean symptom severities of those with and without the factor, and (c) examining associations between the factor and specific symptoms of PGD, PTSD, and depression **(Aim 3)**.

Methods

Participants and procedure

Participants were patients referred to Foundation Center '45, a specialized Dutch clinic for the diagnosis and treatment of PTSD and related disorders who reported to have lost a loved one in the Routine Outcome Measurements (ROM). Participation for ROM is voluntary for both the patient and therapist. In total, 1572 patients were admitted in the period of data collection (March 19, 2015 to July 17, 2017); 642 (41%) patients reported bereavement on the ROM. Of these patients, 458 (71%) completed the three questionnaires used in the current study within the first 3 months after admission. Following a consultation by the medical ethics committee of Leiden University in the Netherlands, the study was exempted from formal review because the primary purpose of the ROM is diagnostic and not research-oriented. All patients were informed during the ROM that their answers could be anonymously used for research purposes and could object if they did not agree.

Questionnaires

All participants completed three questionnaires: The Traumatic Grief Inventory Self Report version (TGI-SR; current sample $\alpha = .95$) (Boelen & Smid, 2017), the PTSD Checklist (PCL-5; $\alpha = .93$) (Blevins, Weathers, Davis, Witte, & Domino, 2015; Boeschoten, Bakker, Jongedijk, & Olff, 2014), and the Brief Symptom Inventory-Depression subscale (BSI; $\alpha = .95$) (Derogatis & Melisaratos, 1983). We examined a subset of core symptoms of PGD, PTSD, and depression to keep the number of estimated parameters in proportion to our sample size. For PGD, we used items 3 to 12 of the TGI-SR questionnaire, corresponding to diagnostic criteria proposed by (Prigerson et al., 2009). For PTSD, we selected items corresponding to the 6-item PCL (items 1, 4, 7, 13, 15, and 19), representing symptoms from each of the DSM-IV symptom clusters (Lang & Stein, 2005). For depression, we used the full BSI depression subscale (i.e., items 9, 16, 17, 18, 35 and 50) (Derogatis & Melisaratos, 1983) (Table 1, Figures 1-4).

Table 1. Questionnaires and descriptions of symptoms

TGI-SR PGD items *Prigerson et al. 2009*	**BSI** Depression items *Derogatis et al. 1983*	**PTSD** PTSD checklist items *Lang et al. 2005*
Yearning	Thoughts of ending your life	Memories, thoughts or images
Role confusion/ diminished sense of self	Feeling lonely	Upset when reminded
Difficulty accepting the loss	Feeling blue	Avoid activities or situations
Avoidance of the reality of the loss	No interest in things	Feeling distant or cutoff
Experiencing mistrust/ inability to trust others since the loss	Feeling hopeless about the future	Irritable or angry
Bitterness over the loss	Feelings of worthlessness	Difficulty concentrating
Difficulty moving on with life		
Feeling emotionally numb since the loss		
Feeling life is empty or meaningless		
Feeling stunned, dazed or shocked by the loss		

Note. BSI = Brief Symptom Inventory; TGI-SR = Traumatic Grief Inventory Self-Report; PGD = Prolonged grief disorder; PTSD = Posttraumatic stress disorder.

Statistical analysis

For **Aim 1**, we used LCA with Mplus version 8 (Muthén & Muthén, 1998-2017) to identify classes of bereaved individuals with comparable PGD, PTSD, and depression symptom profiles. All items were dichotomized with the highest 3-values on a 5-point scale signifying endorsement (Boelen et al., 2016; Djelantik et al., 2017b; Maccallum & Bryant, 2019; Nickerson et al., 2014). We began with a 1-class model and increased the number of classes until we reached the most parsimonious and best-fitting model.

For **Aim 2**, we used network analysis to examine relationships among symptoms of PGD, PTSD, and depression. Our networks comprised two components: symptoms of PGD, PTSD, and depression, represented as nodes in the networks, and the regularized partial-correlations between symptoms, represented by a link between nodes (referred to as an 'edge'). All network analyses were conducted using R (R Core Team, 2013). We estimated the network and assessed the precision of edge weight estimates and stability of centrality indices using the bootnet package (v. 1.0.1). We visualized the network using the package qgraph (v. 1.4.4). We then used the spinglass algorithm from the R package igraph (v. 1.2.2) to examine the community structure of the network. Because the algorithm is non-deterministic,

we used a recently developed iterated community detection procedure to perform the analysis 10,000 times and examine the consistency of results across iterations (Werner, 2018). As a sensitivity analysis, we used a second community detection algorithm (infomap) and evaluated the convergence of the findings with the results of the spinglass analysis.

For **Aim 3**, we examined mechanisms by which two loss-related factors (violent loss and the loss of a partner or child) may contribute to this symptom network. These analyses were completed only for participants who reported on these loss-related characteristics (n = 400). First, we examined whether the structure of the network differed as a function of violent loss using the package NetworkComparisonTest (v. 2.0.1) (van Borkulo et al., 2018). This test needs comparable sample sizes for the groups being compared, preventing us from conducting this test for the 'parent/child loss' variable. Then, we conducted symptom severity analyses. Finally, we used the package mgm (v. 1.2-3) to assess the regularized partial correlations between loss-characteristics and individual symptoms.

Results

Sample characteristics

The final full sample comprised 324 (71%) men and 134 (29%) women with a history of traumatic experiences (M = 6.6, SD = 3.3) and lifetime losses (M = 3.6, SD = 2.1). Their average age was 49.1 (SD = 12.2) years. 204 (45%) participants had a history of at least one violent loss. 57 (12%) participants had lost a partner and/or a child. The proportions of patients with clinically relevant PGD, PTSD, and/or depression were 28% (cut-off: 61, n=126), 78% (cut-off: 32, n = 359), and 51% (cut-off: 11, n = 235), respectively (Blevins et al., 2015; Boelen & Smid, 2017; Derogatis & Melisaratos, 1983)**.** Compared to patients who did not complete all three questionnaires, the included patients were more likely to be older, to be born in the Netherlands and to have experienced a profession-related trauma (Supplementary Materials A-C).

Latent class approach (Aim 1)

The three-class, four-class, and five-class solutions each yielded suitable models considering the goodness-of-fit statistics and smallest sample size (Table 2). However, the four-class solution had the best combination of interpretability (i.e., classes with clear high and low endorsement of symptoms), parsimony and goodness-of-fit indices. We considered a value of >0.6 as a prominent probability of symptom endorsement (Maccallum & Bryant, 2019; Nickerson et al., 2014).

The four-class solution consisted of a class of patients with no prominent PGD, PTSD, and depression symptoms (13%), a class of patients with prominent PTSD and depression symptoms (23%), a class of patients with prominent PGD and PTSD symptoms (20%), and a class of patients with prominent PGD, PTSD and depression symptoms (45%) (Figure 1, Supplementary Material D-E).

Table 2. Goodness-of-fit statistics for 1 to 6 class solutions

Classes	Log likelihood	BIC	SS-BIC	AIC	Entropy	BLRT	VLMRT	Smallest sample size (n)
1 class	-6179.049	12492.888	12423.067	12402.097				
2 class	-5248.773	10773.254	10630.438	10587.545	0.914	$p < .001$	$p < .001$	216
3 class	-5003.364	10423.356	10207.544	10142.728	0.911	$p < .001$	$p < .001$	111
4 class	-4871.082	10299.709	10010.903	9924.164	0.900	$p < .001$	$p = .57$	58
5 class	-4785.231	10268.925	9907.124	9798.462	0.880	$p < .001$	$p = .13$	49
6 class	-4740.656	10320.693	9885.896	9755.312	0.881	$p < .001$	$p = .33$	48

Note. In the six-class model, the BIC (Bayesian Information Criterion) started increasing again, so we did not test more models. AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion; SS-BIC = Sample-Size Adjusted BIC; BLRT = bootstrapped likelihood ratio test; VLMRT = Vuong-Lo-Mendell-Rubin test.

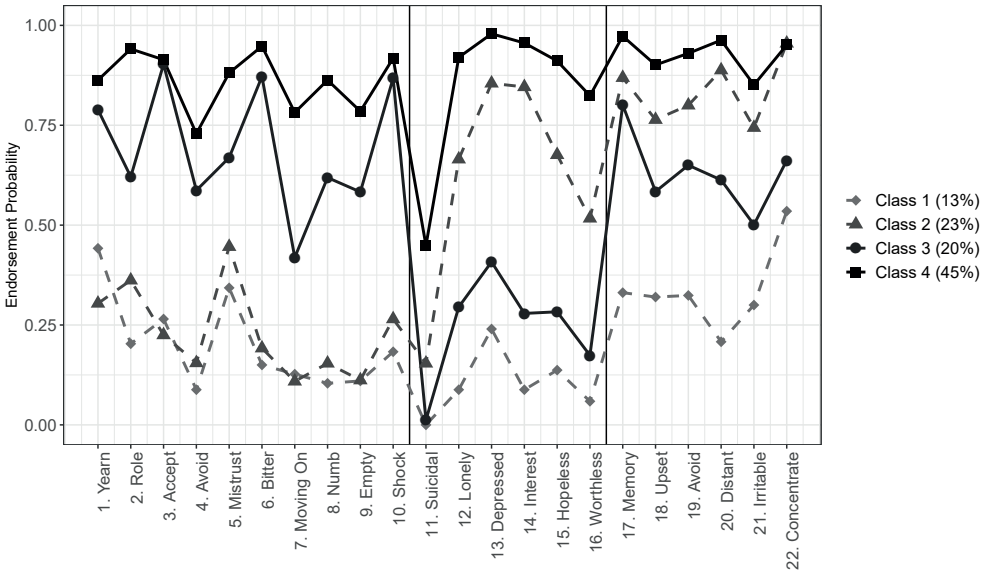
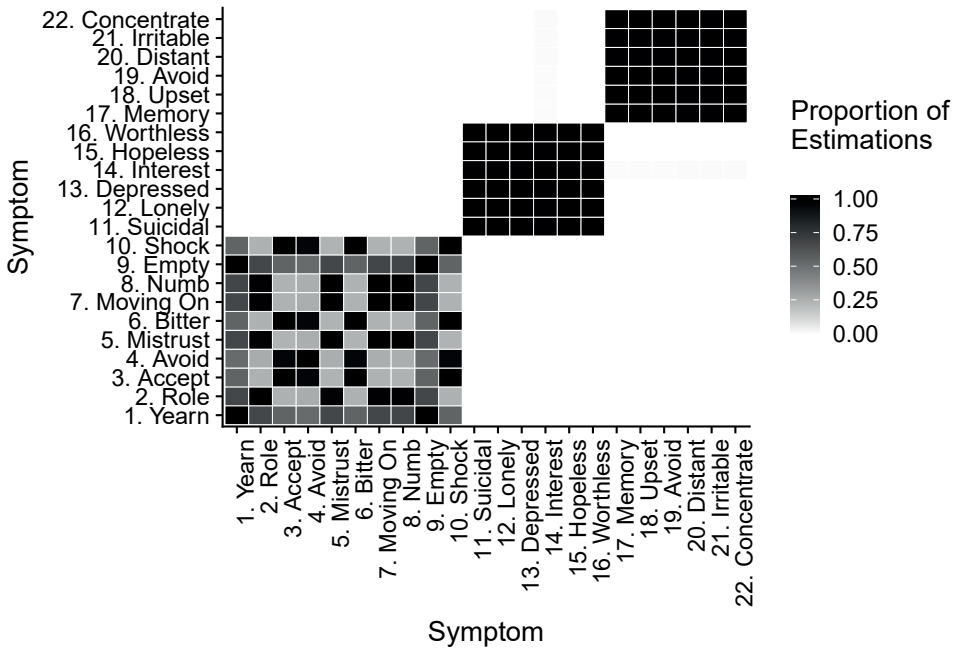


Figure 1. Symptom endorsement probability for the four-class solution of the latent class analyses

Network approach (Aim 2)

Network analyses (see Supplementary Materials F-M) suggested reasonable precision in the estimated edge weights and good stability of the strength and expected influence centrality indices (CS-coefficients = .59, and .67, respectively). Consistent with prior research (Epskamp, Borsboom, & Fried, 2018), we observed relatively low stability of the betweenness and closeness indices (CS-coefficients = .13, and .28, respectively).

The results of our spinglass community detection analyses appear in Figure 2. In 22% of iterations, the algorithm suggested 3 communities grouped along diagnostic boundaries while 75% of iterations identified four communities, most commonly including a community of depression symptoms, a community of PTSD symptoms, and two communities of PGD symptoms: one community defined by 'shock', 'bitterness', 'avoidance', and 'difficulty accepting the loss', and a second community defined by 'numbness', 'difficulty moving on with life', 'difficulty trusting others', and 'role confusion'. The membership of 'yearning' and 'emptiness' oscillated

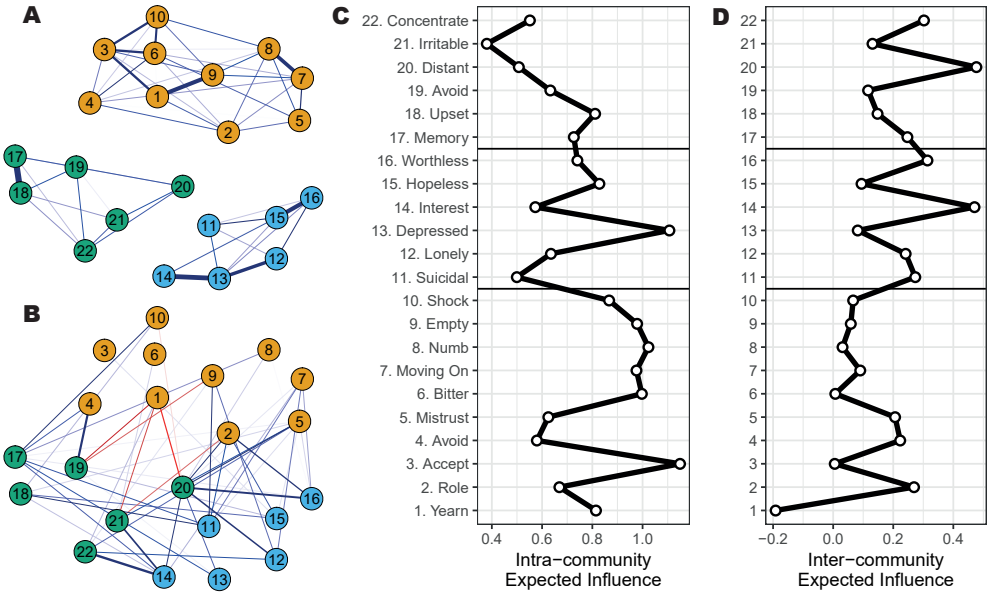


Darker cells represent a higher proportion of the 10,000 iterations of the spinglass community detection algorithm in which the relevant symptoms appeared in the same community.

Figure 2. Analysis of shared community membership

between these communities. The infomap algorithm detected three communities along diagnostic boundaries in 100% of iterations (Supplementary Materials L). Together, these analyses suggest PGD, PTSD, and depression were distinguishable communities of symptoms with some evidence for two communities of symptoms within the PGD syndrome.

We next examined the inter-community edges, considering each syndrome as a distinct community (Figure 3). We focus our interpretation only on the most robust inter-community edges (those with confidence intervals in our bootstrap analysis that did not include zero). The depression symptom 'loss of interest' was strongly associated with the PTSD symptoms 'difficulty concentrating' and 'irritability', consistent with these latter symptoms being part of the depression syndrome (Fried, 2017). Similarly, the PTSD 'avoidance' and PGD 'avoidance' symptoms were strongly associated. Associations were observed among symptoms across



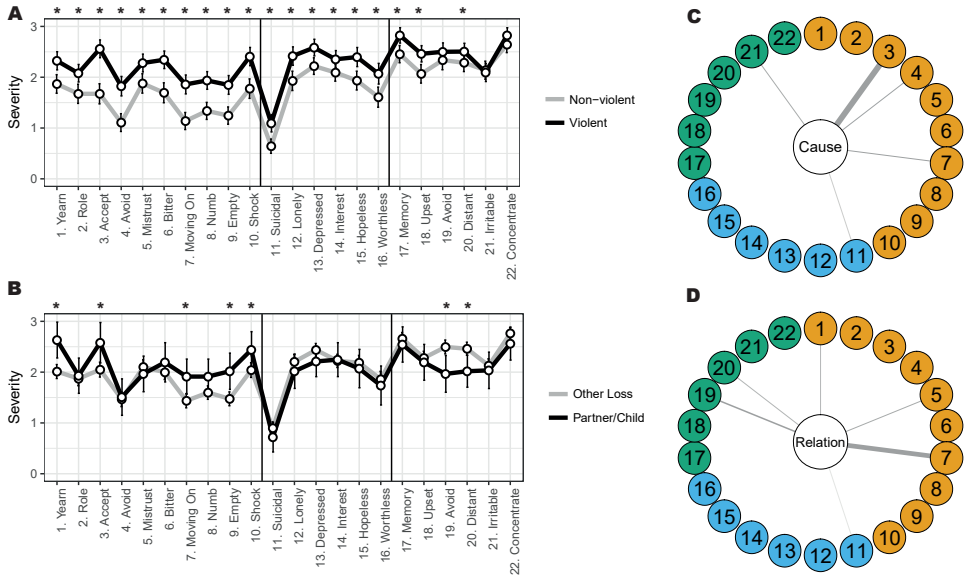
Intra-community edges are depicted in Panels A. Inter-community edges are depicted in Panel B. For both Panel A and Panel B, blue edges represent positive associations and red edges represent negative associations. Thicker edges represent stronger associations. PGD, depression, and PTSD symptoms are represented by orange, blue, and green nodes, respectively. The intra-community expected influence of each symptom (i.e., the sum of the edge weights between a given symptom and other symptoms of the same community) appear in Panel C. The inter-community expected influence of each symptom (i.e., the sum of the edge weights between a given symptom and other symptoms of the other communities) appears in Panel D. Intra-community edges (*M* edge weight = .15) tended to be stronger than inter-community edges (*M* = .04).

Figure 3. Analysis of intra- and inter-community relationships

syndromes that centered on themes of social disconnection and a negative sense of self-worth or purpose in life, including 'feeling distant from others' (PTSD), 'feelings of worthlessness' (depression), and 'confusion about one's role in life' and 'difficulty trusting others' (PGD). 'Feeling distant from others' (PTSD) exhibited the strongest inter-community expected influence.

Risk factor-specific associations (Aim 3)

The network comparison test indicated that both the structure of the network and its global strength did not differ significantly between those with vs. without a history of violent loss (test statistic M = .23, p = .28 and test statistic S = .22, p = .48, respectively). In the symptom severity profile analyses, a violent loss was associated with significant elevations in all symptoms of PGD and depression, and PTSD symptoms 'intrusive memories' and 'emotional reactivity to intrusive memories'. Experiencing the death of a partner or child was associated with a more



Symptom profile plots between groups with and without a history of violent loss (Panel A) and those who did vs. did not lose a partner/child (Panel B) identify symptoms elevated in those with each risk factor. Panels C and D depict the associations between these risk factors and symptoms of PGD, depression, and PTSD symptoms after controlling for all other symptoms. PGD, depression, and PTSD symptoms appear in orange, blue, and green, respectively. *p < .05.

Figure 4. Analysis of loss-related risk factors and their association with symptoms of PGD, PTSD, and depression

circumscribed set of elevated symptoms, including 'yearning', 'emptiness', and 'difficulty with moving on in life'.
To assess the unique associations between these factors and specific symptoms, we re-estimated the network with each of these factors incorporated as a node in the network (Figure 4). A violent loss was most strongly associated with 'difficulty accepting the loss.' Experiencing the death of a partner or child exhibited weaker associations with symptoms of PGD, PTSD, and depression and was most strongly associated with 'difficulty moving on in life'.

Discussion

This study is the first to investigate PGD, PTSD and depression symptoms in a sample of treatment-seeking trauma-exposed patients and the first to jointly examine the relationships among these symptoms. Nearly half (41%) of all patients reported having experienced the death of a loved one. This number is a lower-bound estimate for the rate of bereavement as not all admitted patients completed this survey. The majority of our bereaved patient sample (65%) was member of a class that included some elevated endorsement of PGD symptoms and 20% were members of a class principally characterized by elevated PGD symptom endorsement and, to a lesser extent, elevated endorsement of PTSD symptoms. We did not identify a class characterized by elevated depression, comparable with the findings of the previous study in a community sample (Djelantik et al., 2017b). These results suggest that failing to assess PGD symptoms in this population would lead to an omission of a significant portion of the clinical picture presented by the majority of these patients and that it is important to improve treatment options for patients with co-morbid PGD and PTSD (de Heus et al., 2017; Smid, Kleber, et al., 2015).

First, there is overlap at the symptom level. For example, 'avoidance of reminders of the loss' and 'avoidance of the traumatic event' were strongly connected between PGD and PTSD. Because these symptoms also have overlapping content, we might consider these symptoms as distinct indicators of the same phenomenon, especially in the case where the loss was used as the anchor event for the PTSD symptoms.

Second, there was overlap at the syndrome level, with strong intercommunity relations observed involving symptoms commonly identified as a member of multiple syndromes. For example, we found that the depression symptom 'loss of interest' was strongly associated with the PTSD symtoms 'difficulty concentrating' and 'irritability', a finding that is consistent with the identification of these symptoms as part of the broader depression syndrome.

Third, we observed strong intercommunity relationships among distinct but closely conceptually related symptoms centered around feelings of self-worth, self-identity and social relationships (i.e., "feeling distant from others" (PTSD), "feelings of worthlessness" (depression), and "confusion about one's role in life" and "difficulty trusting others" (PGD)). These results accord with prior network analyses in community samples (Malgaroli et al., 2018; Robinaugh et al., 2014) and are reminiscent of theories stressing the importance of role-transition and meaning making in adjustment to bereavement (Maccallum & Bryant, 2013; Malgaroli et al., 2018; Neimeyer, 2016; Stroebe & Schut, 2001). Also, connectedness and positive sense of identity have been identified as themes in general recovery processes in people with mental health issues (Leamy, Bird, Le Boutillier, Williams, & Slade, 2011). Treatment programs targeting identity disruptions and meaning-making after the loss of a loved one have been found to be effective (Boelen, de Keijser, van den Hout, & van den Bout, 2007; Bryant et al., 2014; Shear et al., 2016). Therefore, it may be that if an individual is not able to address the problems with social isolation and identify confusion, it will confer risk for other symptoms of PTSD, PGD and depression, though this possibility remains highly speculative.

Concerning our third aim, we did not observe significant network differences between the groups in the network structure as a function of the nature of the loss (i.e., nonviolent vs. violent). This finding is consistent with prior work on PGD and PTSD, where comparable network structures were observed across different demographic characteristics (e.g., gender) and across different samples (Fried et al., 2018; Maccallum et al., 2017). However, recently, Benfer et al. (2018) showed that PTSD networks might differ between the type of trauma. Future studies need to elucidate this further. Both violent loss and the loss of a partner or child were more strongly associated with elevations in PGD symptoms than elevations in PTSD or depression symptoms, suggesting that it is especially important to assess PGD in these patient groups. Violent loss was most strongly associated with 'difficulty accepting the loss' which, in turn, was strongly associated with other PGD symptoms (i.e., 'a continued sense of shock', 'bitterness', and 'yearning'; see Figure 3), suggesting that this symptom represents a mechanism through which violent loss contributes to other PGD symptoms and, subsequently PTSD and depression. Consistent with this possibility, we previously found evidence that PGD symptoms precede increases in PTSD symptoms over time in bereaved adults (Djelantik, Smid, Kleber, & Boelen, 2018). In contrast, the loss of a partner or child was most strongly associated with the PGD symptom 'difficulty moving on with life', a finding consistent with prior reports that those experiencing the death of a partner are especially vulnerable to experiencing the belief that the future holds no meaning (Prigerson et al., 2009).

Generalization of our findings can only be done with caution because of the following limitations. Although larger than any prior analysis of the PGD symptom network, our sample remained smaller than is ideal given the number of estimated parameters, especially for the network comparison test (van Borkulo et al., 2018). To mitigate the limitation of sample size, we performed all analyses with only a constrained number of symptoms. Although doing so should afford more stability in our analyses, it also precluded inference about the omitted symptoms. Moreover, the observed associations may differ in networks that include additional symptoms. Accordingly, the observed findings must be interpreted in the context of the symptoms we included in the network. It should also be noted that we observed several very strong zero-order correlations between symptoms (Supplementary Materials F) which can lead to instability in the estimation of regularized partial correlations. To address this concern, we limited our interpretation of the network to those features that were found to be most robust in our bootstrap analyses. Finally, community detection algorithms remain new to psychological networks and, thus, should be interpreted with some caution. Nonetheless, the robustness of these findings across iterations and algorithms permit confidence in our results.

Lastly, PTSD symptoms were reported in regards to a wide range of traumatic events. As a result, subjects could, but were not required to, report PTSD symptoms in regard to the death of a loved one. It could be that, when PTSD symptoms are reported in regard to bereavement, endorsement of some PGD symptoms (e.g., 'avoidance of thoughts about the death') would seem to necessitate endorsement of some PTSD symptoms (e.g., 'avoidance of thoughts about the trauma'). This could result in stronger relationships between these symptoms in the network and more predominant co-morbid classes in the LCA.

In conclusion, in this first study among treatment seeking traumatized individuals, we found that bereavement and PGD symptoms were common and highly inter-connected with PTSD and depression. These findings suggest that clinicians and researchers working with trauma-exposed populations should be aware of bereavement and PGD symptoms in order to adequately capture the clinical presentation of these patients.

Conflict of interest and funding
There is no conflict of interest in the present study for any of the authors. This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.
paid.

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Author contributions
MD, PB, and GS were responsible for the data-collection. MD was responsible for the design of the study. MD and DR were responsible for the data-analysis, and interpretation of the data. DR and PB supervised MD. MD wrote the drafts of the manuscript. DR, GS, RK and PB were involved in revising the draft versions critically and all authors approved the final version of the manuscript.

Supplementary materials

A. Socio-demographic differences between excluded and included patients.
B. Sample characteristics
C. Venn diagram depicting history of loss and relation to the deceased
D. The graphs of the three- and five-class solutions of the latent class analyses
E. Probability of symptom-items in the four-class solution
F. Symptom network visualizations and edge weight distributions
G. Precision of edge weight estimates
H. Edge weight differences plot
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J. Distribution of centrality indices and relationships among them
K. Stability of centrality estimates
L. Infomap community detection results
M. Symptom networks for those with and without a history of violent loss

Supplementary materials A

Table. Socio-demographic differences between excluded and included patients

	Excluded patients (n = 184)	Included patients (n = 458)	Significance tests for differences between the groups
Gender, *n* (%)			$\chi^2(1, n = 639) = 0.169$
Males	131 (72)	324 (71)	
Females	50 (28)	134 (29)	
Age, *M* (SD)	45.1 (11.5)	49.1 (12.2)	$t(639) = 3.836^{***}$
Education, *n* (%)			$\chi^2(1, n = 205) = 0.00$
Lower education	23 (66)	112 (66)	
Higher education	12 (34)	58 (34)	
Country of Birth, *n* (%)			$\chi^2(1, n = 642) = 85.048^{***}$
The Netherlands	48 (26)	303 (66)	
Other country	136 (74)	155 (34)	
Patient group, *n* (%)			$\chi^2(1, n = 553) = 71.525^{***}$
Profession related trauma	25 (17)	157 (38)	
Refugee related trauma	84 (59)	86 (21)	
Other	34 (24)	167 (41)	

Note. SD = Standard Deviation ; * $p < .05$. ** $p < .01$. *** $p < .001$. Excluded patients include bereaved patients who did not complete the TGI-SR, PCL-5 and BSI questionnaires. Included patients are bereaved patients who did completed the TGI-SR, PCL-5 and BSI questionnaires (included patients)

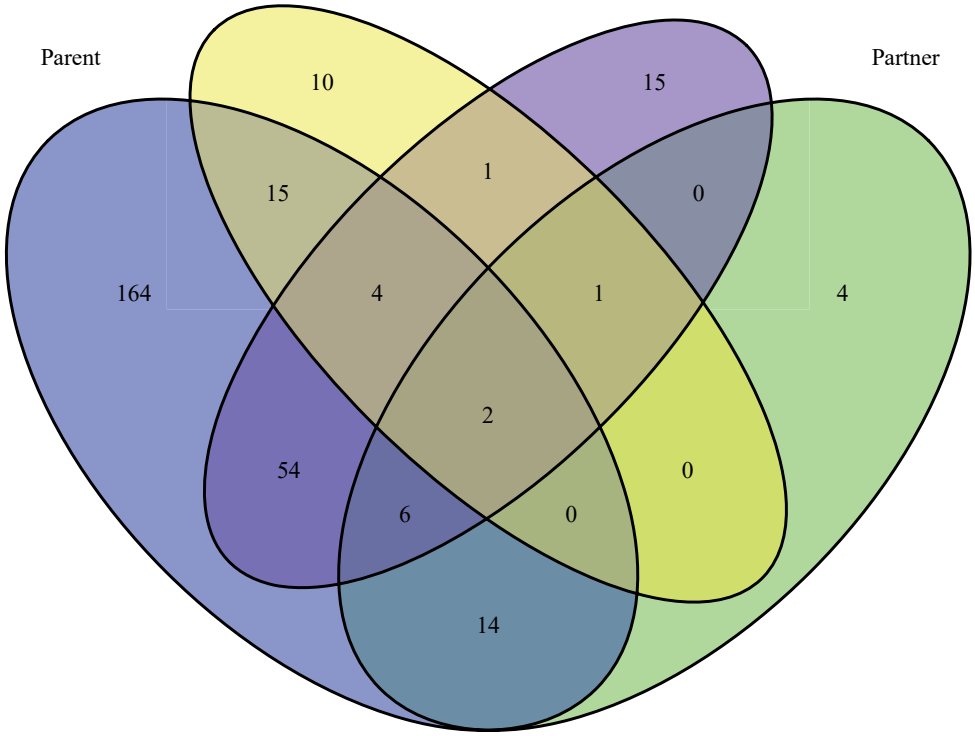
Supplementary materials B

Table. Patient sample characteristics

	Characteristics of the included patients	Number of participants, *n* (% of the included patient sample)
Loss-related characteristics		
Time since loss in years, M (SD)	15.2 (10.4)	345 (75)
Number of participants with at least one violent loss, *n* (%)	204 (45)	400 (87)
Number of losses, M (SD)	3.6 (2.1)	400 (87)
Number of participants with at least once this relation with the deceased person, *n* (%)*		400 (87)
Partner	27 (6)	
Child	33 (7)	
Parent	259 (57)	
Sibling	83 (18)	
Friend/ other	337 (74)	
Other trauma-related characteristics		
Total number of different traumatic events, M (SD)	6.6 (3.3)	340 (74)
Number of different traumatic events besides losses, M (SD)	5.6 (2.9)	340 (74)
Mental Health characteristics		
PGD total score, M (SD)	48.9 (17.1)	458 (100)
PGD cases, *n* (%)	126 (28)	458 (100)
PTSD total score, M (SD)	46.2 (16.4)	458 (100)
PTSD cases, *n* (%)	359 (78)	458 (100)
Depression total score, M (SD)	11.8 (6.1)	458 (100)
Clinically relevant depression symptoms cases, *n* (%)	235 (51)	458 (100)
Functional impairment, M (SD) (Scale: 0 (full) – 100 (no impairment))		
Role limitations due to emotional problems	23.6 (33.4)	292 (64)

Note. SD = Standard Deviation; * For more specific information, see Supplementary Materials C.

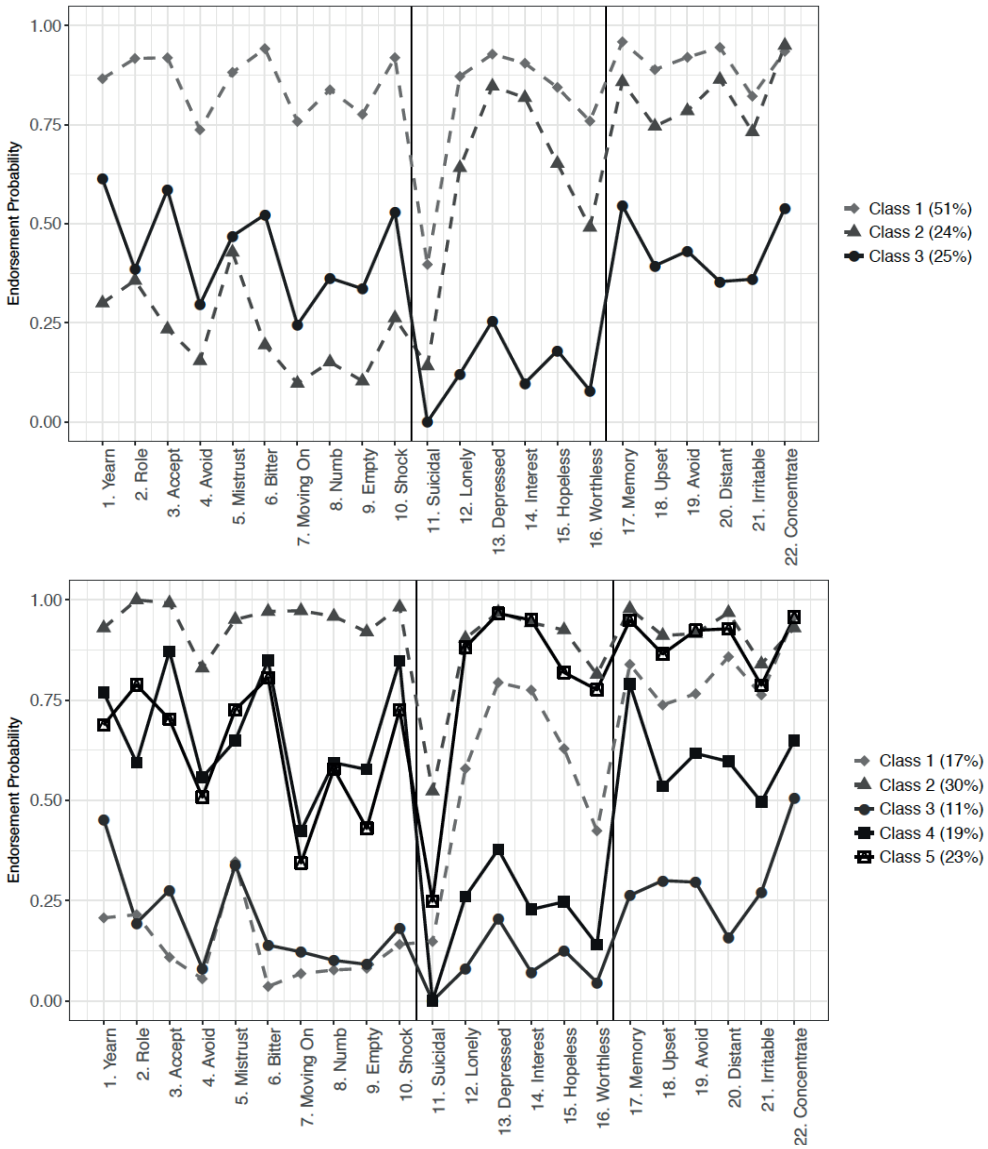
Supplementary materials C



Each participant reported the history of losses they have experienced. The total number of individuals in each oval represent the number of people who have experienced each loss. For example, 27 participants experienced the death of a partner (as depicted in the green oval). Points of overlap in the Venn diagram indicate the number of people who have experienced the losses signified by the ovals that overlap (e.g., 14 participants experienced both the death of a partner and the death of a parent).

Figure. Venn diagram depicting history of loss and relationship to the deceased

Supplementary materials D



The probability graphs of the three- and five-class solutions are presented, showing the interpretability and parsimony of these solutions.

Figure. The graphs of the three- and five-class solutions of the latent class analyses

Supplementary Materials E

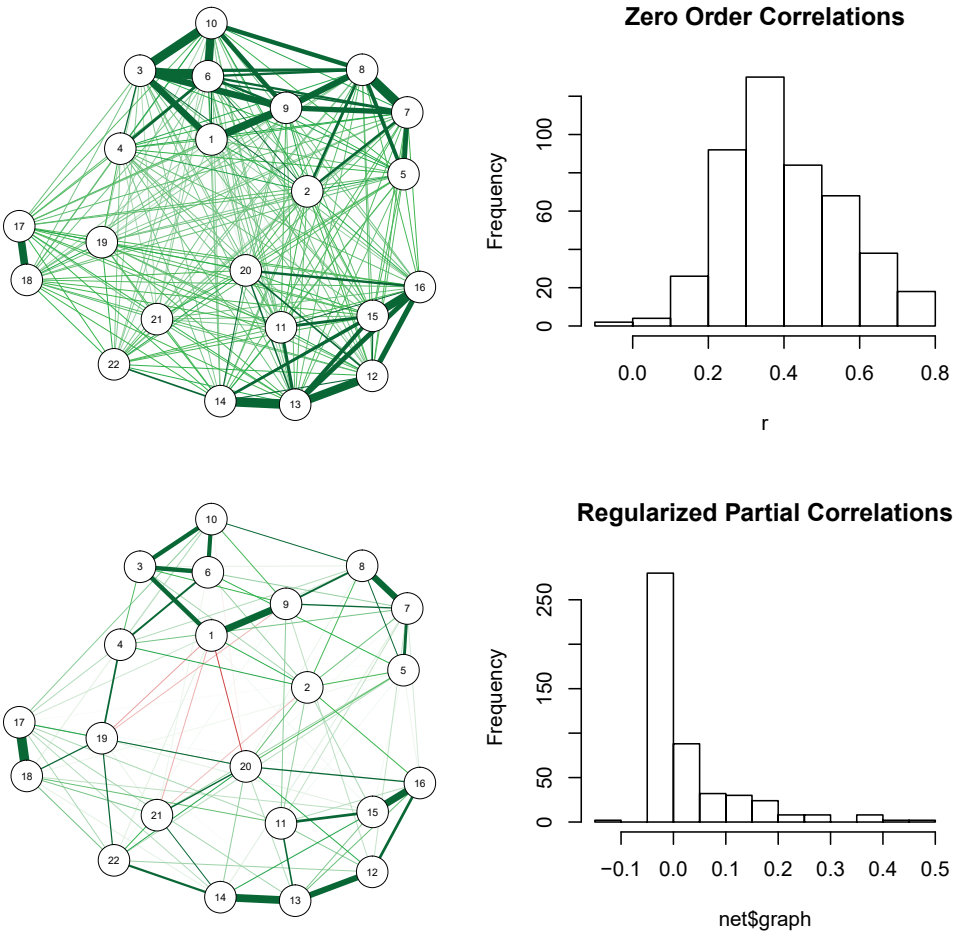
Table. Probability of symptom-items in the four-class solution

Questionnaires	Overall symptom frequency	Class 1 (13%) Low PGD/ PTSD/ depression		Class 2 (23%) PTSD/depression		Class 3 (20%) PGD/PTSD		Class 4 (45%) PGD/PTSD/ Depression	
Description of symptom	%	Probability	SE	Probability	SE	Probability	SE	Probability	SE
TGI-SR									
PGD items									
Prigerson et al. 2009									
Yearning	67	0.44	0.21	0.30	0.08	**0.79**	0.06	**0.86**	0.03
Role confusion/ diminished sense of self	65	0.20	0.14	0.36	0.10	**0.62**	0.10	**0.94**	0.02
Difficulty accepting the loss	67	0.27	0.24	0.23	0.09	**0.90**	0.12	**0.91**	0.03
Avoidance of the reality of the loss	49	0.09	0.18	0.16	0.08	0.59	0.10	**0.73**	0.04
Experiencing mistrust/ inability to trust others since the loss	67	0.34	0.18	0.45	0.07	**0.67**	0.07	**0.88**	0.03
Bitterness over the loss	66	0.15	0.31	0.19	0.12	**0.87**	0.09	**0.95**	0.02
Difficulty moving on with life	47	0.13	0.11	0.11	0.05	0.42	0.10	**0.78**	0.04
Feeling emotionally numb since the loss	56	0.10	0.10	0.15	0.06	**0.62**	0.17	**0.86**	0.04
Feeling life is empty or meaningless	50	0.11	0.22	0.11	0.04	0.58	0.10	**0.79**	0.05
Feeling stunned, dazed or shocked by the loss	66	0.18	0.08	0.27	0.08	0.87	0.25	**0.92**	0.03
BSI									
Depression items									
Derogatis et al. 1983									
Thoughts of ending your life	24	0.00	0.00	0.15	0.05	0.01	0.02	0.45	0.04
Feeling lonely	63	0.09	0.05	**0.67**	0.08	0.30	0.10	**0.92**	0.03
Feeling blue	75	0.24	0.09	**0.86**	0.05	0.41	0.11	**0.98**	0.02
No interest in things	69	0.09	0.06	**0.85**	0.06	0.28	0.13	**0.96**	0.02
Feeling hopeless about the future	64	0.14	0.10	**0.68**	0.07	0.28	0.07	**0.91**	0.03
Feelings of worthlessness	52	0.06	0.07	0.52	0.08	0.17	0.07	**0.82**	0.04

PCL-5									
PTSD checklist items									
Lang et al. 2005									
Memories, thoughts or images	83	0.33	0.19	**0.87**	0.04	**0.80**	0.07	**0.97**	0.01
Upset when reminded	73	0.32	0.13	**0.76**	0.05	0.58	0.20	**0.90**	0.02
Avoid activities or situations	77	0.32	0.10	**0.80**	0.06	**0.65**	0.18	**0.93**	0.02
Feeling distant or cutoff	78	0.21	0.11	**0.89**	0.04	**0.61**	0.14	**0.96**	0.02
Irritable or angry	69	0.30	0.08	**0.74**	0.06	0.50	0.12	**0.85**	0.03
Difficulty concentrating	84	0.54	0.15	**0.96**	0.02	**0.66**	0.13	**0.95**	0.02

Note. Probability greater than 0.6 are shown in boldface; PGD = Prolonged grief disorder; PTSD =Posttraumatic stress disorder; SE = Standard Error.

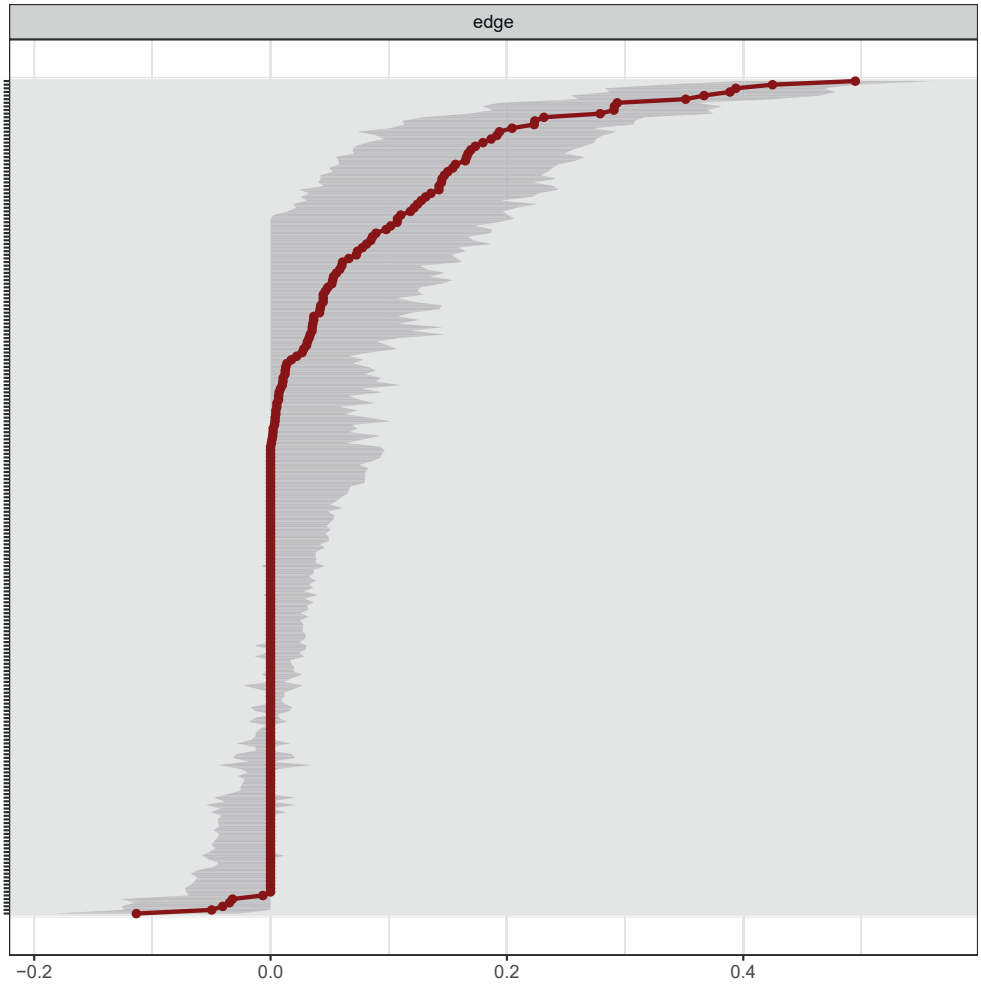
Supplementary materials F



Network visualization of zero-order correlations among symptoms (Top Left) and the distribution of zero-order correlations (Top Right). Network visualization of the estimated structure of the symptom network using regularized partial correlations (Bottom Left) and the distribution of regularized partial correlations (Bottom Right).

Figure. Distribution of edge weights

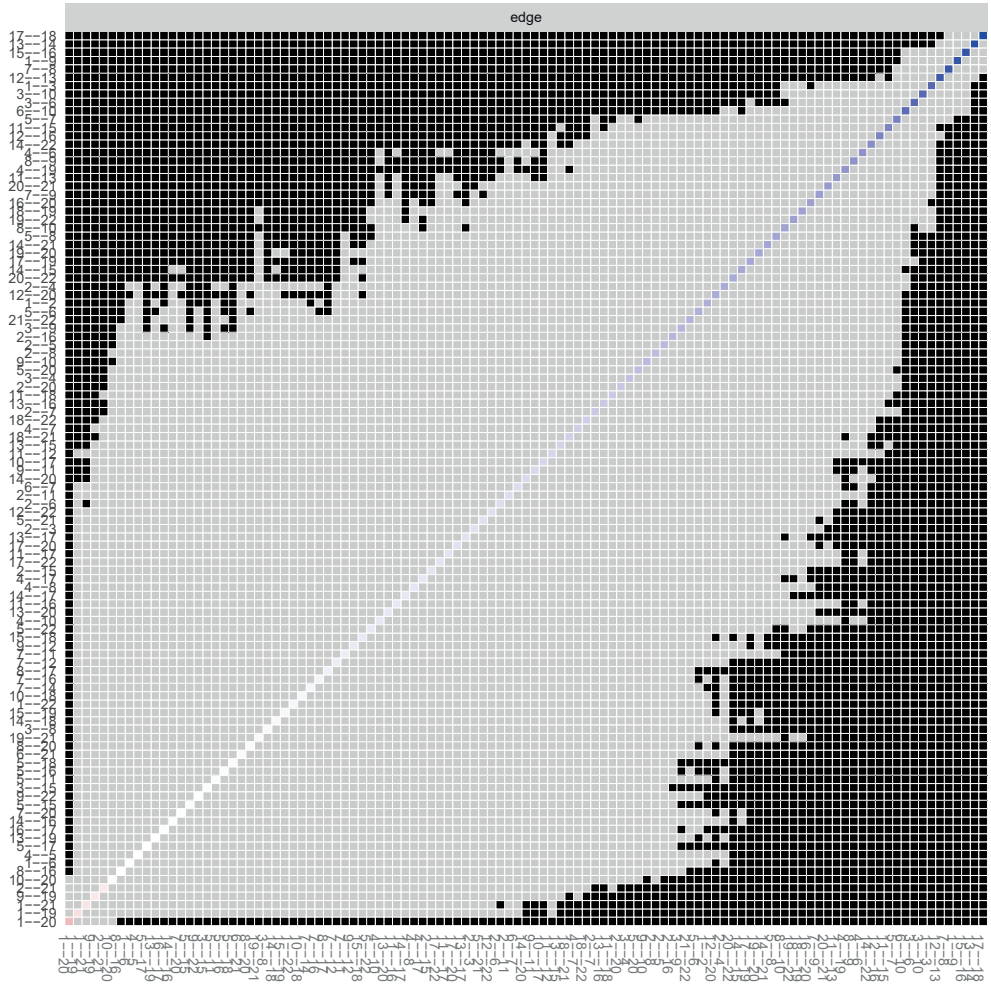
Supplementary materials G



The observed edge weight for the current sample appears in red. The 95% confidence interval produced by the bootstrap analysis appears in grey.

Figure. Precision of edge weight estimates

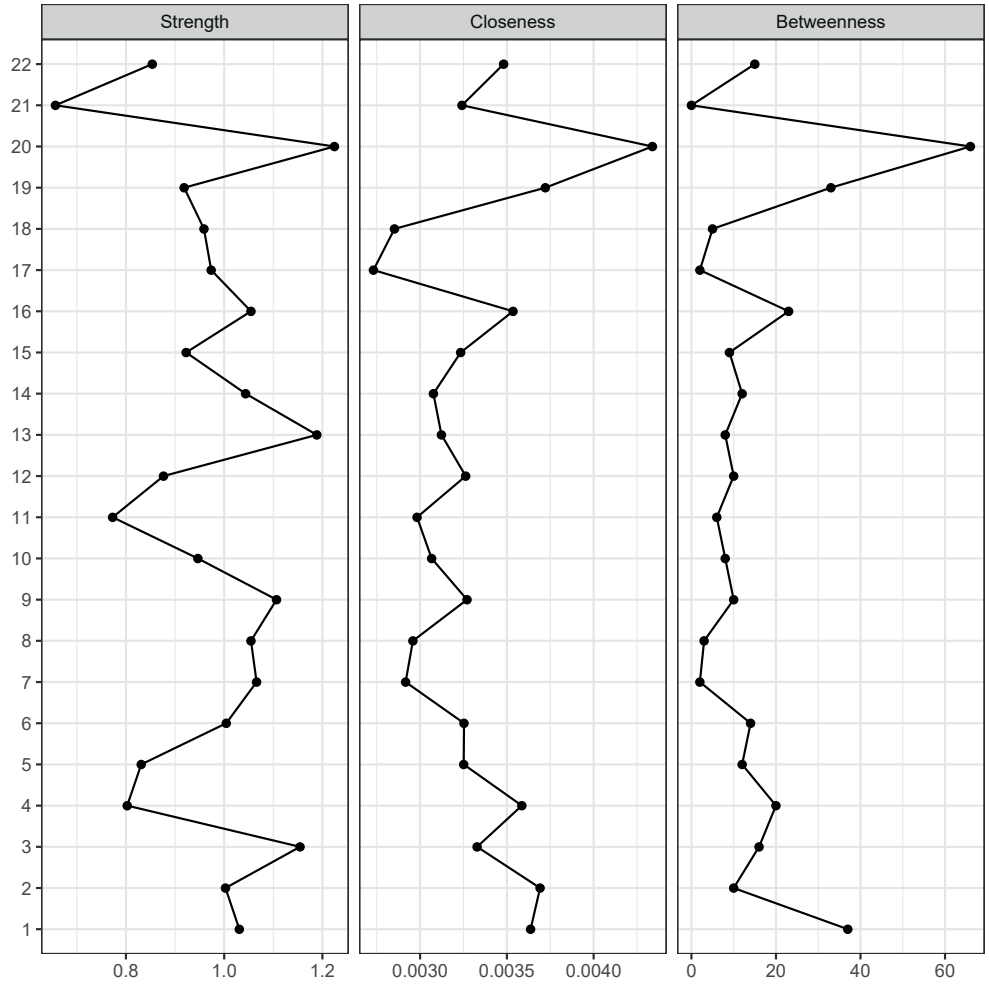
Supplementary materials H



Bootstrap analysis of differences in edge weights. Edge weights are ordered from negative (bottom and left) to strongly positive (top and right). Black cells signify a significant difference between edge weights.

Figure. Edge weight differences plot

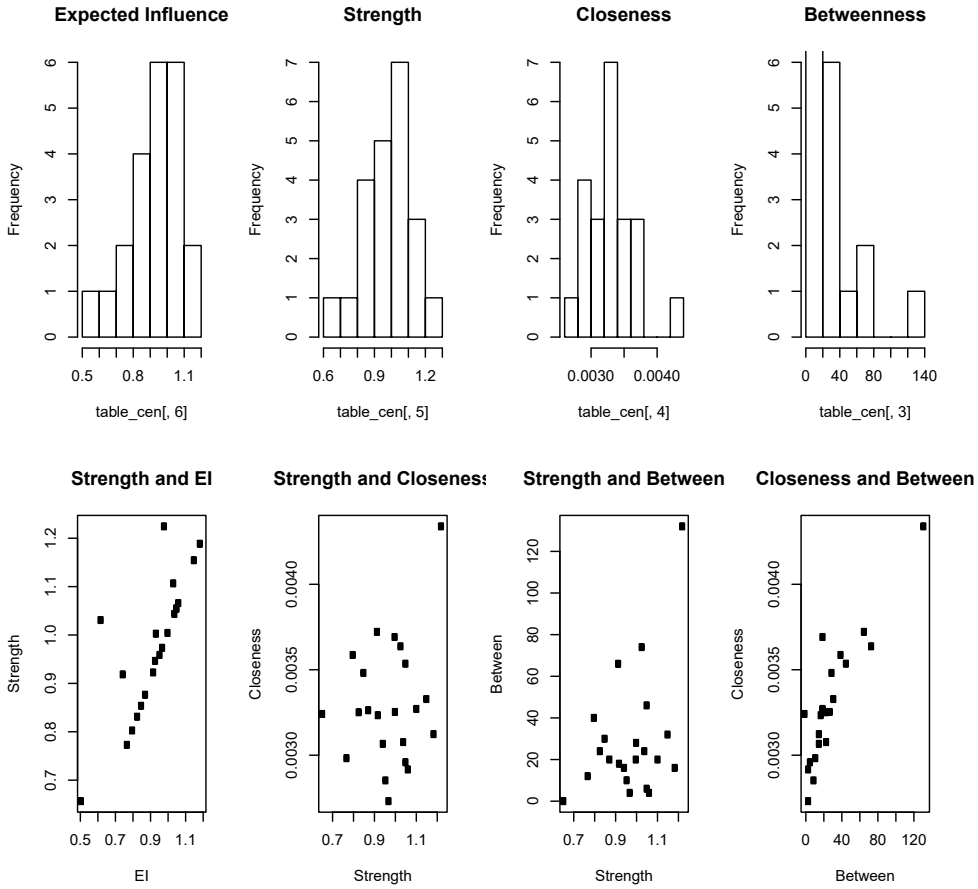
Supplementary materials I



Centrality plots depicting raw strength, closeness, and betweenness values for each symptom

Figure. Node centrality plots

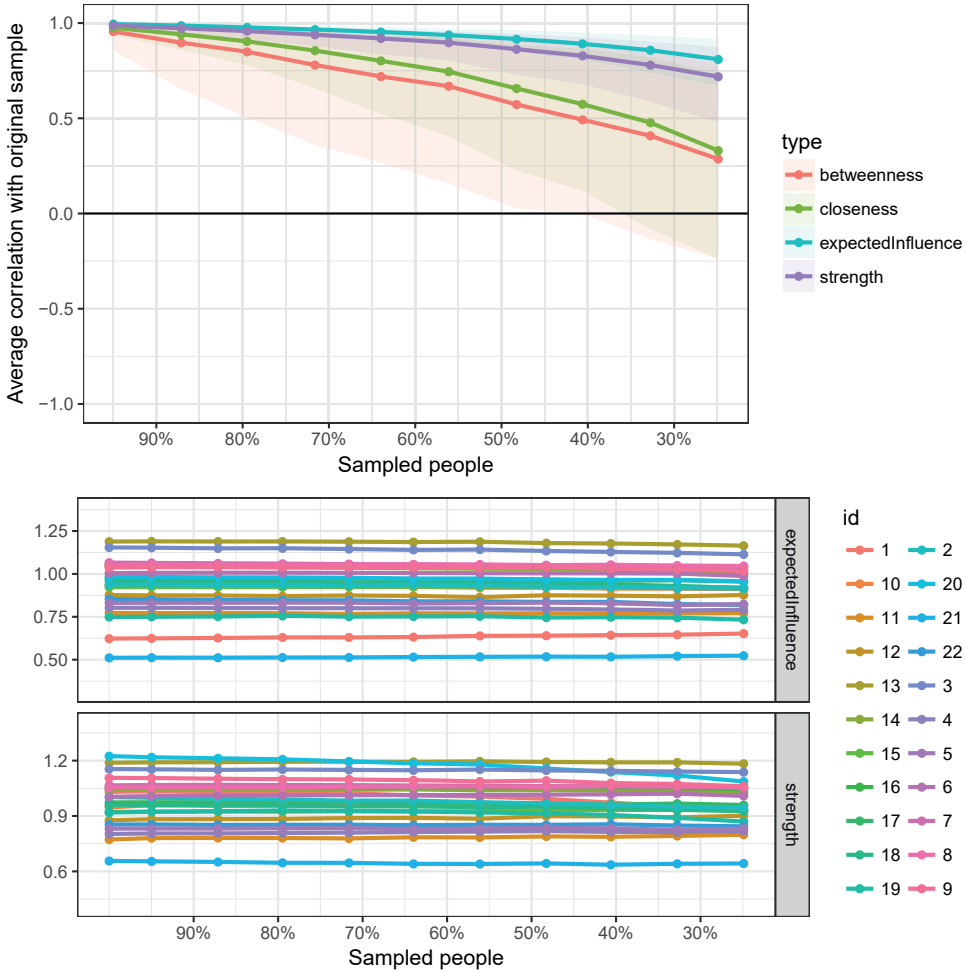
Supplementary materials J



The distribution of node expected influence, strength, closeness, and betweenness appear in the top panel. The relationships among different indices of node importance are depicted in the bottom panel.

Figure. Distribution of centrality indices and relationships among them

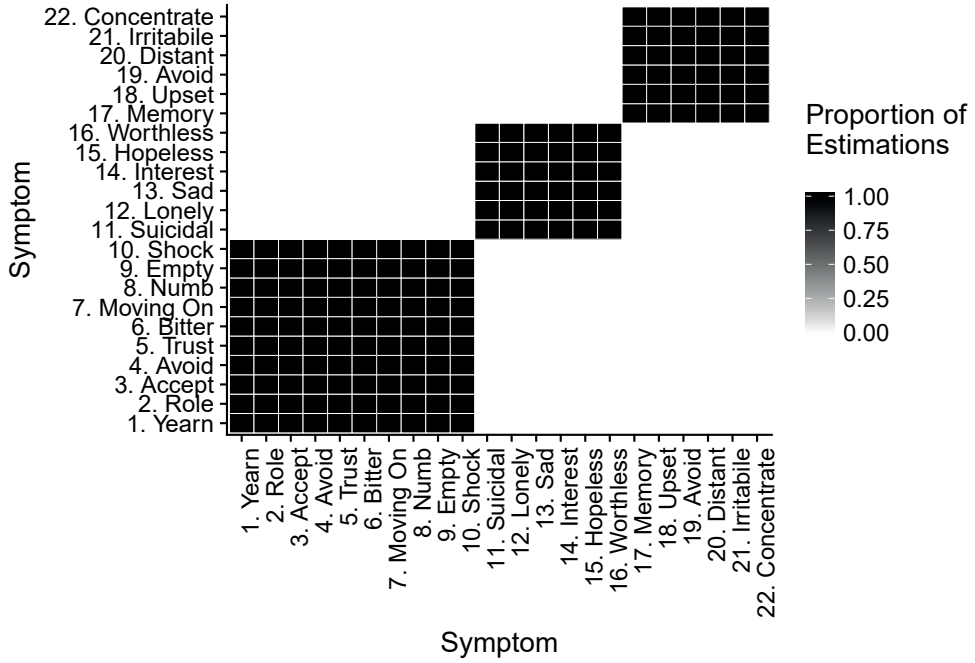
Supplementary materials K



The stability of centrality estimates based on case-dropping bootstrap analysis. As illustrated in the top panel, expected influence and strength estimates remained the most consistent with the overall sample over increasingly small sub-samples. CS-coefficients were .13, .28, .59, and .67 for betweenness, closeness, strength, and expected influence, respectively. The bottom panel depicts the stability of the strength and expected influence indices for each node.

Figure. Stability of centrality estimates

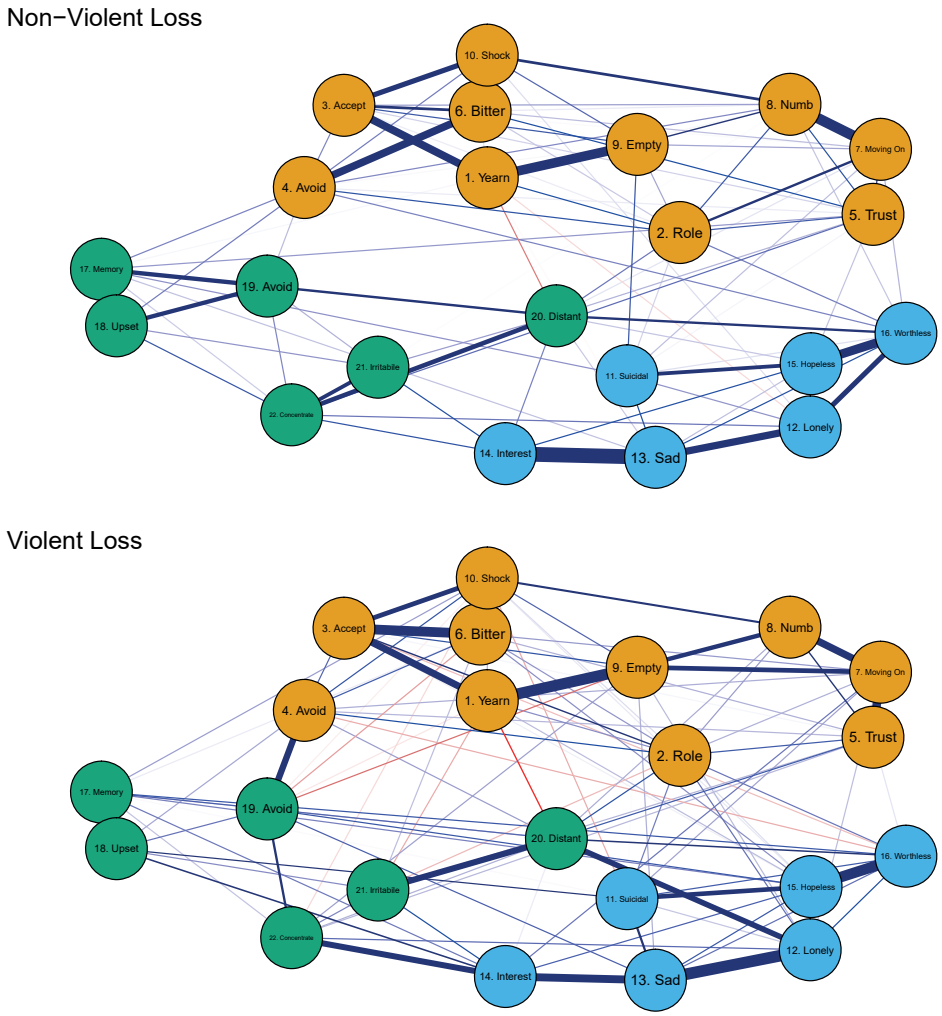
Supplementary materials L



The results of the infomap community detection algorithm. Darker cells represent a higher proportion of 10,000 iterations of the infomap community detection algorithm in which the relevant symptoms appeared in the same community.

Figure. Infomap community detection results

Supplementary materials M



Regularized partial correlation network for those with and without a violent loss. Blue edges represent positive associations. Red edges represent negative associations. PGD, Depression and PTSD symptoms are depicted in orange, blue, and green, respectively.

Figure. Symptom networks for those with and without a history of violent loss

Chapter 7

Post-migration stressors and their association with symptom reduction and non-completion during treatment for traumatic grief in refugees

Djelantik, A. A. A. M. J., de Heus, A., Kuiper, D., Kleber, R. J., Boelen, P. A., & Smid, G. E. (2019). Post-migration stressors and their association with symptom reduction and non-completion during treatment for traumatic grief in refugees.

Submitted

Abstract

Background

Resettled refugees exposed to trauma and loss are vulnerable to developing mental health issues such as posttraumatic stress disorder (PTSD) and persistent complex bereavement disorder (PCBD). Post-migration stressors have been linked to deteriorations in mental health and treatment effects.

Aim

To explore the presence of post-migration stressors and their associations with symptom change and non-completion in a traumatic grief focused treatment.

Methods

In this naturalistic study, 81 files of consecutive patients were included. Paired sample t-tests were used to test the significance of the symptom reductions in PTSD and PCBD symptoms during treatment. The presence of post-migration stressors was derived from a qualitative analysis of the patient files. Associations between post-migration stressors and symptom reductions as well as non-completion were calculated.

Results

Significant reductions in both PCBD and PTSD symptomatology with medium effect sizes were found. Patients experienced a mean of three different post-migration stressors during the treatment. Undocumented asylum seekers were more likely to be non-completers. Ongoing conflict in the country of origin was associated with smaller PTSD symptom reductions and the total number of post-migration stressors was associated with smaller PCBD symptom reductions.

Conclusions

Treatment for resettled refugees for traumatic grief coincides with alleviations in both PCBD and PTSD symptomatology. Specific post-migration stressors were associated with reduced treatment effects and increased non-completion. This is a first step towards well-informed improvements of mental health interventions for resettled refugees.

Keywords

• traumatic loss • PCBD • PTSD • day treatment program • brief eclectic psychotherapy • refugees • post-migration stressors

Highlights of this article

- We evaluated reductions in PCBD and PTSD symptoms during a traumatic grief focused treatment in a treatment seeking refugee sample.
- Although many post-migration stressors were present, significant symptom reductions with a medium effect sizes were observed.
- Undocumented asylum seekers were more likely to not complete the treatment.
- Ongoing conflict in the country of origin and the total number of post-migration stressors were associated with decreased symptom reductions.
- Clinicians treating mental health disorders in resettled refugees should consider the effects of post-migration stressors to prevent treatment drop-out and manage treatment expectations.

Introduction

Refugees and traumatic grief

Resettled refugees in western countries commonly have been exposed to traumatic and loss events due to war, persecution and/or natural disasters in their countries of origin (de Jong et al., 2001; Knipscheer, Sleijpen, Mooren, ter Heide, & van der Aa, 2015). It is not surprising that in this group mental health problems such as posttraumatic stress disorder (PTSD) are frequently observed (Bogic, Njoku, & Priebe, 2015; Fazel, 2018). Recently, persistent complex bereavement disorder (PCBD), characterized by debilitating and prolonged grief, has been recognized as another form of psychopathology commonly seen in refugees seeking mental health support following loss and trauma (Comtesse & Rosner, 2019; Djelantik, Robinaugh, Kleber, Smid, & Boelen, 2019; Nickerson et al., 2014). PCBD has been included as a condition for further study in the 5th edition of the Diagnostic and Statistical Manual of Mental Disorders (American Psychiatric Association, 2013). An equivalent syndrome named Prolonged grief disorder (PGD) was recently included in the 11th edition of the International Classification of Diseases (ICD) (Mauro et al., 2019; Prigerson, Frank, et al., 1995). An estimated 10% of bereaved adults confronted with natural loss will develop PCBD (Lundorff et al., 2017). However, unexpected and violent losses and the loss of close kin (partner or child) have been associated with substantially higher rates of psychopathology than anticipated and non-violent losses and losses other than close kin (Currier, Holland, Coleman, & Neimeyer, 2008; Djelantik et al., 2017b). In a recent study, it was shown that the symptom network of PCBD is closely associated with the symptom networks of PTSD and depression (Djelantik, Robinaugh, et al., 2019), sometimes labelled together as 'traumatic grief' (de Heus et al., 2017; Smid, Kleber, et al., 2015). Nevertheless, treatments of mental health problems following violent loss focusing both on PTSD and PCBD at the same time are scant and have not been evaluated in refugee samples yet (de Heus et al., 2017; Eddinger, Hardt, & Williams, 2019). In a first naturalistic study among 16 consecutive patients, a treatment program for traumatic grief for refugees was found feasible and associated with a decline in PTSD symptoms (de Heus et al., 2017). While these results are promising, evaluation of the treatment results in a larger cohort of patients and the changes in both PTSD and PCBD symptoms is needed.

Post-migration stressors and their effect on psychological treatment among refugees

Refugees resettling in a new country often experience post-migration stressors and these stressors have been linked to adverse mental health outcomes. These stressors include (a) socio-economic factors, i.e., financial and housing security and work problems; (b) social and interpersonal factors, i.e. family separation, family reunification, lack of social support, changes in social roles, discrimination, and changes in socioeconomic status, (c) process and immigration policies, i.e. detention, time of the asylum-seeking process, limited duration of residence permit, and as a consequence, living difficulties such as family conflict and unstable housing (S. Y. Li, Liddell, & Nickerson, 2016).

The association between post-migration stressors and treatment outcome is an important research topic because these stressors may interfere with successful treatment conditions in several ways. First, refugee patients may be too occupied by sorting out and arranging solutions for the post-migration stressors and this could lead to compromised treatment attendance. Second, in the treatment sessions there may be less time to conduct treatment, because the discussion of the current social stressors takes up too much time. Furthermore, sometimes the refugee may ask the clinician to provide solutions for their post-migration problems, which may result in ethical dilemmas for the clinician and slow down the treatment progress (Jacobsen & Landau, 2003; Kramer, Olsman, Hoogsteder, & Van Willigen, 2017). Lastly, when financial and housing problems are present, the costs for the treatment may be too high for the refugee, and he/she may withdraw from treatment. To the best of our knowledge, the association of these post-migration stressors with treatment outcome in resettled refugees has been only partly investigated in two studies (Schick et al., 2018; Sonne et al., 2016). Sonne et al. (Sonne et al., 2016) investigated the post migration stressors 'employment status' and 'integration' and found that not being employed was significantly, albeit weakly, correlated with poorer treatment outcome. Additionally, Schick et al. (Schick et al., 2018) found a correlation between a decrease of the amount of post-migration stressors 'employment status', 'trauma exposure' and 'visa status' over the time of treatment and better outcomes in anxiety and depression symptomatology. Importantly, an elaborate investigation of the presence of post-migration stressors and their association with drop-out rate or treatment outcome among refugees in a grief focused treatment has not yet been performed.

Aim of the current study

In sum, the purpose of this naturalistic study was twofold. Firstly, our aim was to evaluate a traumatic grief focused treatment in a larger cohort of refugees than the previous feasibility study among 16 patients (de Heus et al., 2017) and to include both the reductions in PTSD and PCBD symptoms. Because PTSD and PCBD are likely to co-occur in these patients (Djelantik, Robinaugh, et al., 2019) we were also interested in the correlation between PTSD and PCBD outcomes. We expected a medium size treatment effect for both PTSD and PCBD symptom reductions, based on the PTSD symptom change found in the feasibility study (de Heus et al., 2017), and a correlated decline in PCBD and PTSD symptoms. Secondly, our aim was to explore the associations between postmigration stressors and treatment non-completion and examine associations between post-migration stressors and reductions in PCBD and PTSD symptomatology. We hypothesized that post-migration stressors would be associated with a higher drop-out rate and smaller symptom reductions during treatment.

Methods

Patients and procedure

This study used data from all consecutive patients ($N = 81$) who participated in the day patient treatment for traumatic grief (DPT-TG) between October 2014 and October 2018 at ARQ National Psychotrauma Center, The Netherlands, which receives nationwide referrals for specialized treatment of refugees and other traumatized groups. Patients were enrolled when a clinical primary diagnosis of PCBD and PTSD due to the loss of a loved one was made at intake during full clinical evaluation according to DSM-5. Intake assessments were carried out by psychiatrists and clinical psychologists as well as by psychiatric residents and clinical psychologists in training under direct supervision of a psychiatrist. Exclusion criteria for participation were acute and active suicidality, severe florid psychotic disorder, and/or severe alcohol or substance dependency. Patients underwent standardized measurements at the start (T1) and at the end (T2) of the DPT-TG. Measures were administered by a team of independent psychologists and psychiatrists, all trained in diagnostics and receiving regular supervision from senior clinical psychologists. Measurements were part of the Routine Outcome Measurements (ROM). We consulted the medical ethics committee of Leiden University, and the study was exempted from formal review because the primary purpose of ROM is not research oriented. All patients were informed during the ROM that their answers could be anonymously used for research purposes and

could object if they did not agree. None of the patients eligible for inclusion in the current study expressed objections.

Setting

The DPT-TG is a multidisciplinary treatment program for bereaved refugees that includes exposure-based psychotherapy focused on both separation and traumatic distress. In addition, the program aims to stimulate the patients' social activity and reinforce their social networks, and offers support in relation to legal issues, work, and education. The treatment consists of a one-year weekly five-hour program divided in three phases of each four months. The first phase is a stabilization phase intended to increase patients' understanding of their symptoms and to become acquainted with the group and the treatment. The second phase focuses on processing the traumatic loss. During this phase, weekly sessions of individual brief eclectic psychotherapy for traumatic grief (BEP-TG) (Smid, Kleber, et al., 2015) are offered. BEP-TG consists of 16 sessions and was carried out by trained therapists (i.e. psychologists and psychiatrists). The third phase is focused on resocialization. Concrete individual future orientated goals are addressed in the group therapy and patients are encouraged to strengthen their social networks and assisted in applying for jobs or voluntary work (de Heus et al., 2017).

Measurements and data collection

Traumatic Grief Inventory-Self Report (TGI-SR). To assess the intensity of grief symptoms, the TGI-SR (Boelen & Smid, 2017) was administered. The TGI-SR consists of two parts. The first part measures lifetime losses of loved ones and the second part assesses the intensity of the grief symptoms as experienced by the client in the past month. In case of multiple losses, the loss that is currently considered most painful is used as the anchor event for the second part. This consists of 18 items to assess the intensity of grief reactions rated on a 5-point Likert scale, ranging from '1 = never' to '5 = always', e.g., 'I had intrusive thoughts and images associated with his/her death'; 'I felt a strong longing or yearning for the deceased.' A questionnaire diagnosis of probable PCBD according to DSM-5 was assigned to patients who scored 4 ('often') or 5 ('always') on at least one core symptom, at least six out of twelve additional symptoms, and the dysfunction criterion. The TGI sum score provides an index of severity of the grief symptoms (range, 18 to 90). The TGI-SR has been validated in both a patient and a community sample (Boelen, Djelantik, et al., 2018). The internal consistency in the current study was good (Cronbach's alpha at T1 = .84 and at T2 = .92).

Clinician-Administered PTSD Scale 5 (CAPS-5). PTSD symptom severity was assessed with the CAPS-5 (Weathers et al., 2013). The CAPS-5 is a 30-item clinician rated interview, comprising 20 items assessing PTSD symptoms according to the DSM-5 (American Psychiatric Association, 2013). The intensity and frequency of symptoms during the past month are separately rated and then combined to form a single severity score for each item. Severity scores are rated on a 5-point scale ranging from 0 (absent) to 4 (extreme/incapacitating), resulting in a total score range of 0 to 80. A diagnosis of PTSD according to DSM-5 was assigned to patients who scored ≥ 2 on at least one symptom of criterion B and C, at least two symptoms of criterion D and E, and criterion F (disturbance has lasted one month) and G (dysfunction criterion). An initial evaluation showed good psychometric properties for the CAPS-5 (Weathers et al., 2013). The internal consistency in the current study was good (Cronbach's alpha at T1 = .86 and at T2 = .91). For one participant PTSD symptoms were assessed by the Clinician Administered PTSD Scale for DSM-IV (CAPS-4 (Blake et al., 1995)) To be able to compare the scores both CAPS versions, the sum scores were converted into probability scores.

Socio-demographic information and post-migration stressors. Socio-demographic information and the presence of post-migration stressors in the current patient sample were examined using information retrieved from patient files. Each file, including the admission report and notes from the therapists, was examined for the presence of post-migration stressors by AdH and DK. The first three authors created a list of post-migration stressors using information from the review by S. Y. Li et al. (2016). Subsequently, additions and removals of this list of post-migration stressors were made by exploring similarities and differences across the files by AdH and DK. When in doubt, the findings were discussed with the first author until consensus was reached. For the stressor 'ongoing conflict in the country of origin', we searched the internet to find evidence of conflict at the time of treatment (Supplementary Materials A).

Statistical analysis

Missing data. Statistical analyses were performed using SPSS version 25 (Wagner, 2019). The significance threshold was set at $p < .05$ for all analyses. Missing data at item level were considered missing completely at random and did not exceed 5%, permitting us to replace these by the sample mean (Tabachnick, Fidell, & Ullman, 2007). The missing data regarding social stressors and sum scores of PCBD and PTSD were handled using listwise deletion.

Aim A: PCBD and PTSD symptom reductions during treatment. We used the data of all patients who completed DPT-TG as well as the TGI-SR or CAPS on both

timepoints. We performed a paired samples t-test to test the statistical significance of symptom reduction (Faul, Erdfelder, Buchner, & Lang, 2009). Additionally, we calculated the Cohen's d to assess the effect size. We performed this with the TGI-SR sum score and the two subscales symptom clusters of PCBD, namely separation distress and reactive distress and social/identity disruption. We repeated this with the CAPS sum score and PTSD subscales, namely intrusive symptoms, avoidance of stimuli associated with the event, negative changes in cognitions and mood, and marked alterations in arousal and reactivity. Lastly, we calculated the correlation between PCBD and PTSD symptom reductions. To test the robustness of our findings, we repeated this correlation with the expectation-maximization algorithm. This algorithm accounts for the missing data using maximum-likelihood estimates (Moon, 1996).

Aim B: Post-migration stressors and the association with treatment drop-out and symptom reductions during treatment. We determined whether or not the group of DPT-TG completers (both the patients with complete and missing questionnaires; $n = 57$) and DPT-TG non-completers ($n = 24$) differed significantly in terms of post-migration stressors, using t-tests, chi square and Fisher exact tests. We used both chi square and Fisher exact tests because, due to our sample size, some of the expected frequencies of the post-migration stressors were smaller than 5 (Field, 2013). In addition, we evaluated the associations between post-migration stressors and symptom reductions. To account for both the initial differences between scores at T1 and for measurement error inherent in the use of repeated measures on the same instrument, we first calculated the residual change score for PCBD and PTSD (Steketee & Chambless, 1992). Then, we examined whether these residual change scores varied as function of the post-migration stressors using one-way ANOVA.

Results

Patient characteristics

Of the 81 patients who started, 57 patients completed the full year (completers) and 24 patients did not complete DPT-TG (non-completers). Fourteen patients dropped out completely from DPT-TG before the BEP-TG module was finished. Ten patients were not able to attend the weekly one-day treatment sessions, but continued treatment at the outpatient clinic with a customized program due to pregnancy and/or psychosocial problems. Eight patients did not complete at least one of the questionnaires due to various reasons such as psychosocial problems or illnesses in the week of the administration of the questionnaires but completed the

Table 1. Socio-demographic and loss-related characteristics and symptom levels of the completers and early drop-outs or customized treatment in a refugee sample

	Completers of DPT-TG (n = 57)	Early drop-outs or customized treatment (n = 24)	Significance test for differences between groups	p value
Age, M (SD)	42.25 (9.43)	41.79 (9.573)	t(79) = 0.13	.84
Gender, n (%)			$\chi^2(1, n = 80) = 0.03$	.86 Fisher's exact test: 1.00
Female	9 (16)	4 (17)		
Male	48 (84)	19 (83)		
Marital status, n (%)			$\chi^2(3, n = 81) = 1.89$	.56 Fisher's exact test: .62
Single	14 (25)	7 (29)		
Married	32 (56)	12 (50)		
Divorced	8 (14)	2 (8)		
Widowed	3 (5)	3 (13)		
Level of education, n (%)			$\chi^2(2, n = 75) = 1.88$	.39 Fisher's exact test:.37
Low	10 (18)	6 (25)		
Middle	35 (61)	10 (42)		
High	9 (16)	5 (21)		
Region of origin, n (%)			$\chi^2(4, n = 81) = 2.96$	.57 Fisher's exact test: .50
Dutch/Colony	2 (5)	3 (13)		
Middle East	34 (60)	12 (50)		
Africa	11 (19)	4 (16)		
Bosnia Herzegovina / Serbia	9 (16)	4 (17)		
Asia	1 (2)	1 (4)		
Missing Family, n (%)	10 (17.5)	4 (17)	$\chi^2(1, n = 81) = 0.01$	.92 Fisher's exact test: 1.00
Number of losses, M (SD)	5.59 (2.14)	5.65 (2.46)	t(75) = 0.11	.92 Fisher's exact test: 1.00
Relationship to lost loved one[1], n (%)			$\chi^2(5, n = 60) = 10.81$	.06 Fisher's exact test: .04
Partner	1 (1.8)	3 (12.5)		
Child	4 (7.0)	2 (8.3)		
Parent(s)	15 (26.3)	5 (20.8)		

Sibling	8 (14.0)	3 (12.5)		
Friend	15 (26.3)	1 (4.2)		
Other	1 (1.8)	2 (8.3)		
Violent loss a, *n* (%)	47 (83)	20 (83.3)	$\chi^2(1, n = 78) = 0.03$	.86 Fisher's exact test: 1.00
PCBD according to TGI-SR, *n* (%)	30 (53)	13 (54)	$\chi^2(1, n = 81) = 0.02$	.90 Fisher's exact test: 1.00
PTSD according to CAPS, *n* (%)	51 (90)	21 (88)	$\chi^2(1, n = 78) = 0.74$	.39 Fisher's exact test: .67
Number of traumatic events, M (SD)	19.70 (5.24)	19.47 (4.48)	$t(64) = 0.75$	.87 Fisher's exact test: .76
Psychiatric medication, *n* (%)	41 (72)	15 (63)	$\chi^2(1, n = 72) = 0.12$	.73 Fisher's exact test: .48
Psychiatric comorbidity at during clinical intake assessment, *n* (%)				
Depressive disorder	45 (79)	20 (83)	$\chi^2(1, n = 81) = 0.21$	.65 Fisher's exact test: .77
Substance abuse	8 (14)	6 (25)	$\chi^2(1, n = 81) = 1.42$	.23 Fisher's exact test: .33
Dissociative disorder	2 (4)	0 (0)	$\chi^2(1, n = 81) = 0.86$	.35 Fisher's exact test: 1.00
Disruptive, Impulse-Control, and Conduct Disorders	2 (4)	0 (0)	$\chi^2((1, n = 81) = 0.86$	.35 Fisher's exact test: 1.00
Somatic Symptom and Related Disorders	3 (5)	0 (0)	$\chi^2(1, n = 81) = 1.31$	.25 Fisher's exact test: .56
Schizophrenia and other psychotic disorders	1 (2)	1 (4)	$\chi^2((1, n = 81) = 0.41$	.52 Fisher's exact test: .51
Sexual Disorders	1 (2)	0 (0)	$\chi^2(1, n = 81) = 0.426$	.51 Fisher's exact test: 1.00
Obsessive Compulsive Disorders	2 (4)	0 (0)	$\chi^2(1, n = 81) = 0.863$	0.35 Fisher's exact test: 1.00
Eating Disorder	1 (2)	0 (0)	$\chi^2(1, n = 81) = 0.426$	0.51 Fisher's exact test: 1.00
Indications for probable personality disorder	32 (56)	13 (54)	$\chi^2(1, n = 81) = 0.027$	0.87 Fisher's exact test: 1.00

Note. [1] Concerning the loss that is considered most painful; PCBD = persistent complex bereavement disorder; PTSD = Posttraumatic Stress Disorder; DPT-TG = Day Treatment Program Traumatic Grief.

rest of the DPT-TG (see the flow chart included in Supplementary Materials B). On average, patients were 42 years old (SD = 9.24). Most patients were male (84%) and originated from the Middle East (58%). Patients who had lost a child or partner were slightly more likely to drop-out or receive a customized treatment (Table 1). Patients attended a mean of 74% of the psychotherapy sessions (SD = 14.08, range 35-100%).

Table 2. Symptom reductions and diagnostic changes in the Day Treatment Program for Traumatic Grief Completers

	Pre-treatment score M (SD)	Post treatment score M (SD)	Significance test for differences between groups	*p* value	Cohen's d
Symptom reductions PCBD *Patients who filled in both PCBD questionnaires (n = 54)*					
PCBD sum score, M (SD)	66.80 (11.01)	58.92 (14.71)	t(54) = 3.91	< .001	0.61
subdomain: separation distress. M (SD)	4.17 (0.49)	3.69 (0.89)	t(54) = 4.72	< .001	0.70
subdomain: reactive distress and social/ identity disruption. M (SD)	3.56 (0.72)	3.14 (0.85)	t(54) = 3.33	.002	0.53
subdomain: functional impairment. M (SD)	3.68 (1.29)	3.19 (1.30)	t(54) = 2.63	.01	0.38
Patients endorsing separation distress, *n* (%)	53 (98.2)	44 (81.5)			
Patients endorsing reactive distress and social/identity disruption, *n* (%)	49 (90.7)	47 (87.0)			
Patients endorsing functional impairment, *n* (%)	34 (63.0)	27 (50.0)			
Symptom reductions PTSD *Patients who completed both PTSD interviews (n = 52)*					
PTSD sum score, M (SD)	0.54 (0.15)	0.48 (0.19)	t(52) = 2.92	.01	0.34
Criterium B: intrusive symptoms M (SD)	0.64 (0.19)	0.54 (0.18)	t(52) = 3.44	< .001	0.55
Criterium C: avoidance of reminders of the event M (SD)	0.55 (.215)	0.41 (0.26)	t(52) = 3.49	< .001	0.62
Criterium D: negative alterations in cognitions and mood M (SD)	0.52 (0.20)	0.49 (0.24)	t(52) = 1.17	.25	0.15
Criterium E: alterations in arousal and reactivity M (SD)	0.47 (0.16)	0.44 (0.17)	t(52) = 1.10	.28	0.15
Patients meeting criterium B, *n* (%)	51 (98.1)	47 (90.4)			
Patients meeting criterium C, *n* (%)	52 (100)	44 (84.6)			
Patients meeting criterium D, *n* (%)	48 (92.3)	42 (80.8)			
Patients meeting criterium E, *n* (%)	49 (94.2)	46 (88.5)			

Note. DPT-TG = day patient treatment–traumatic grief; PCBD = Persistent complex bereavement disorder; PTSD = Posttraumatic stress disorder.

Aim A: PTSD and PCBD symptom reduction during treatment

Table 2 shows an overview of the reductions in PCBD and PTSD symptomatology during DPT-TG. As shown in table 2, patients scored significantly lower on the post-treatment grief measurement compared to the pre-treatment grief measurement. With respect to the effect size we found a medium effect for PCBD and PTSD (d = .61 and d = .33, respectively) (Cohen, 1988). PCBD diagnoses decreased from 54% (29 patients) at T1 to 41% (22 patients) at T2. PTSD diagnoses dropped from 89% (46 patients) at T1 to 70% (36 patients) at T2 (Table 2). The symptom reduction of PCBD and PTSD was highly correlated ($r(49)$ = .60, p < .01)), also when applying expectation-maximization to account for the missing questionnaires ($r(57)$ = .59).

Table 3. Post-migration stressors in the completers and early drop-outs or customized treatment group of the refugee sample

	Completers of DPT-TG (n = 57)	Early drop-outs or customized treatment (n = 24)	Significance test for differences between the groups	p value
Time in the Netherlands (months), M (SD)	191.40 (104.85)	192.40 (107.56)	t(73) = 0.29	.97
Time asylum period (months), M (SD)	66.74 (59.41)	87.40 (102.74)	t(35) = 5.99	.45
Legal status, n (%)			$\chi^2(3, n = 81)$ = 10.00	.02 Fisher's exact test: .02
Permanent permit	46 (81)	16 (67)		
Temporary permit	7 (12)	3 (13)		
Pending	3 (5)	0 (0)		
Illegal	1 (2)	5 (21)		
Language, n (%)			$\chi^2(1, n = 81)$ = 0.010	.92 Fisher's exact test:1.00
Dutch	41 (72)	17 (71)		
Insufficient Dutch proficiency	16 (28)	7 (29)		
Work situation, n (%)			$\chi^2(3, n = 81)$ = 2.93	.40 Fisher's exact test: .43
Employed	2 (4)	3 (13)		
Sick leave	10 (18)	3 (13)		
Disabled	8 (14)	2 (8)		
Unemployed	37 (65)	16 (67)		
Housing problems, n (%)	12 (21)	8 (33)	$\chi^2(1, n = 81)$ = 1.37	.24 Fisher's exact test: .27
Family separation close kin, n (%)	18 (32)	9 (38)	$\chi^2(1. n = 81)$ = 0.27	.70 Fisher's exact test: .62
Ongoing conflict in country of origin, n (%)	30 (53)	8 (33)	$\chi^2(1. n = 81)$ = 2.53	.11 Fisher's exact test: .15
Total number of stressors M (SD)	2.86 (1.76)	2.83 (1.81)	t(79) = .72	

Note. DPT-TG = Day patient treatment–traumatic grief.

Aim B: Post-migration stressors and the association with treatment drop-out and symptom reductions during treatment

The following list of post-migration stressors were identified: time in the Netherlands, duration of the asylum period, refugee status, language problems, work situation, housing problems, family separation of close kin, ongoing conflict in country of origin and total number of post-migration stressors. The categories of the post-migration stressors are specified in Table 3. Three patients experienced a change in legal status during treatment. One participant received a temporary permit, one participant lost a temporary permit and became illegal, and one participant received, lost and received again a temporary permit during the year of treatment. Although these are interesting findings, there were too few patients to be included in the further analyses.

On average, patients experienced three different post-migration stressors during the treatment. Undocumented asylum seekers were more likely to be non-completers (Table 3). Some of them completely dropped out from DPT-TG (n = 3) and others received a customized treatment (n = 2). Other post-migration stressors were not significantly associated with treatment non-completion. The post-migration stressor 'ongoing conflict' was inversely associated with PTSD symptom reductions. This indicates that refugees with ongoing conflict in their homeland benefit less from treatment compared to refugees from countries where conflicts have been resolved. Total number of different post-migration stressors was inversely associated with PCBD symptom reductions. This indicates that refugees with a high number of stressors benefit less from treatment compared with refugees with a lower number of stressors (Table 4).

Table 4. *The associations between the post-migration stressors and the TGI and CAPS residual change score*

	TGI RES				CAPS RES			
	F	df1	df2	*p* value	F	df1	df2	*p* value
Legal status	1.07	3	50	.37	0.41	3	48	.75
Language	1.17	1	52	.29	0.01	1	50	.94
Work situation	0.90	3	50	.45	1.78	1	50	.19[a]
Housing problems	1.21	1	52	.28	0.14	1	50	.72
Family separation close kin	0.68	1	52	.41	1.01	1	50	.41[b]
Ongoing conflict in country of origin	1.36	1	52	.25[b]	4.83	1	50	.03[b]
Total number of stressors	4.67	1	52	.04	0.54	1	50	.47

Note. [a] = due to the violation of the assumptions regarding outliers, normality and homogeneity, we have dichotomized 'work situation' for this analysis into employed versus not-employed. [b] = due to the violation of the assumption regarding homogeneity we have reported the Welsh test; CAPS RES = Clinician Administered Posttraumatic Stress Disorder residual score; TGI RES = Traumatic Grief Inventory Residual score.

Discussion

In this study on symptom reductions during treatment of traumatic grief in resettled refugees, a significantly correlated reduction of both PCBD and PTSD symptomatology was found with a medium effect size. Post-migration stressors were associated with both higher treatment non-completion and smaller symptom reductions. More specifically, not having a legal permit was associated with higher treatment non-completion. Ongoing conflict in the country of origin and a higher total number of post-migration stressors were associated with smaller reductions in PTSD and PCBD symptoms, respectively. Our finding that both PCBD and PTSD symptomatology may decrease simultaneously during treatment is in accordance with findings of other studies that evaluated both PCBD and PTSD symptom reductions in a grief focused treatment (Eddinger et al., 2019), however this result was not yet shown in refugee populations.

In our study, asylum seekers who are illegally residing in the Netherlands were more likely to drop out of the treatment fully or to require customized treatment. Although several studies have indicated that residence status is not a factor in the prevalence of mental health problems (Gerritsen et al., 2006; Kirmayer et al., 2011; Laban, Komproe, Gernaat, & de Jong, 2008), recently, in the case of PCBD, one study found that having a resident status was associated with less symptoms (Comtesse & Rosner, 2019). Undocumented asylum seekers have received a negative status decision, and are illegally residing in the Netherlands with only limited access to shelter, food and health care (Lahuis, Scholte, Aarts, & Kleber, 2019). Due to the combination of post-migration stressors, legal situation and uncertain future perspective, these people may be in need for special attention to prevent drop-out. Conversely, one could imagine that an improvement in legal status might be a protective factor. However, in the current study, we were unable to examine this because there was only one patient who received a temporary permit during treatment. Future studies are needed to further elucidate the association between legal status and treatment effect. Nevertheless, all other post-migration stressors were found not to be associated with treatment drop-out. Clinicians' hesitance to start treatment with a refugee because of the fear for drop-out appears therefore unnecessary in most circumstances.

In our sample, ongoing conflict in the country of origin was significantly associated with less reductions in PTSD symptomatology. Nickerson et al.(Nickerson, Bryant, Steel, Silove, & Brooks, 2010) evaluated the influence of fear for family remaining in the country of origin with an ongoing conflict and the mental health of Iraqi refugees in a cross-sectional survey. They found higher PTSD

symptomatology and depression as well as greater mental health-related disability. Perhaps the news about the ongoing conflict continues to trigger traumatic experiences and memories. Furthermore, it could be that the worries about family members still in the conflict area exposed to war and violence could play a role in why treatment may not be that effective. As expected, the total number of post-migration stressors was associated with smaller treatment effects. This is in line with our clinical observations of patients who sometimes appear so occupied by sorting out and arranging solutions for their post-migration stressors that they are not capable to adhere to the steps of a treatment protocol. Clinicians need to provide emotional and information support for patients reporting post-migration stressors while realizing that this may not immediately antagonize their effects.

The findings of this study need to be interpreted in the light of its naturalistic setting. It cannot be stated with certainty that the decreases in PCBD- and PTSD symptom severity can be attributed to the effects of the DPT-TG. Furthermore, we could only assess the importance of the post-migration stressors that clinicians noted in the patient files. On the one hand, one could argue that we now have data on the naturally by clinicians and patients reported factors that may influence the treatment process. On the other hand, 'ongoing conflict in the country of origin' was one of the few post-migration stressors found to be associated with treatment outcome and this stressor was not systematically asked by clinicians in the patient files. Therefore, there might be a lack of knowledge by clinicians about which post-migration stressors are worth assessing at the beginning of treatment. Future studies are needed to investigate the role of post-migration stressors more elaborately and to assess the treatment effect of the DPT-TG with a control group and follow-up measurement.

The findings of this study generate several well-informed answers to some urgent clinical questions that rise in treating resettled refugee patient populations characterized by multiple post-migration stressors. Our findings indicate that treatment for traumatic grief coincides with alleviations in both PCBD and PTSD symptoms in refugees who have faced multiple traumatic events and traumatic losses. Findings also indicate that traumatized refugees may benefit from treatment even in the presence of multiple post-migration stressors. However, clinicians need to keep in mind that post-migration stressors may interfere with a smooth treatment process and that these stressors are worth documenting systematically at intake. In the case of ongoing conflict or a high number of stressors, symptom reductions may be modest, and clinicians may educate patients about these effects to manage treatment expectations and to prevent demoralization. Furthermore, special attention is needed for undocumented patients who were denied a refugee status in order to prevent them from early drop-out of treatment.

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Author contributions
MD, GS, and PB were responsible for the design of the study. MD, GS, AdH, and DK were responsible for the data-collection. MD was responsible for the data-analysis and MD, GS, and PB for the interpretation of the data. AdH and DK contributed to the data-analysis and paragraphs of the manuscript. PB, RK, and GS supervised MD. MD wrote the drafts of the manuscript. All authors were involved in revising the draft versions critically and all authors approved the final version of the manuscript.

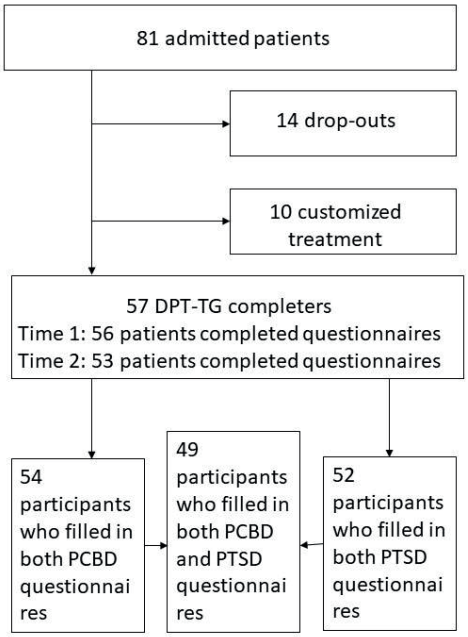
Supplementary materials

Supplementary materials A

Table. Conceptualization of the post-migration stressors

Social stressors	Conceptualization
Language	In need of an interpreter vs. not in need of an interpreter.
Legal status	Differentiation between having a permanent permit, a temporary permit (5 years or 1 year), pending (waiting for the verdict about the status), or illegal (having the permit request denied)
Time in NL	Months since arrival in The Netherlands until start of the treatment.
Time of asylum period	Duration in months between arrival in The Netherlands and receiving a temporal status.
Housing problems	Not having housing problems versus having housing problems (defined as living on the streets, in an asylum center and/or a high dissatisfaction with current housing situation).
Work	Being employed, on sick leave, disabled, or unemployed at the start of treatment.
Family separation	Not being separated from family vs. being separated from partner and/or children, or when there is/are no partner/children, being separated from parents and/or siblings
Ongoing conflict	The presence of a current ongoing conflict. (currently is during treatment period). Information retrieved from: https://www.crisisgroup.org/, https://www.cfr.org/, http://isdp.eu/, http://www.bbc.com/, https://www.nederlandwereldwijd.nl/reizen/reisadviezen, https://www.state.gov/, https://www.britannica.com, https://diplomatie.belgium.be/nl
Living situation	Living alone, living with partner and/or children, living separated from partner and/or children.
Change in legal status	Having a change in the legal status (during the treatment period). This can be the change from pending to a temporary permit or the loss of a temporary permit

Supplementary materials B



PCBD = Persistent complex bereavement disorder. PTSD = Posttraumatic Stress Disorder. DPT-TG = Day patient treatment program – traumatic grief.

Figure. Flow chart day patient treatment – traumatic grief (DPT-TG)

Chapter 8

Prolonged grief disorder, posttraumatic stress disorder, and depression following traffic accidents among bereaved Balinese family members: Latent class analyses and cultural correlates

Djelantik, A. A. A. M. J., Putu, A., Boelen, P. A., Lesmana, C. B. J., & Kleber, R. J. (2019). Prolonged grief disorder, posttraumatic stress disorder and depression following traffic accidents among bereaved Balinese family members: Latent class analysis and cultural correlates.

In Preparation

Abstract

Background

The island of Bali is known for its special rituals around loss and bereavement. Many qualitative studies have described the rather unique adjustment styles of Balinese people with adversity, although with inconsistent conclusions. No quantitative research among bereaved individuals assessing prolonged grief disorder (PGD), posttraumatic stress disorder (PTSD) and depression has been performed yet.

Aim

This study aimed to estimate the prevalence of PGD, PTSD and depression among bereaved individuals after traffic deaths in Bali. Secondly, we examined the presence of cultural characteristics, such as religion, performance of the rituals according to the religion, purpose of the rituals and notions of post-traumatic growth (PTG). Thirdly, we searched for subgroups of individuals sharing the same symptoms. In addition, the relation between these subgroups and loss of close kin, low level of education, cultural characteristics and PTG were examined.

Method

A cross-sectional survey was conducted across the island. 301 participants were asked about PGD, PTSD and depression symptoms, socio-demographic and cultural characteristics and PTG. The main purposes of the rituals were determined with a thematic qualitative analysis of the answers of the participants. To estimate the subgroups sharing the same symptoms we performed latent class analyses and subsequently we calculated the odds ratios between membership of the classes and characteristics with a multivariate 3step analysis.

Results

Prevalences of PGD (0%), PTSD (1%) and moderate depression (2%) were low. Most participants followed the bereavement rituals characteristic for the Balinese culture. The purpose of these rituals were mainly expressions of caring for the deceased. Three classes or subgroups of bereaved individuals were found: a large resilient class (73%) and two smaller classes, one characterized with PGD symptoms (11%) and another with PTSD symptoms (13%), respectively. Loss of close kin was associated with membership of the PTSD class.

Conclusions
The prevalence rates of PGD, PTSD and depression in the Balinese community were surprisingly low, compared to prevalence rates in other countries. Participants appeared to be quite homogeneous in terms of following their religious and cultural habits. Our findings may suggest that certain aspects of the Balinese culture protect the bereaved individual for developing mental health issues. This finding could be used for an informed reformation of bereavement rituals in other cultures.

Highlights of this article

- The prevalence rates of PGD, PTSD and depression in bereaved Balinese families due to traffic accidents are surprisingly low.
- The purpose of Balinese bereavement rituals are mainly expressions of caring for the deceased.
- Our findings may suggest that certain aspects of the Balinese culture protect the bereaved individual for developing mental health issues.

Introduction

The island of Bali in Indonesia has attracted numerous Western anthropologists and other scientists for its colorful rituals around loss and bereavement (Geertz, 1966; Mead, 1955; Wikan, 1990). Bali has often been considered as a paradise in which serious negative emotions are hardly expressed or even not experienced (Bateson & Mead, 1942). Some authors have argued that the Balinese people are a world-wide exception: they do not cry at death as was found in a comprehensive cross-cultural comparison of grief and mourning in 73 cultures (Rosenblatt, 1975, 2008). Others have argued that sadness and grief are experienced, but that public displays of emotions are considered culturally inappropriate and that Balinese people have strong mechanisms for handling emotional feelings internally (Wikan, 1988, 1990).

Balinese ceremonies after the death of a loved one are traditionally embedded in the religion of Hinduism. Strong positive beliefs about death and afterlife (e.g., reincarnation, karma) are important aspects of the Hindu religion. These beliefs play a role in strengthening resilience in the Balinese people and may create an element of psychological growth. Although ceremonies vary between the island regions and social casts, in general, they show the following sequence In time: washing and embalming of the body, preservation of the body (in the house or buried), public ceremony of cremation ('ngaben'), scattering of the ashes in the sea, collecting the 'soul' and bringing it to different temples (including the family temple 'ma-ajarajar'), and, finally, re-cremation/ purification after a period of time from up to 12 days to several years after the last ceremony.

In the last decades, the amount of modern traffic has increased rapidly in Bali. This has resulted in an increasing number of traffic accidents and deaths. In 2010, 2012, and 2013, the police registered around 2166 to 3000 traffic incidents and between 578 and 601 deaths each year in a population of approximately 3,5 million people. In comparison, in the same years in the Netherlands, the number of deaths varied between 570 and 640 in a population of approximately 16,5 million people (SWOV, 2018). This means that, annually, hundreds to thousands of Balinese people lose a family member due to traffic accidents.

Psychopathology after traffic accidents

Although the psychological consequences of traffic accidents have been less examined than the consequences of combat, war, and disaster, research has clearly shown that they may lead to serious and sometimes long-term consequences, particularly posttraumatic stress disorder (PTSD). In a meta-analysis, Lin and colleagues (Lin, Gong, Xia, & Dai, 2018) analyzed fifteen studies including 6804

road traffic accidents survivors. The prevalence of PTSD was 22% (range 6% to 58%). Research into this subject in low and middle-income countries (comparable to Indonesia) is limited. The prevalence of PTSD was found to be 23% among Ethiopian survivors of road traffic accidents (Yohannes, Gebeyehu, Adera, Ayano, & Fekadu, 2018) and 30% among Iranian victims (Khodadadi-Hassankiadeh, Dehghan-Nayeri, Shahsavari, Yousefzadeh-Chabok, & Haghani, 2017). Prevalence rates appear to be lower in Western countries (Mayou, Ehlers, & Bryant, 2002), but this difference is not well studied yet.

PTSD is not the only form of psychopathology resulting from the loss of loved one due to a traffic accident. Such a loss can precipitate the development of other forms of psychopathology, including Prolonged Grief Disorder (PGD) and major depression (Boelen & van den Bout, 2005; Bonanno & Kaltman, 2001; Djelantik et al., 2017b; Kristensen, Weisaeth, et al., 2012). The distinctiveness and co-occurrence of symptoms of these three disorders have been the topic of several studies in different samples, including European, Australian, and displaced communities (Djelantik et al., 2017b; Maccallum & Bryant, 2019; Nickerson et al., 2014). In these studies, Latent Class Analyses (LCA) consequently resulted in the identification of distinct groups (or classes) of bereaved people: a resilient group, a group with only PGD symptoms and a group with combined psychopathology.

Study objectives

Quantitative studies of mental health issues following traumatic events in Bali are scarce. Following the disastrous Bali Bombings in 2002, only one study examined mental health difficulties of Balinese participants. In that study, 2000 Balinese children (8-18 years old) were screened for PTSD symptoms. The prevalence of probable PTSD was 10%, 6 weeks after the event (Lesmana, Suryani, Jensen, & Tiliopoulos, 2009).

Because of the combination of a lack of quantitative studies in Bali assessing mental health issues following traumatic events on one hand, and the special way the Balinese cope with loss and bereavement, a mixed methods study was considered relevant. Our study has three objectives. First, there is the question, pertinent to transcultural psychology and psychiatry, whether the prevalence rates and symptoms among Balinese bereaved people are similar or lower in comparison to those observed in other populations. Hypothetically, due to the Balinese ways of managing emotions, the prevalence rates of PGD, PTSD, and depression could be expected to be lower among Balinese people, compared to other populations (including western populations).

Secondly, we investigated several socio-demographic and cultural characteristics which could be associated with psychopathology. For example, endorsement of both PGD and PTSD symptoms in the Dutch community has been found to be associated with the confrontation with violent loss (including traffic incidents), the loss of close kin, and a lower level of education (Djelantik et al., 2017b). Adaptation to loss and trauma does not occur in a vacuum. It is affected by the cultural context (Kleber, 1995). We therefore also investigated cultural factors such as the engagement of the participants in performing the rituals following the Balinese culture and the purposes of these rituals. We were also interested in posttraumatic growth (PTG). PTG refers to the notion that a traumatic experience may help to value one's life more because one has been confronted with the transiency of life (Splevins, Cohen, Bowley, & Joseph, 2010). In the context of Balinese culture, anthropological theorizing and research has suggested that growth relates to healthier mental functioning and that the Balinese culture might be strong in focusing on positive notions about life and death because of their beliefs in karma and reincarnation (Wikan, 1990).

Thirdly and lastly, we were interested whether in Bali the same symptomatic classes can be distinguished as in other studies using the technique of LCA (i.e., a resilient, a PGD only, and a combined PGD/PTSD class). Additionally, we explored the associations between loss of close kin, level of education, cultural factors, and PTG on the one hand and class membership on the other hand. We expected that loss of close kin and low level of education would be associated with more severe classes. Considering the supportive impact of ceremonies of the Balinese religion, we predicted that engagement in such ceremonies would be associated with membership of the more resilient class. Furthermore, we would expect stronger growth to be reported by people in the resilient class. However, there is rather paradoxical evidence from Western samples that stronger growth is associated with more posttraumatic and bereavement related distress, e.g., Eisma, Lenferink, Stroebe, Boelen, and Schut (2019), Sleijpen, Boeije, Mooren, and Kleber (2017). Accordingly, it could also be expected that stronger growth in our sample would be reported by people in the more disturbed classes.

Methods

Design and procedure

This study used a mixed design of quantitative and qualitative methods. Most research on Balinese health and social issues has been conducted from an anthropological or historical perspective using qualitative methods. Little

quantitative research has been conducted on Bali, while there is currently a growing need to investigate the incidence of mental health difficulties related to traffic accidents.

A cross-sectional survey was conducted across the island, supervised by the first author (a Dutch psychiatrist and researcher as well as a descendant of Balinese migrants; MD) and the second author (a Balinese public health medical doctor and researcher; AP). Information about names and addresses of bereaved families was gathered from a list from the insurance company specialized in traffic accidents (i.e. Jasa Raharja) and, furthermore, based on mouth to mouth communication. Trained members of the Faculty of Medicine of Udayana University (a counterpart trusted by the Balinese community) contacted the participants by phone and when the participant agreed to participate, visited the participant at home or in a private location to conduct the interview.

Participant recruitment

Eligible respondents were male and female inhabitants of Bali who lost close kin due to traffic accidents in the three years before the survey and were 18 years of older at the time of the survey. Furthermore, the participant needed to be proficient in Bahasa Indonesia. People that only spoke Balinese were excluded. The Balinese language consists of various sublanguages varying in each conversation, depending of the social cast of the respondent and the interviewer. This made it very difficult to perform an appropriate translation of the materials.

A total of 417 traffic accidents were reported at the insurance company list, including 319 deaths. Eighteen descriptions of these cases did not include an address or phone number of the family. The families of 150 deceased persons lived in an area which could not be accessed by vehicles or the head of the village could not explain the interviewers how to reach the family or address. The families of 43 deceased persons were not present at the address or were not willing to participate. In the case of 108 case descriptions, the families could be reached; they were willing to participate. The interviews of the participants took place between August 9th and September 29th, 2017. The final sample consists of 301 participants, from 103 different families.

Ethics statement

Ethical permission for the study was provided by the Udayana University in Bali. The study was conducted according to the ethical provisions of the Declaration of Helsinki for medical research involving human subjects. The respondents received an information letter about the study and gave written consent prior to the

commencement of the interviews. Interviews were conducted in a private location or within the home of the participant, depending on their preference.

Field personnel training

Alumni of the Faculty of Medicine of the Udayana University (from the Medicine, Public Health, Psychology and Nursing Programs) were selected on the base of their competence and commitment to the project. They received a three-day training giving by MD, AP and other medical doctors who were part of the research unit of the department of Public Health, Udayana University. The training was focused on general research skills, information about mental health issues which could be present in bereaved individuals, familiarity with the research protocol, and practicing the administration of the questionnaires. At the end, four alumni were hired as research assistants. Interrater-reliability was supervised and assessed by AP (Udayana University). Each newly trained research assistant needed to administer at least two interviews with a respondent, side to side with another research assistant. The interrater-agreement of these interviews was good (couple 1: 93%, couple 2: 95%).

The gathered questionnaires were checked for errors by AP. She was also the contact person in case the research assistants needed consultation. Furthermore, a Balinese psychiatrist and researcher (CL) and MD could be consulted in case she needed extra consultation. All completed interviews were entered into an electronic database by the research assistants and cross-checked by AP. In the Netherlands the database was once again checked for missing data and weird values by MD.

Measures

Assessment modules preparation. The questionnaires for assessing PGD, PTSD and PTG were translated from English into Bahasa Indonesia with a forward translation by a bilingual public health medical doctor and a backward translation by another independent bilingual public health medical doctor. The translation of the depression questionnaire (QIDS) was derived from a previous study conducted in Jakarta (Arjadi, Nauta, Utoyo, & Bockting, 2017). After this, the translated questionnaires underwent a critical review process focusing on the comprehensibility, relevance and cultural appropriateness consisting of a consultation with CL and two focus groups including the research assistants, public health staff, AP and MD (one before the administering of the pilot interviews and one after the pilot of 20 administered interviews and three more in-depth interviews).

Traumatic Grief Inventory Self-Report (TGI-SR). The Traumatic Grief Inventory Self-Report (TGI-SR) consists of 18 grief items which can be rated on a 5-point Likert scale (Boelen, Djelantik, et al., 2018; Boelen & Smid, 2017). Cronbach's alpha in this sample was .88.

Posttraumatic Stress Disorder Checklist for DSM-5 (PCL-5). The Posttraumatic Stress Disorder Checklist for DSM-5 (PCL-5) is a commonly used self-report questionnaire to examine PTSD symptoms. It consists of 20 items that can be rated on a 5-point Likert scale to measure the severity of the PTSD symptoms. The total score ranges from 0 to 80 (Blevins et al., 2015). Cronbach's alpha for the PCL-5 in this sample was .87.

Quick Inventory of Depressive Symptomatology Self Report (QIDS-SR). The Quick Inventory of Depressive Symptomatology (QIDS-SR) is a 16-item questionnaire available in a self-rating format (Rush et al., 2003). This questionnaire includes a subset of questions of the Indonesian Inventory of Depressive Symptomatology Self Report (IDS-SR) which is known to have good validity and reliability in a sample of Javanese participants (Arjadi, Nauta, Utoyo, & Bockting, 2017). The items are scored in a 4-point Likert scale. Cronbach's alpha in this sample was .66.

Post Traumatic Growth Inventory – Short Form (PTGI-SF). In a group meeting with the Balinese researchers (see the above-mentioned assessment modules preparation), the Post Traumatic Growth Inventory was discussed. The researchers agreed that the PTGI items mirrored the Balinese vision of adjustment after difficult situations in life. The PTG – Short Form includes 10 items with a 6-point Likert scale, covering five factors associated with a significant positive change following challenging life circumstances. These factors are 1) New possibilities, 2) Relating to others, 3) Personal strength, 4) Spiritual change, and 5) Appreciation of life (Cann et al., 2010). The sum score ranged from 0 to 50. Cronbach's alpha for the PTGI-SR in this sample was .92.

Socio-demographic and loss characteristics. In close discussion between the Dutch and Balinese author (see the assessment modules preparation), a questionnaire was designed assessing a wide range of socio-demographic and loss-related characteristics including the loss of close kin and level of education (Djelantik et al., 2017b).

Cultural and ceremonial characteristics. The questionnaire about the cultural and ceremonial characteristics was developed in the earlier-mentioned assessment modules preparation. The questions included the religious beliefs of the family and the funeral rituals performed. However, following the death of a loved one, numerous rituals will and can be performed in Bali, and they vary among castes

and regions. In discussion with the Balinese researchers, we decided to ask the purpose of the ceremony in the following open question: 'What was the purpose of the ceremony for the dead?' This would provide the opportunity to investigate in an exploratory way the purposes of the death ceremonies in Bali.

Statistical and qualitative analyses

Aim 1. We estimated the probable prevalence rate of PGD, PTSD and PTSD using the algorithms of each questionnaire. For PGD, we used a sum score of >60, (Boelen & Smid, 2017). For PTSD, we used a sum score of >32 (Blevins et al., 2015). For depression, we used the scoring model of the QIDS-SR for mild and moderate depression (Rush et al., 2003).

Aim 2. The analysis of the open question 'What was the purpose of the ceremony for the dead?' was predominantly thematic. We made a synthesis of the answers per categories, by exploring similarities and differences across the individual answers (as assessed by MD and RK). We discussed our final descriptions of these categories until we reached consensus (MD, PB, RK). Next, we repeated this process to find overarching themes. We discussed our results with the Balinese researchers (AP and CL).

Aim 3. LCA was used to find subgroups of individuals sharing the same occurrence of PGD, PTSD and depression symptoms. This was carried out in Mplus version 8 (Muthén & Muthén, 1998-2017). We could only examine a subset of core symptoms of PGD, PTSD and depression to keep the number of estimated parameters in proportion to our sample size. We used the 10 items which resemble the PGD criteria according to Prigerson et al. (2009), a subset of 6 items corresponding to the symptoms from each of the DSM-IV symptom clusters (Lang & Stein, 2005) and 10 symptoms resembling the criteria for MDD as defined in the DSM-5 (American Psychiatric Association, 2013).

First, conform earlier LCA studies (Djelantik, Robinaugh, et al., 2019; Maccallum & Bryant, 2019; Nickerson et al., 2014), items were dichotomized with the highest three-values (in case of the PGD and PTSD items) and the highest two-values (in case of the MDD items) signifying endorsement. We used the following indices to find the optimal number of classes: Sample-Size Adjusted Bayesian Information Criterion (SS-BIC), the Aikaike's Information Criterion (AIC), entropy and VLRT. Lower BIC and AIC values and higher entropy values indicate better fit.

Lastly, we examined the associations of correlates with class membership. For this analysis, we dichotomized all categorical predictors. For each category of aim 2, we made a dummy variable with 1 referring to that this purpose was mentioned by the individual and 0 referring that this purpose was not mentioned by the

individual. We conducted the 3step method. The analysis includes a multinomial regression and enables the user to conduct all analyses at once in one model without the LCA losing its formation and meaning due to the influence of the covariates. We used complex modeling to generate a model for the entire population while taking into account the possible non-independence between family members (Asparouhov & Muthén, 2014; Zhu, Steele, & Moustaki, 2017).

Results

Aim 1. Prevalence rates of PGD, PTSD, and depression in the Balinese community

Socio-demographic characteristics and cultural characteristics are presented in Table 1. There were 129 female participants (43%). The mean age was 44.2 (SD = 15.2) years; 59 participants had a high level of education. The loss happened on average 16 months ago (SD = 6.8); 148 participants lost their spouse or child while nine participants witnessed the accident.

As illustrated in Table 1, none of the participants was found to suffer from a probable diagnosis of PCD or PCBD. Only 1% of the participants scored above the diagnostic cut-off point for PTSD. 21% of the participants would be considered mildly to moderately depressed.

Aim 2. Religious and cultural characteristics

In our sample, almost all participants expressed that they were Hindu and that they performed their rituals according to their culture/religion. As the PTGI-SF items mirrored the Balinese vision of growth after difficult situations, we presented the results with this inventory here: the mean score of the sample was 18.2 (SD = 6.4). In the qualitative analysis the two overarching themes were caring for the deceased and obligation, respectively. The answers of the theme caring for the deceased could be categorized in 5 categories: calming the spirit of the deceased, purification of the spirit of the deceased, helping the deceased to reach or enter heaven, uniting the body with the soil, and reincarnation. In the obligation theme, we could only find one category: obligation (adat). The categories were included in the database. Each of the themes and categories is described in detail below.

Theme 1. Caring for the deceased.

Purification of the spirit of the deceased. According to Hindu belief, the atman is considered as that part of the individual spirit that is heavenly. During life, this atman is covered by human ego. Before the atman can be reunited with heaven

Table 1. Characteristics of the sample

	Participants (N = 301)
Socio demographic characteristics	
Female gender, *n* (%)	129 (43)
Age, M (SD)	44.2 (15.2)
High level of education, *n* (%)	59 (20)
Trauma and Loss-related characteristics	
Loss of partner/child, *n* (%)	148 (49)
Being a witness of the accident, *n* (%)	9 (3)
Time since loss in months, M (SD)	16 (6.8)
Cultural characteristics (qualitatively assessed)	
Purification, *n* (%)	87 (29)
Calming, *n* (%)	118 (39)
Helping to enter heaven, *n* (%)	72 (24)
Unite with the soil, *n* (%)	9 (3)
Reincarnation, *n* (%)	10 (3)
Obligatory, *n* (%)	5 (2)
Performing rituals according to the culture/religion, *n* (%)	300 (100)
Hindu religion, *n* (%)	286 (95)
Posttraumatic growth	
PTGI-SF sum score mean (SD)	18.2 (6.4)
Questionnaires characteristics	
TGI total score mean (SD)	13.57 (0.46)
People scoring above cut-off point for PCBD	0 (0)
People scoring above cut-off point for PGD	0 (0)
PCL-5 total score, mean (SD)	7.02 (0.38)
People scoring above cut-off point for PTSD	4 (1)
QIDS-SR (corrected) total score mean (SD)	3.1 (0)
People scoring above cut-off point for no depression, *n* (%)	239 (79)
People scoring above cut-off point for mild depression, *n* (%)	57 (19)
People scoring above cut-off point for moderate depression, *n* (%)	5 (2)
People scoring above cut-off point for severe depression, *n* (%)	0 (0)
People scoring above cut-off point for very severe depression, *n* (%)	0 (0)

Note. PCBD = Persistent complex bereavement disorder; PCL-5 = Posttraumatic Stress Disorder Checklist for DSM-5; PGD = Prolonged grief disorder; PTSD = Posttraumatic stress disorder; PTGI-SF = Posttraumatic Growth Inventory–Short Form; TGI = Traumatic Grief Inventory; QIDS-SR; Quick Inventory of Depressive Symptomatology Self Report.

or god, the human ego needs to be cleaned off. This motive for the rituals was mentioned 87 times (29%).

Calming the spirit of the deceased. In Bali, it is believed, that the spirit (atman) of the deceased is confused after the death. To prevent the spirit from going around and haunting, the spirit needs to be calmed down by rituals. There were 118 participants (39%) for whom this was the main motive for doing the rituals.

Helping the deceased to reach or enter heaven. After calming and purify the atman, rituals are needed to guide the spirit to heaven. This is mostly seen as stages. In the first stage, the spirit is split up from the body and stays in the house of the family. In the second stage, the spirit goes to the family temple. In the last stage, during a large ceremony, the spirit is united with god. This was the main motive for 72 participants (24%).

Uniting the body with the soil. Once atman has left the body. The body is cremated and scattered in the sea to be part of the earth again. This was mentioned 9 times (3%).

Reincarnation. After the atman is reunited with god, reincarnation will occur by giving atman to a newborn baby again (n = 10; 3%).

Theme 2: Obligation (adat). Five participants (2%) mentioned that the main motive for the rituals was that it is obligatory because of their culture.

Aim 3. Subgroups of bereaved individuals and correlates of class membership

Latent class analysis. The questions PCL-13 (feeling distant or cut-off from people), QIDS-11 (view of myself) and QIDS-12 (suicide) had no positive categories. In an LCA, items with no variation cannot be included. Therefore, these three items were excluded in the analysis. We have chosen to report them in the graph of the LCA with a probability of 0 in each class. Both the two-class and three-class solution had good fit indices. However, the three-class solution had the best goodness of fit indices and interpretability of the classes (i.e., classes with high and low probabilities of the symptoms: Figure 1 and Supplementary Materials A).

Table 2. *Latent class models and fit-indices*

Model tested	Loglikelihood	AIC	BIC	SS – BIC	Entropy	VLMRT	Lowest sample size
1 class	-1106.150	2258.301	2343.564	2270.62			301
2 class	-905.412	1904.824	2079.059	1930.001	0.978	0.0000	34
3 class	-862.979	1867.957	2131.162	1905.991	0.873	0.0075	34
4 class	-838.254	1866.507	2218.683	1917.397	0.862	0.4198	18

Note. AIC = Akaike Information Criterion; BIC = Bayesian Information Criterion; SS-BIC = Sample-Size Adjusted BIC; VLMRT = Vuong-Lo-Mendell-Rubin test.

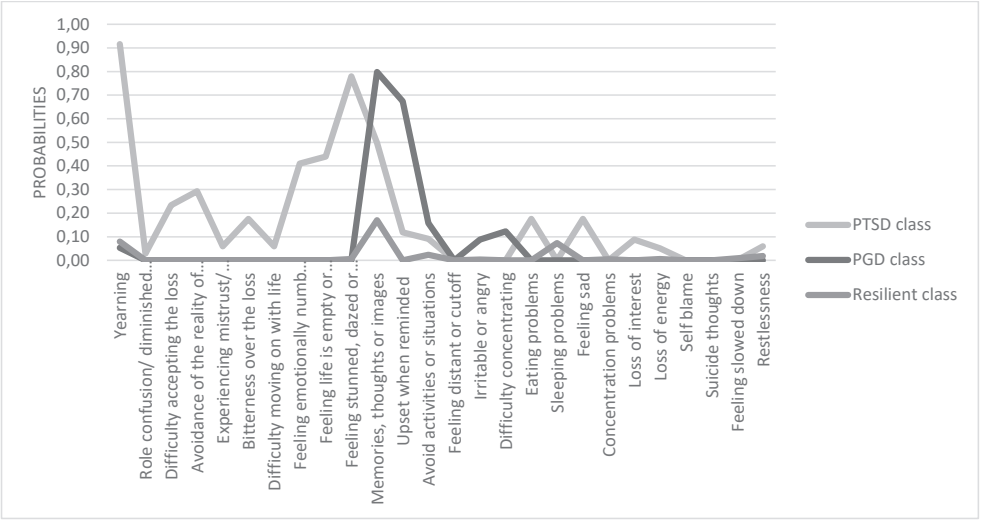


Figure 1. Visual graph of the three-class solution.

We considered a value of 0.6 as a high probability (Maccallum & Bryant, 2019; Nickerson et al., 2014) and a value between 0.2 and 0.6 as a moderate probability of symptom endorsement. The three-class solution consisted of: 1. a class of participants with prominent PGD symptoms of 'yearning' and 'feeling stunned' and oderate PGD symptoms of 'difficulty accepting the loss', 'avoidance of reminders of the loss', 'emotional numbness', 'feeling life is meaningless', 'feeling shocked', and the PTSD symptom 'recurrent memories of the event' (PGD class 1, 11%), 2. a class of participants with the prominent PTSD symptoms 'repeating and disturbing memories of the event' and 'feeling very upset when being reminded of the event' symptoms (PTSD class 2, 13%), and 3. a class of patients with no prominent or moderate PGD, PTSD, and depression symptoms (resilient class 3, 76%) (Figure 1 and Table 3).

Loss-related, socio-demographic, PTG and cultural correlates of class membership. In this step, we examined if the loss-related and socio-demographic characteristics (i.e., the loss of close kin and high level of education), the PTGI-SF sum score and the ceremonial purposes were significant predictors of class membership. In our sample, almost all participants expressed that they were Hindu and that they performed their rituals according to their culture/religion. Only a very few participants expressed that the purpose of their rituals were 'unite with the soil', 'reincarnation' and/or 'obligatory'. This means that all these characteristics did not have a lot of variance. Putting these characteristics in the model of the 3step

Table 3. Probabilities for the symptoms for each class

Symptom names	Overall symptom frequency	PGD class (11%)		PTSD class (13%)		Resilient class (76%)	
	%	Probability	SE	Probability	SE	Probability	SE
TGI-SR							
PGD items							
Prigerson et al. 2009							
Yearning	17	**0.916**	0.051	0.053	0.052	0.079	0.022
Role confusion/ diminished sense of self	0	0.029	0.029	0	0	0	0
Difficulty accepting the loss	3	0.234	0.054	0	0	0	0
Avoidance of the reality of the loss	3	0.293	0.090	0	0	0	0
Experiencing mistrust/ inability to trust others since the loss	1	0.059	0.039	0	0	0	0
Bitterness over the loss	2	0.176	0.057	0	0	0	0
Difficulty moving on with life	1	0.059	0.039	0	0	0	0
Feeling emotionally numb since the loss	5	0.41	0.121	0	0	0	0
Feeling life is empty or meaningless	5	0.439	0.105	0	0	0	0
Feeling stunned, dazed or shocked by the loss	9	**0.779**	0.074	0	0	0.006	0.008
PCL-5							
PTSD checklist items							
Lang et al. 2005							
Memories, thoughts or images	31	0.498	0.114	**0.798**	0.074	0.17	0.066
Upset when reminded	12	0.119	0.067	**0.674**	0.251	0	0
Avoid activities or situations	5	0.091	0.064	0.158	0.069	0.024	0.018
Feeling distant or cutoff	0	0	0	0	0	0	0
Irritable or angry	2	0	0	0.088	0.064	0.003	0.004
Difficulty concentrating	2	0	0	0.123	0.077	0	0

Continued Table 3.

Symptom names	Overall symptom frequency	PGD class (11%)		PTSD class (13%)		Resilient class (76%)	
	%	Probability	SE	Probability	SE	Probability	SE
QIDS-SR Depression criteria items *Blevins et al. 2015*							
Eating problems	2	0.176	0.073	0	0	0	0.000
Sleeping problems	5	0	0.000	0	0	0.073	0.025
Feeling sad	2	0.176	0.062	0	0	0	0.000
Concentration problems	0	0	0.000	0	0	0.005	0.005
Loss of interest	1	0.088	0.044	0	0	0	0.000
Loss of energy	1	0.051	0.043	0	0	0.006	0.007
Self blame	0	0	0	0	0	0	0
Suicide thoughts	0	0	0	0	0	0	0
Feeling slowed down	1	0	0.000	0	0	0.009	0.007
Restlessness	2	0.059	0.041	0	0	0.018	0.009

Note. Probability greater than 0.6 are shown in boldface; PCL-5 = Posttraumatic Stress Disorder Checklist for DSM-5; PGD = Prolonged grief disorder; PTSD = Posttraumatic stress disorder; TGI-SR = Traumatic Grief Inventory – Self Report; QIDS-SR; Quick Inventory of Depressive Symptomatology Self Report.

procedure, it would be very likely that all participants in a class would endorse or not endorse the characteristic. These characteristics may then act as a constant and would result in infinite odd's ratios. Therefore, we had to exclude these variables from the 3step procedure. There were no significant correlations between the included cultural and ceremonial characteristics and class membership (Table 3). As for the results of the final model of the 3step procedure, there were no significant associations between the correlates and class membership of the PGD class compared to the resilient class. In the PTSD class, bereaved individuals were more likely to have lost a partner or a child compared to the resilient class (Table 4).

Table 4. Multivariate parameter estimates for the latent class model

	Class resilient 3 vs class PGD class 1						class resilient 3 vs PTSD class 2					
	β	SE	*p*	Lower Bound	Upper bound	Exp (B)	β	SE	*p*	Lower Bound	Upper bound	Exp (B)
Purification	0.60	1.19	.62	-1.73	2.93	1.82	0.56	0.93	.55	-1.27	2.38	1.75
Calming	0.44	1.14	.70	-1.80	2.68	1.55	0.53	0.89	.55	-1.22	2.29	1.71
Helping to enter heaven	0.12	1.21	.92	-2.24	2.49	1.13	1.06	0.91	.24	-0.71	2.84	2.90
PTGI-SF sum score	-0.01	0.05	.86	-0.10	0.08	0.99	0.00	0.03	.96	-0.05	0.05	1.00
Loss of close kin	-0.05	0.40	.91	-0.82	0.73	0.96	1.21	0.45	.01	0.32	2.10	3.34
High level of education	-0.26	0.57	.65	-1.38	0.87	0.77	-0.51	0.59	.39	-1.66	0.65	0.60

Note. β = Beta coëfficient; CI = Confidence Interval; *p* = p-value; PGD = Prolonged grief disorder; PTSD = Posttraumatic stress disorder; SE = Standard Error.

Discussion

Summary

The findings of this mixed-methods research among bereaved Balinese individuals showed that the development of a probable diagnosis of PGD, PTSD or depression following a loss of a loved one is relatively rare. Most individuals did not suffer from one of these mental health disorders. Furthermore, there was little variation in the cultural characteristics of the sample. Almost the complete sample reported to be Hindu and followed characteristic Balinese cultural traditions after a loss of a loved one. Two overarching themes of purposes of rituals were identified, namely, 'caring for the deceased' and 'out of obligation'. Almost all individuals had 'caring for the deceased' as the main purpose.

Next to the large resilient group, there were two subgroups of bereaved individuals sharing the same occurrence of mental health symptoms, namely a subgroup of individuals expressing PGD symptoms and a subgroup of individuals

expressing PTSD symptoms. When combining the cultural and socio-demographic characteristics in the 3step analysis, loss of a child and/or partner was found to be correlated with the PTSD class.

Aim 1. Prevalence rates of PGD, PTSD, and depression in the Balinese community

The low prevalence rates of PGD (0%), PTSD (1%) and moderate depression (2%) confirm our first hypothesis, namely that in comparison with findings in other societies, Balinese bereaved individuals tend to have a lower prevalence of psychopathology following a loss of a loved one by a traffic accident. The world-wide prevalence of PGD after unnatural losses is approximately 49% (Djelantik et al., 2019); in other Asian developing countries prevalence rates of 75% or 88% were found (He et al., 2014; Stammel et al., 2013; Xu et al., 2014). Regarding PTSD, we found much lower prevalences than in previous studies (Lin et al., 2018), including in other middle to low income countries such as Ethiopia and Iran (Mayou et al., 2002; Yohannes et al., 2018). However, we need to state that in these studies all participants were involved in the traffic accident themselves. In our sample, we focused on the bereaved family members and most of them were not a witness of the accident. The PTSD prevalence of family members who were no witnesses may be lower in other countries too. Regarding depression, the overall depression prevalence of 4% in Indonesia (WHO, 2017) is higher than in our study in Bali among bereaved individuals. In a study located in the United States the prevalence of depression two months after the death of a partner was 20% and decreased to around 14% at seven, thirteen and twenty five months (Zisook et al., 1997). Interestingly, the symptoms 'feeling distant or cut-off from people', 'negative view of myself' and 'suicidal ideations' had no positive categories at all. In a study in a western clinical sample of patients confronted with loss and trauma, symptoms connected to social isolation and diminished sense of self were recognized as important symptoms connecting networks of PGD, PTSD, and depression (Djelantik, Robinaugh, et al., 2019). Hypothetically, it could be that because of the Balinese cultural rituals and notions, bereaved individuals are not likely to endorse these negative emotions and that this, in turn, protects them for developing more psychopathology.

Overall, our results confirm earlier findings from qualitative research that Balinese people may have strong coping strategies for bereavement-related psychological issues (Rosenblatt, 1975; Wikan, 1988, 1990). Quite remarkably, our findings appear to be in line with the well-known description of Balinese culture by Bateson and Mead (1942) as a culture in which strong negative emotions do

not exist or at least are not shown. According to this perspective, this emotional distance manifested itself in the way that Balinese 'are physically active but affectively passive.' Balinese may not respond to the world emotionally but rather contained or dissociated. This provocative hypothesis has led to a long-term debate in cultural anthropology. Critical authors (Jennaway, 2002) have emphasized that the experience of emotions among Balinese may be profound while historians have stressed that Bali is not (only) the island of paradise as often mentioned, but a society that has struggled with violence, war and terror, just like almost any other region in the world (Robinson, 1995).

Aim 2. Religious and cultural characteristics

Almost the whole sample reported to be Hindu and performed the rituals according to their cultural customs, which is an indication that even though modern times have arrived in Bali and tourism is omnipresent at the island, people keep their old traditions alive. Most people carried out the rituals with a purpose to care for their deceased. Rituals have been described as cultural devices that provide ways to comprehend the complex and contradictory aspects of human existence (Turner, 1969). Funeral rituals in particular may include both affirmative and meaning making aspects for the bereaved and may serve as a transitional phase for the deceased to go from life to death and for the bereaved to go to a new status as a bereaved person in its community (Fulton, 1988; Pine, 1989). Several authors, e.g., Romanoff (1998), have argued that in the contemporary way of performing funerals in the western world, these ritual purposes have been deteriorated, which might have resulted in more pathological grieving symptoms in bereaved individuals. In our study in Bali, the transition of the deceased from life to death appeared to be the most central purpose for the rituals. This purpose may play a role in the low prevalence of reported psychopathology. Another possible mechanism could be that organizing these extensive funeral rituals have enhanced social support, which is a widely found to be correlated with more positive outcomes in mental health following adverse events (Drogendijk, van der Velden, Gersons, & Kleber, 2011; Maercker & Horn, 2013). As avoidance of painful emotions is commonly seen in bereaved individuals with mental health problems (Boelen & van den Bout, 2010), performing multiple and repetitive rituals over years may help in breaking through this avoidance and could provide time and place to give the loss a place in the autobiographic memory.

Aim 3. Subgroups of bereaved individuals and correlates of class membership

On symptom-level, we have found three classes or subgroups of bereaved individuals: a large resilient class (73%) and two smaller classes, one characterized by PGD symptoms (11%) and another by PTSD symptoms (13%) respectively. No class characterized by depression symptoms was found. These classes of co-occurring symptoms are roughly similar to the classes found in other bereaved populations (Djelantik et al., 2017b; Maccallum & Bryant, 2019; Nickerson et al., 2014). However, as we hypothesized, the resilient class was much larger compared to the other groups, which is in line with the low probabilities of the indications for clinical relevant PGD, PTSD and depression diagnoses.

Combining loss-related, socio-demographic and cultural characteristics as well as the PTGI-SF sum score in the 3step analysis, loss of a child and/or partner was found to be correlated with the PTSD class when considering all other characteristics. This is in line with a whole body of research, indicating that losing a child and/or partner is one of the strongest predictors for psychopathology following bereavement, more than for instance having a high education (Heeke, Kampisiou, Niemeyer, & Knaevelsrud, 2019; Wijngaards-De Meij et al., 2007). This finding illustrates that, although the cultural values in Bali may have an overall protective effect on serious mental health difficulties, losing someone who is so close is an overwhelming experience that causes psychological pain.

We assessed PTG based on the notion that a traumatic experience may help to value one's life more after been confronted with the transiency of life. Nevertheless, we did not find that the PTGI-SF sum score was associated with class membership. In previous research in Western samples is found that stronger growth might be associated with more PTSD and PGD symptoms (Eisma, Lenferink, Stroebe, et al., 2019; Sleijpen et al., 2017). Another study has shown that individuals adapt to an adverse event in heterogeneous ways and that PTG is not necessarily related to a high symptom PTSD class or a low symptom PTSD class (Birkeland, Hafstad, Blix, & Heir, 2015).

Limitations

The findings need to be interpreted in the light of several limitations. First, it is important to keep in mind that in this study, although the research assistants administered the questionnaires in a clinical interview, we have based the prevalence rate on the algorithm of questionnaires. Scoring above a clinical cut-off of a questionnaire should be recognized as an indication of disorder. A structured clinical interview assessing all criteria and taking into account a psychiatric examination by licensed clinicians is needed for a formal diagnosis.

Another limitation is that in the dataset there was very little variation. For the latent class analysis, it meant that not all symptoms could be included. In addition, in the 3step analysis not all predictors could be included because of their low variance. Future studies, targeting the validation and psychometric characteristics of the complete questionnaires used in this study, are therefore necessary. The current findings also do not preclude that distress following loss may manifest itself in non-assessed problems, including substance misuse. Nevertheless, we reason that the low variation in cultural characteristics in our sample is a remarkable finding itself and shows the dedication of Balinese people to follow their own traditions. Therefore, direct comparison with other populations in future studies could inform us on the relevance of these cultural characteristics. Another reason for the low prevalence of psychopathology could be that the questionnaires were not sufficiently adapted for the Balinese community or that people did not fully disclose their psychological problems because of a stigma regarding mental health issues. However, because this research was carried out in close collaboration with Balinese researchers and focus groups and because forward and backward translations were conducted before administering the questionnaires, we allow ourselves to have some confidence in the results. Yet, replication studies are needed to verify our findings.

Conclusions

In this first large quantitative study addressing psychopathology following bereavement in Bali, a relatively low prevalence of psychopathology following a loss of a loved one after traffic accidents was found. Furthermore, the Balinese sample appeared to be quite homogeneous in terms of following their religious and cultural habits. Nearly all people followed the typical Balinese bereavement rituals and stressed the purpose of these rituals as expressions of caring for the deceased. This could be an indication that certain aspects of the Balinese culture protect the bereaved individual for developing mental health issues, and this finding could be used for an informed reformation of bereavement rituals in other cultures.

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Author contributions
MD, AP, PB, CL and RK were responsible for the design of the study. MD, AP and CL were responsible for the data-collection. MD was responsible for the data-analysis and MD, AP and RK for the interpretation of the data. PB and RK supervised MD. MD an RK wrote the drafts of the manuscript. All authors were involved in revising the draft versions critically and all authors approved the final version of the manuscript.

Supplementary materials

Supplementary materials A

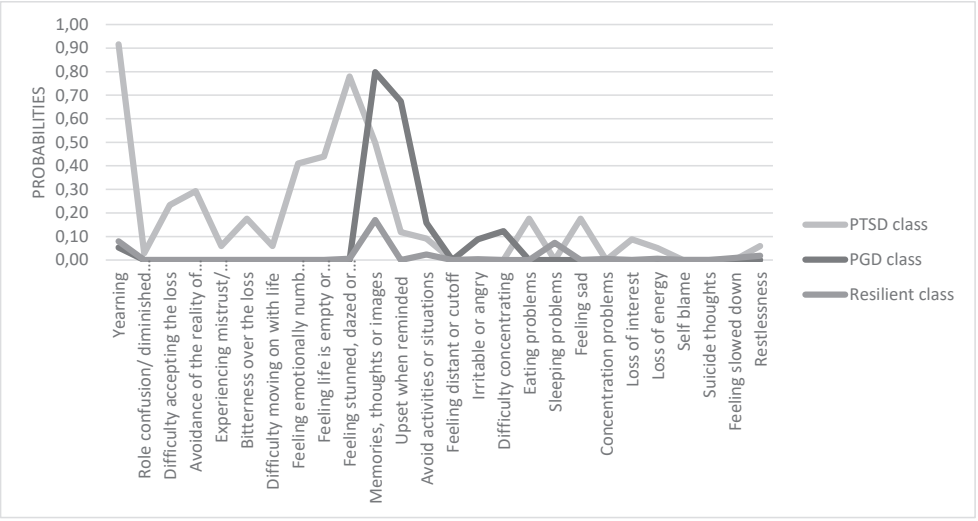


Figure. Visual graph of the two-class solution

Chapter 9

General discussion

General discussion

The aim of this thesis was to increase our understanding of the development and treatment of psychopathology following bereavement. We first focused on traumatic loss and then conducted a series of studies focusing more closely on the psychopathology which may arise following a loss of a loved one, taking into account the probable co-morbidity of prolonged grief, posttraumatic stress, and depression. In this final chapter, we will summarize the main results from the studies, make a first attempt to establish an integrated understanding of traumatic grief, discuss limitations and set out directions for future research and clinical implications.

Summary of main findings

Consequences of traumatic loss

In several ways, this dissertation has furthered our knowledge about the psychological consequences for bereaved individuals following an unnatural loss of their loved. First, Chapter 2 shows that PGD following unnatural loss is far more common than we initially thought. If we compare our prevalence rate of PGD (i.e., 49%) to prevalence rates of PTSD following unnatural losses (i.e., 5% (Atwoli et al., 2017)) and prevalence rates of PGD following natural losses (i.e., 10%; (Lundorff et al., 2017)), this indicates that clinicians and professionals should be very aware of the development of PGD symptoms in bereaved individuals following unnatural losses. Bereaved parents who lost their only child and bereaved individuals following violent killings such as suicide, accidents, homicide, and war-related deaths appear to be particularly vulnerable for developing PGD. Additionally, we showed that researchers use different sets of criteria for PGD and that these different sets of criteria account for significant differences in the prevalence rates between studies. See Chapter 2 (Djelantik, Smid, Mroz, Kleber, & Boelen, 2020).

In Chapter 3, we found that individuals confronted with a violent loss, the loss of close kin, and a low level of education are more likely to develop comorbid PGD, PTSD, and depressive symptoms compared to individuals with other sociodemographic and loss-related characteristics. This means that co-morbidity of PGD, PTSD, and depression symptoms is not exclusively connected to a traumatic loss, as has been previously suggested by, among others, Kristensen, Weisaeth, et al. (2012), van Denderen et al. (2015) and Boelen, Olff, and Smid (2019). Therefore, it is important to assess symptoms of all three disorders in bereaved individuals, regardless of the cause of the loss. See Chapter 3 (Djelantik et al., 2017b).

Traumatic grief: The co-occurrence and relationships of PGD, PTSD and depression symptoms in bereaved individuals

In Chapter 4, we showed that, over time, individuals at risk for developing psychopathology might be able to be identified in the early stages following bereavement by severity of symptoms and specific symptoms. Interestingly, the trajectories consisted mostly of persistent low, moderate, or high scores (i.e., a persistent high PGD symptom-trajectory, a persistent moderate PGD, a decreasing moderate PGD and a persistent low PGD symptom-trajectory). Possible early indicators for the problematic grief trajectories were (often endorsement of): 'yearning', 'feeling stunned', 'life is empty', and 'bitterness' (Djelantik et al., 2017a). However, it still is unclear how many of the persons who follow these adverse trajectories have a clinical diagnosis of PGD.

We did find that PGD and PTSD sum scores were substantively correlated with each other in the first and second year. Furthermore, higher PGD and PTSD levels in the first year were predictive for higher PGD and PTSD levels in the second year. Additionally, we found that high PGD levels were predictive for higher PTSD levels in the second year following bereavement, whereas high PTSD levels in the first year were not predictive of higher PGD levels in the second year. This could suggest that targeting PGD symptoms in the first year might be beneficial for preventing higher PTSD and PGD levels in the second year. See Chapter 5: Djelantik et al. (2018).

Using a person-centered approach, we were able to distinguish subgroups of bereaved individuals with co-occurring symptoms and found separate predictors. Apparently, the group of people with co-occurring symptoms of PGD and PTSD were more likely to have lost close kin, have a lower level of education, or have lost a loved one due to traumatic bereavement. Interestingly, in our patient sample we could not distinguish a group of people endorsing solely PGD symptoms. See Chapter 6: Djelantik, Robinaugh, et al. (2019). In every clinical subgroup, PTSD symptoms were apparent as well. Hypothetically, these findings may suggest that only patients with co-occurring symptoms are referred to a psycho trauma clinic or that PGD does not exist as a distinct singular disorder in patient groups.

In Chapter 6, we found that 'feeling distant to others', 'feelings of worthlessness', 'difficulty trusting others', and 'confusion about one's role in life' might be especially relevant in persons with a co-morbidity of PGD, PTSD, and depression (Djelantik, Robinaugh, et al., 2019). This is in accord with previous theories about adjustment to bereavement in which the processes of role-transition and meaning making have been postulated to be important (Maccallum & Bryant, 2013; Malgaroli et al., 2018; Neimeyer, 2016; Stroebe & Schut, 2001). In line with this, psychotherapeutic

interventions aimed at identity disruptions and meaning-making after the loss of a loved one have been aspects in effective treatments for PGD (Boelen et al., 2007; Bryant et al., 2014; Shear et al., 2016).

Furthermore, we found that both violent loss and the loss of close kin were more strongly associated with elevations in PGD symptoms than elevations in PTSD or depression symptoms. See Chapter 6: Djelantik, Robinaugh, et al. (2019). PGD symptoms might therefore be especially important to investigate in these patient groups. More specifically, difficulty accepting the loss was identified as a bridge symptom between the risk factor 'violent loss' and other PGD symptoms (i.e., 'a continued sense of shock', 'bitterness', and 'yearning'). This means that accepting the loss in this manner could represent a mechanism through which violent loss contributes to other PGD symptoms and, subsequently, to PTSD and depression. In the same way, the symptom 'difficulty moving on with life' was identified as leading to PGD, PTSD, and depression in bereaved individuals confronted with a loss of close kin. The finding that a PGD symptom may act as a bridge symptom to symptoms of other networks of symptoms are in line with another study presented in this dissertation, where we found some evidence that PGD symptoms precede increases in PTSD symptoms over time in bereaved adults. See Chapter 5: Djelantik et al. (2018).

In our treatment study among refugees, we were able to show that even in groups that are known to have lower response rates of psychological treatments, such as resettled refugees (Nosè et al., 2017), psychotherapy aimed at grief symptoms might be beneficial. Our study also provide indications that psychotherapy aimed at grief distress also is effective for posttraumatic distress (Eddinger et al., 2019). However, in addition to psychotherapeutic help, social work may be important to optimize treatment response in refugees who experience multiple post-migration stressors. Undocumented asylum seekers were more likely to not complete the treatment, and ongoing conflict in the country of origin and the total number of post-migration stressors were associated with decreased symptom reductions. See Chapter 7: Djelantik, de Heus, et al. (2019).

In our last study in Bali, we found a low prevalence of psychopathology following a loss of a loved one due to traffic incidents. For example, in other studies, the prevalence rate of PTSD after traffic incidents in low- and middle-income countries was found to be around 20–30% (Khodadadi-Hassankiadeh et al., 2017; Yohannes et al., 2018), but we found a prevalence rate of only 1% of PTSD and 0% of PGD in our population. See Chapter 8: Djelantik, Putu, Boelen, Lesmana, and Kleber (2019). Interestingly, the symptoms 'feeling distant from others', 'self-blame' and 'suicidal ideation' were not endorsed at all. This suggests that, in different

cultural contexts, grief may be experienced differently and that cultural, societal, or religious factors may contribute to preventing development of mental health issues following bereavement. This study nuances the generalizability of the findings about the (co-)occurrence of symptoms in our previous studies. and it shows that our findings (and the remainder of this discussion) need to be interpreted within the context where the data were collected.

Toward an integrated understanding of traumatic grief

We have tried to summarise our findings as an integrated understanding of the dynamic interplay of the development, treatment, and resolution of grief and posttraumatic distress in bereaved individuals in Figure 1.

This figure can be understood in the following way. We have displayed networks of symptoms (blue dots stand for grief symptoms, red dots for posttraumatic stress symptoms, and black dots for depressive symptoms). The fading of colors means a decrease of the severity of symptoms. Bereaved individuals with high PGD and PTSD levels are more likely to have high PGD and PTSD levels in the second year and bereaved invidivuals with low PGD and PTSD levels are more likely to have low PGD and PTSD levels in the second year rather than having a delayed or linear recovery or development of symptoms. See Chapter 4 and 5: (Djelantik et al., 2018) and Djelantik et al. (2017a). Therefore, the first two networks of the different subgroups show the same intensity of colors.

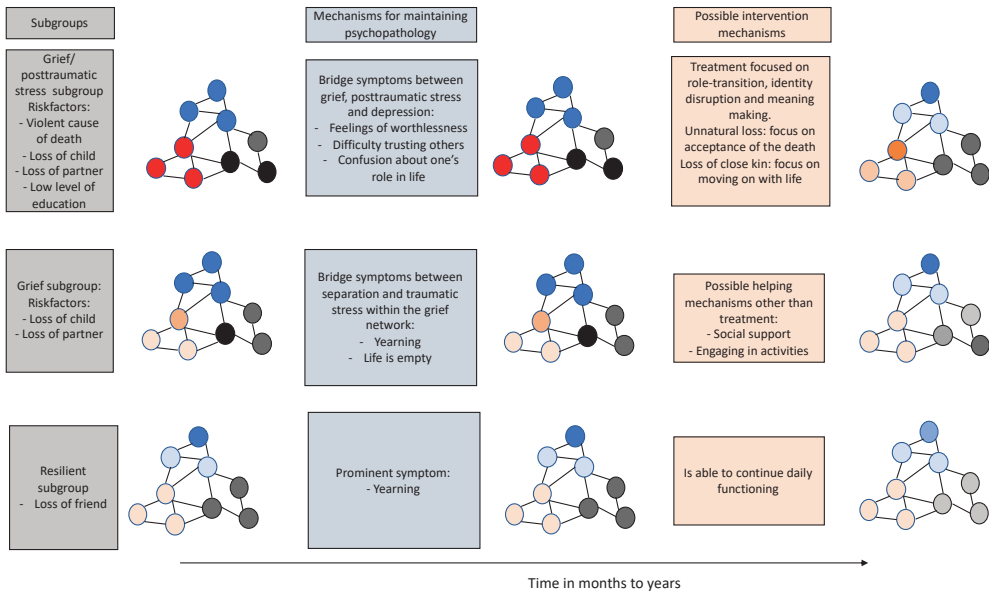
In the figure, we have displayed one subgroup endorsing mainly PGD and PTSD symptoms, one subgroup reporting mainly PGD symptoms, and one subgroup with no dominant symptoms of PGD, PTSD, or depression (Djelantik et al. (2017b).

Psychopathology and functional impairment are worst among bereaved individuals who endorse both PGD and PTSD symptoms; these people are also more likely to seek psychological help in specialised psychotrauma clinics as we showed in Chapter 6 (Djelantik, Robinaugh, et al., 2019). The results of Chapter 5 and 6 suggest that targetting PGD symptoms might be more beneficial than targeting PTSD symptoms (Djelantik, Robinaugh, et al., 2019; Djelantik et al., 2018). Additional to a grief treatment, our results suggest that patients who have suffered a traumatic loss might need a special focus on 'acceptance of the loss' and patients who have suffered the loss of close kin more focus on 'moving on with life'.

For the subgroup of individuals who endorse mainly PGD symptoms, we found that the symptoms 'yearning' and 'life is empty' may be especially important in the persistence of distress within the PGD network. We have some indications that this subgroup of individuals will benefit most from support of family and friends or

first-line grief treatment or help, such that referral to a specialised psychotrauma clinic is not necessary. See Chapters 3 and 6; Djelantik et al. (2017b) and Djelantik, Robinaugh, et al. (2019).

The majority of bereaved individuals will not experience severe grief symptoms following bereavement and may be considered resilient to the development of psychopathology. For this resilient subgroup, we found that 'yearning' is the grief symptom which is most present. We have not found any clues that the resilient group need special attendance or need to be followed up. See Chapters 3 and 4: Djelantik et al. (2017a, 2017b).



Blue dots: grief symptoms; Red dots: posttraumatic stress symptoms; Black dots: depression symptoms.
Fading colors mean decline of severity of symptoms. Possible early indicators for problematic grief trajectories are often endorsement of 'yearning', 'feeling stunned', 'life is empty', 'bitterness'.

Figure 1. Hypothesized integrated understanding of the dynamic interplay of the development, treatment and decline of grief and posttraumatic distress in bereaved individuals.

Methodological limitations

The results of this dissertation need to be interpreted in the light of several methodological limitations. First, most of our studies relied on sampling techniques other than a randomised selection of the participants. This means that the group of participants may not by representative for all bereaved individuals. For example, in Chapters 3, 4, and 5 (Djelantik et al., 2017a, 2017b, 2018), participants were recruited by Internet advertisements. It could be that participants who are willing to cooperate in a study are more likely to experience (sub) clinical symptoms. That could be the reason that they were looking for information about grief in the first place. Also, in terms of demographics, there were substantial differences between the samples. For example, in Chapters 3, 4, and 5 (Djelantik et al., 2017a, 2017b, 2018) there was an over-presentation of women who had lost a partner. And in Chapters 6, 7, and 8 (Djelantik, de Heus, et al., 2019; Djelantik, Putu, et al., 2019; Djelantik, Robinaugh, et al., 2019) the samples included more men than women. This means that generalization of the findings can only be done with caution.

Another limitation that must be considered is that this dissertation used mainly data-driven approaches. These approaches are useful for recognising patterns and associations in datasets and are therefore helpful to generating hypotheses about how to conceptualise traumatic grief. Interestingly, the findings of Chapters 3, 4, and 5 have been (more or less) found in various populations in other recent studies so this permits us some confidence in the results. However, to test our proposed understanding of the interplay of the development, treatment, and decline of PGD, PTSD and depression symptoms following bereavement, additional future studies are needed. We will summarize the findings of recent other studies and give some directions for future studies in the following section.

Future research directions

Future studies to examine the development of traumatic grief

In several chapters of this dissertation, we showed that in subgroups of bereaved individuals, PGD symptoms likely co-occur with PTSD; Similar findings haves been found in recent other cross-sectional studies (Boelen et al., 2016; Djelantik, de Heus, et al., 2019; Djelantik, Putu, et al., 2019; Djelantik, Robinaugh, et al., 2019; Djelantik et al., 2017b, 2018; Eisma, Lenferink, Chow, Chan, & Li, 2019; Maccallum & Bryant, 2019; Nickerson et al., 2014). As a next step, it is essential to investigate the co-occurrence and development of PGD, PTSD, and PTSD in bereaved individuals in longitudinal studies.

Several studies have estimated trajectories based on sum scores of PGD, PTSD and depressive symptoms in bereaved individuals (Aneshensel, Botticello, & Yamamoto-Mitani, 2004; Bonanno & Malgaroli, 2019; Galatzer-Levy & Bonanno, 2012; Lenferink, Nickerson, de Keijser, Smid, & Boelen, 2019; Maccallum et al., 2015; Nam, 2015; Sveen, Johannesson, Cernvall, & Arnberg, 2018; Zhang, Mitchell, Bambauer, Jones, & Prigerson, 2008). The most commonly found trajectories for the MDD and PTSD sum scores are a resilient trajectory, a chronic trajectory, and a recovery trajectory. Interestingly, for PGD, the recovery trajectory is not often found. To date, all studies used only one timepoint in the first year or started more than one year since the loss. As we discussed in Chapter 2 and Chapter 4, there is a scientific debate about the specific time criterion of the onset of a disturbed grief disorder. The persistent complex bereavement disorder (PCBD) criteria set includes a time criterion of 12 months, whereas the PGD criteria use a time frame of 6 months. More knowledge about the existence of a recovery trajectory is needed to reach consensus about the preferred time criterion. In order to reach this knowledge more studies are needed that include multiple time points in the first year.

As far as we know, all studies assessing trajectories focused on one disorder for each trajectory. In order to gain more knowledge about the development of a combination of the three disorders in a bereaved individual over time, we need to try to focus on analyses that are able to take into account all three disorders in a trajectory (i.e., PGD, PTSD, and depression).

On top of this, it still remains largely unknown what the development of individual symptoms is in the first years following a loss. As we described in Chapter 4, there have been several studies investigating early indicators for PGD (Djelantik et al., 2017a; Guldin et al., 2011; Shear et al., 2006), that can contribute to establishing screening tools. However, all these studies found different sets of symptoms. Recently, Bonanno and Malgaroli (2019) found three trajectories (i.e., a resilient, recovery, and a prolonged-stable trajectory) using the PCBD criteria and two additional trajectories (i.e., a prolonged-worsening and an acute-recovering trajectory) using the PGD criteria. They argued that PGD symptoms were more sensitive in detecting changes over time compared to PCBD. Because of the ongoing discussion about the criteria set of a disturbed grief disorder, it could be interesting to focus not on sum scores but on individual symptoms when assessing trajectories in the future.

Future studies to examine interventions for patients with traumatic grief

As far as we know, this dissertation includes the first study that assessed PGD, PTSD, and depression with latent class and network analyses in a treatment-seeking

sample of patients confronted with trauma and loss. We found that, in every clinical subgroup, PTSD symptoms were apparent, suggesting that only patients with a co-morbid profile of PGD and PTSD seek help in a specialised psychotherapy clinic. Replications in other treatment-seeking samples are needed to test this finding. Furthermore, as a next step, it would be interesting to investigate if we could find specific subgroups of patients over the course of treatment and investigate the associations with sociodemographic and loss-related characteristics and, as well, therapeutic circumstances. Gaining knowledge on this issue could be relevant for designing tailored treatments for subgroups of bereaved patients sharing the same symptoms or socio-demographic and loss-related characteristics. In order to do so, we would need longitudinal measurements with multiple time points assessing PGD, PTSD, and depression symptoms during treatment.

Following our integrated understanding, we should expect that PGD treatments would work faster or better or, alternatively, we should see in treatment that a decrease of PGD symptoms is accompanied by a decrease in PTSD symptoms (Figure 1). In a study assessing the effectivity in a treatment including both PTSD and PGD sessions in homicidally bereaved patients, it was found that this treatment was more effective for PTSD symptoms compared to PGD symptoms (van Denderen, de Keijser, Stewart, & Boelen, 2018). As a next step, it would be interesting to compare a treatment solely focusing on PTSD to a treatment solely focusing on PGD to see which approach works best for patients endorsing both PGD and PTSD symptoms following bereavement in a randomised control trial design.

Furthermore, in this dissertation we focused more on specific symptoms instead of full disorders. It would be interesting to further investigate symptom-specific effectiveness of interventions further. One way to do this would be to investigate the reduction in the severity of specific symptoms over the course of treatment and compare this with central and bridge nodes in the symptom networks of individual patients. Hypothetically, you would find that a treatment would be more effective in patients with a higher improvement in their individual-specific central and bridge nodes (Boschloo et al., 2019). This could be a first step in developing precision psychiatry interventions in patients affected by loss and trauma.

Grief as a natural or a pathological reaction: Reaching consensus about the criteria of PGD

Grief, in nature, is a normal reaction after the loss of a loved one (Stroebe & Schut, 1999; Stroebe et al., 2000). Disturbed grief is defined by what is considered psychopathology by societal and cultural norms (Djelantik, Putu, et al., 2019).

Distinguishing between grief and disturbed grief can therefore be objective only to a certain point. As the reader possible was able to derive from the chapters of this dissertation, there is a very lively and sometimes heated debate about which exact set of criteria would serve best to describe a grief disorder in the next versions of the DSM and ICD. However, the different groups of researchers (Cozza et al., 2019; Killikelly & Maercker, 2017; Lenferink, Boelen, Smid, & Paap, In press; Maciejewski et al., 2016) do not seem to reach consensus easily. The reason for this is partly historical (over the last decades, independent research groups have developed their own understanding of disturbed grief); partly, it is inherent to the fact that grief is a natural reaction after the loss of a loved one, which makes it difficult to define the exact transition between normal and disturbed grief. From this perspective, it is not altogether surprising that research groups from different parts of the world have come up with different criteria sets of disturbed grief – nor is it surprising that we found that these various sets of criteria cause differences in prevalence rates across cultures and regions (Djelantik, Putu, et al., 2019; Djelantik, Smid, et al., 2019). However, these disparities make it difficult to compare research findings to each other. For example, in this dissertation, five different sets of criteria have already been used and the debate is not yet over. Importantly, research is needed to investigate the possibility of reaching consensus about the PGD criteria. In order to achieve this goal, more exchange and collaboration between researchers from different parts of the world is needed to derive a shared conceptualisation of natural and pathological grief.

Other psychological and neurobiological mechanisms

In this dissertation, the focus has mainly been on the co-occurrence and correlations of symptoms of PGD, PTSD, and depression, and the correlations with sociodemographic, loss-related and cultural variables. Still, other psychological mechanisms could play a role in the development to psychopathology. For instance, rumination has been considered as a maintaining phenomenon in PGD, PTSD, and depression in bereaved individuals (Eisma & Stroebe, 2017). It might be interesting to see whether the importance of rumination or other psychological mechanisms that have been studied in bereaved populations, such as emotional loneliness and positive affect (van der Houwen et al., 2010), differs between subgroups with a co-morbid endorsement of PTSD and PGD symptoms compared to a subgroup with predominantly PGD symptoms.

An effort to understand the development of the different disorders in bereaved patients has been made by neurobiological researchers. From a neurobiological approach, mental disorders are understood as disturbances of the homeostatic

state of neurobiological mediators such as hormones, immune mediators, or neurotransmitters. Normally, these mediators will help the brain and the rest of the body to respond adequately to stressful live events, for example, the loss of a loved one. However, it could be that there is insufficient release of certain neuro-mediators, that they are not well regulated, and/or that there is insufficient inhibition of the mediators when the stressor has passed. When this happens, maladaptive changes may take place in the brain and the development of psychopathology may occur. This is called a disturbance of the allostasis or 'allostatic' load (McEwen, 2004). The studies that have assessed neurobiological mediators in bereaved individuals (Gerra et al., 2003; Hofer, Wolff, Friedman, & Mason, 1972; Holland et al., 2014; O'Connor, 2012; O'Connor, Irwin, & Wellisch, 2009; Pfeffer, Altemus, Heo, & Jiang, 2007; Saavedra Pérez et al., 2017; Schultze-Florey et al., 2012; Smid & Djelantik, 2018) have found disturbances that are characteristically for chronical stress in general but did not identify disturbances specifically connected to PGD, PTSD, and depression symptoms. It would be interesting to develop future studies with a focus to understand the associations with neurobiological markers to subgroups of individuals presenting with different combinations of PGD, PTSD, and depressive symptoms.

Loss, trauma and co-morbidity

Finally, we have limited our research to the disorders PGD, PTSD, and depression. The reason for this is that these disorders have been a focus for research in bereaved individuals in the last decades. Nonetheless, in recent years there has been emerging attention to the role of trauma in the development of other psychiatric disorders (Allsopp, Read, Corcoran, & Kinderman, 2019). Associations between the development of psychopathology and trauma and childhood adversities have been demonstrated by meta-analyses in depression (Mandelli, Petrelli, & Serretti, 2015); anxiety (Lindert et al., 2014); obsessive compulsive disorder (Barton & Miller, 2015); functional neurological disorder or conversion (Ludwig et al., 2018); dissociation (Vonderlin et al., 2018); eating disorders (Bus et al., 2014); schizophrenia and psychotic disorders (Palmier-Claus, Berry, Bucci, Mansell, & Varese, 2016); and bipolar disorders (Palmier-Claus et al., 2016). On the other hand, losing a loved one has been found to be associated with several other psychiatric disorders such as panic disorder, manic episode, phobias, alcohol use disorders, and generalised anxiety disorder (Keyes et al., 2014). However, the co-occurrence and networks of the symptoms of these disorders in bereaved individuals have not yet been elaborately investigated.

Implications

Our findings, summarised in Figure 1, would suggest the following guidelines for clinicians:

1. Most bereaved individuals follow a resilient or recovery trajectory following the loss of a loved one and do not need psychotherapeutic help.
2. A traumatic loss is not exclusively connected to a co-morbidity of PGD, PTSD and depression symptoms in bereaved individuals. For example, loss of close kin and a low level of education are predictors as well.
3. It is important to be aware of the existence of PGD, PTSD, and depressive symptoms if you assess a bereaved individual as a clinician, regardless of the cause of death.
4. It is important to be aware of (the development of) PTSD symptoms in bereaved individuals with PGD symptoms in the first year and the other way around.
5. In patients endorsing both PGD and PTSD symptoms, consider starting treatment focusing on PGD. Important topics might be 'role-transition, 'identity-disruption' and 'meaning making'. Furthermore 'social support', 'acceptance of the loss' and 'future perspectives' could be important topics as well.
6. Although multiple post-migration stressors may be present in a refugee patient, treatment for traumatic grief can be still efficacious.
7. Cultural notions and rituals regarding death and bereavement may play a role in the occurrence of specific symptoms and psychopathology in bereaved individuals.

This information might be beneficial for the further development of models of care such as the stepped model for traumatic grief (Boelen, 2016; Boelen et al., 2019) or the three-tiered approach to bereavement care of Aoun et al. (2015). In these stepped-care model, stages of increasing severity in PGD complaints are defined and risk factors and treatment options are offered. This dissertation emphasises that high-risk groups can be identified early on following bereavement, possibly by characteristic symptoms. Hypothetically, when bereaved individuals have a high sum score on a grief scale, endorse 'yearning', 'stunned', 'life is empty' and 'bitterness' often or 'have difficulties moving on in life', this could mean that these patients need to be followed up for an extra screening.
Furthermore, the dissertation creates possibilities for developing prevention strategies aimed at grief symptoms in the first year following a loss to maybe prevent development of co-morbid posttraumatic distress symptoms in the second

year. The high-risk group could be offered, for instance, psychoeducation or online help to assist them in processing the grief symptoms. The focus for this prevention tool could be 'acceptance of the loss', breaking 'social isolation', and the formulation of 'future perspectives'. Further, when people present with co-morbid PGD and PTSD symptoms, the first choice of psychotherapy might be aimed at PGD symptoms. This knowledge is not yet widely known among clinicians. Workshops and implementation of guidelines in order to create awareness are necessary.

Conclusion

In this dissertation, we showed that to understand the intersection between grief and posttraumatic distress, it may be more beneficial to focus on the occurrence and co-occurrence of symptoms, rather than on the occurrence and co-occurrence of disorders. Future studies could use this symptom-level focus to provide more precise screening tools, prevention strategies, and therapeutic interventions for those affected by loss and trauma.

Case follow –up
Hanna started cognitive behavioural therapy (CBT) for PGD. After some initial hesitance, she started confronting herself with the reality of the loss of her brother. She expressed a lot of emotions over the ensuing weeks but, at the end, she started to engage in more activities with friends and family and could formulate some future perspectives. Although she will never forget her brother and thinking about him still makes her sad from time to time, Hanna felt better and more confident in life in general. She and her boyfriend are planning to marry next year.

Samenvatting

Summary in Dutch

Een beter begrip van traumatische rouw

De samenhang tussen symptomen van gecompliceerde rouw, posttraumatische stress en depressie bij nabestaanden na traumatische en niet-traumatische verliezen.

Beknopte samenvatting

Het overlijden van een dierbare is een schokkende en levensveranderende ervaring. Onderzoek naar psychische klachten bij nabestaanden richt zich meestal op een van de volgende drie psychische stoornissen: de persisterende complexe rouwstoornis, de posttraumatische stressstoornis en depressie. De samenhang tussen symptomen van deze drie psychische stoornissen in individuen was echter nog weinig onderzocht en is het onderwerp van dit proefschrift.

Uit dit onderzoek komt naar voren dat bijna de helft (49%) van de nabestaanden na traumatische verliezen, persisterende complexe rouwstoornis ontwikkelt. Dit is vijf keer zoveel als bij nabestaanden na niet-traumatische verliezen. Daarnaast heeft deze populatie meer kans om een combinatie van persisterende complexe rouw en posttraumatische stress te ervaren. Vijf en zestig (65%) procent van patiënten die zich aanmelden bij een psychotrauma kliniek en die een overlijden hebben meegemaakt ervaren persisterende complexe rouw naast posttraumatische stress. Behandeling gericht op rouw, naast posttraumatische kan effectief zijn, zelfs in een vluchtelingen populatie met meerdere post-migratie stressoren. Als laatste vonden we verrassend lage prevalentie cijfers voor de persisterende complexe rouwstoornis, posttraumatische stressstoornis en depressieve stoornis onder Balinese nabestaanden van verkeersdoden, vergeleken met andere landen. Dit suggereert dat culturele, sociale en religieuze factoren invloed kunnen hebben op de ontwikkeling van psychopathologie.

In dit proefschrift hebben we laten zien dat bij complexe vraagstukken, zoals co-morbiditeit van psychische klachten bij nabestaanden, het nuttiger kan zijn om te focussen op symptomen, dan op gehele psychische stoornissen. Professionals en onderzoekers zouden meer rekening moeten houden met persisterende complexe rouwklachten, wanneer zij werken met mensen die trauma en verlies hebben meegemaakt.

Uitgebreide samenvatting

Introductie

Het verlies van een naaste kan veel emoties oproepen. Het doel van dit proefschrift is ons begrip van de ontwikkeling en behandeling van psychopathologie bij nabestaanden te vergroten. In het eerste gedeelte onderzochten we het onderwerp traumatisch verlies. Hierna voerden we verschillende onderzoeken uit om de psychopathologie die kan ontstaan na het verlies van een dierbare beter te begrijpen. Veelvoorkomende psychopathologie bij nabestaanden zijn, gecompliceerde rouw (ook wel persisterende complexe rouw stoornis (PCRS) genoemd), posttraumatische stress (PTSS) en depressie. In het verleden richtten veel onderzoeken in de psychiatrie en klinische psychologie zich op stoornissen in het geheel. Om een beter inzicht te krijgen in de samenhang tussen PCRS, PTSS en depressie bij nabestaanden na traumatische en niet-traumatische verliezen voerden wij in dit proefschrift de onderzoeken uit op symptoom niveau. In dit laatste hoofdstuk zullen we de belangrijkste resultaten van de onderzoeken samenvatten en een figuur presenteren met de resultaten van dit proefschrift. We eindigen met het bespreken van een aantal klinische implicaties.

Samenvatting van de resultaten

Traumatisch verlies

Een traumatisch verlies definiëren wij als een verlies van een naaste door een onnatuurlijke oorzaak, zoals ongevallen, rampen, suïcides of moorden. Er is weinig bekend over de prevalentie van gecompliceerde rouw bij nabestaanden die een naaste hebben verloren door een traumatisch verlies. Daarom begonnen wij in **hoofdstuk 2** met een literatuuronderzoek. Het doel van deze literatuurstudie was om een gepoold prevalentie cijfer van gecompliceerde rouw te bepalen. Daarnaast wilden wij onderzoeken of kenmerken van het verlies invloed zouden kunnen hebben op het prevalentie cijfer. Wij voerden het literatuuronderzoek uit met de zoekmachines PsycINFO, Ovid Medline, PILOTS, Embase, Web of Science en CINAHL. Er waren 25 geschikte studies die konden worden gebruikt voor de verdere berekeningen, de meta-analyse en meta-regressie. De gepoolde prevalentie van random-effects was 49%, 95% BI [33.6, 65.4]. Een gewelddadige dood (moord of suïcide), de dood van een enig kind en het zijn van een nabestaande in een niet-westers land waren geassocieerd met hogere prevalentie cijfers. Een langere tijd sinds het verlies en een verlies bij een natuurramp waren geassocieerd met een

significant lager prevalentie cijfer. Deze meta-analyse gaf aan dat bijna de helft van de nabestaanden na een traumatisch verlies PCRS had. Dit illustreert het belang van het beoordelen van een gecompliceerde rouw stoornis bij mensen die een traumatisch verlies hebben meegemaakt.

Echter, nabestaanden met psychische klachten presenteren zich naast gecompliceerde rouw, regelmatig ook met posttraumatische stress en depressie symptomen. In **hoofdstuk 3** onderzochten wij of een traumatisch verlies een predictor is voor een specifieke combinatie van symptomen van gecompliceerde rouw, posttraumatische stress en depressie in een groep van 496 Nederlandse nabestaanden. We gebruikten een latente klasse analyse om subgroepen nabestaanden te vinden die op elkaar leken wat betreft de combinatie van symptomen. Daarna onderzochten we of bepaalde socio-demografische kenmerken en verlies kenmerken, waaronder een traumatisch verlies meer voorkwamen in een specifieke subgroep van nabestaanden met een gedeelde combinatie van symptomen. We vonden drie verschillende subgroepen: Een subgroep met weinig symptomen, een subgroep met vooral gecompliceerde rouw symptomen en een subgroep met een combinatie van gecompliceerde rouw en posttraumatische stresssymptomen. Een traumatisch verlies, een verlies van een kind, een verlies van een partner en een lager opleidingsniveau waren significante voorspellers voor lidmaatschap van de subgroep met een combinatie van gecompliceerde rouw en posttraumatische stress. Het is dus niet zo dat een traumatisch verlies de enige predictor is voor een combinatie van gecompliceerde rouw en posttraumatische stress symptomen, ook andere voorspellers zoals een verlies van een kind of partner zijn geassocieerd met deze combinatie van symptomen. Er was geen subgroep van nabestaanden die gekenmerkt werd door depressie symptomen. Deze gegevens helpen om subgroepen nabestaanden met veel risico factoren vroeg te herkennen. Het kan een eerste stap zijn bij het ontwerpen van diagnostische vragenlijsten en interventies, speciaal gericht op subgroepen van nabestaanden die dezelfde combinatie van symptomen ervaren.

Traumatische rouw

Er is nog weinig bekend over de ontwikkeling van traumatische rouw symptomen over tijd. Meer kennis over het beloop van symptomen over tijd zou nuttig kunnen zijn om vroegtijdig individuen te kunnen herkennen die een risicogroep zijn om psychopathologie te ontwikkelen. We zouden bijvoorbeeld symptomen kunnen aanwijzen die specifiek zijn voor een problematisch beloop van rouw symptomen. Het doel van hoofdstuk 4 was 1) om subgroepen nabestaanden met vergelijkbare trajecten van gecompliceerde rouw symptomen te herkennen en 2) een voorlopige screening tool te ontwerpen met symptomen die

lidmaatschap van subgroepen met een problematisch beloop kunnen voorspellen. 166 Nederlandse nabestaanden vulden in het eerste jaar (T1; gemiddeld rond de 6 maanden) en tweede jaar (T2; gemiddeld rond de 18 maanden) een vragenlijst in over rouwsymptomen. Met behulp van een latente klasse analyse konden we 4 subgroepen nabestaanden identificeren. Er was een subgroep met persisterende hevige gecompliceerde rouw symptomen (klasse 1, 6%), een subgroep met individuen met persisterende matige PGD-symptomen (klasse 2, 35%), een subgroep met individuen met licht dalende matige PGD-symptomen (klasse 3, 33%), en een subgroep van individuen met persisterende lichte PGD-symptomen (klasse 4, 26%). Vervolgens onderzochten we welke symptomen op T1 het beste lidmaatschap van de problematische subgroepen (klasse 1 en 2) voorspelden met Receiver Operating Characteristics (ROC) analyses. Een hogere score op de symptomen 'een hevig verlangen naar de overledene', 'verbijsterd zijn over het overlijden', 'het leven is zinloos zonder de naaste' en 'een gevoel van boosheid over de dood van de naaste' voorspelde lidmaatschap van een subgroep nabestaanden met een problematisch verloop van gecompliceerde rouw symptomen het beste. In de toekomst zouden we deze nabestaanden extra informatie over rouwverwerking kunnen aanbieden.

In **hoofdstuk 5** keken we vervolgens naar hoe gecompliceerde rouw en posttraumatische stress symptomen elkaar beïnvloeden over de tijd. Hiervoor konden we gegevens gebruiken van 204 Nederlandse nabestaanden die rond de 6 (T1) en 18 maanden (T2) na het verlies van een naaste vragenlijsten over gecompliceerde rouw en posttraumatische stress hadden ingevuld. We voerden een cross-lagged analyse uit, waarbij alle relaties (de cross-lagged en de autoregressieve relaties) tussen gecompliceerde rouw en posttraumatische stress tegelijkertijd werden berekend. Er werd een significante cross-lagged relatie gevonden tussen PCRS-symptomen op tijdstip 1 (T1) en PTSS-symptomen op tijdstip 2 (T2) ($\beta = 0.270$, $p < .001$). Verder voorspelden PCRS-symptomen op T1 PCRS-symptomen op T2 en PTSS-symptomen op T1 voorspelden PTSS-symptomen op T2 (respectievelijk $\beta = 0{,}617$ en $\beta = 0{,}458$, ps $<0{,}001$). Bovendien waren PCRS- en PTSS-symptomen op beide tijdstippen significant gecorreleerd. Concluderend, vonden we in deze studie dat het PCRS-symptoom niveau op T1, het PTSS-symptoom niveau op T2 na verlies voorspelde. Mogelijk kan dit helpen bij het ontwerpen van nieuwe strategieën en interventies voor nabestaanden: Misschien dat het op tijd behandelen van PCRS-symptomen, PTSS-symptomen kan voorkomen. Bovendien voorspelden PCRS-symptoom niveaus op T1, PCRS-symptoom niveaus op T2, onafhankelijk van de PTSS-symptoom niveaus. Deze bevinding draagt bij aan het bewijs dat PCRS een afzonderlijke aandoening is van PTSS.

In **hoofdstuk 6** hebben wij samen met dr. Don Robinaugh van de Harvard Medical School in Boston onderzoek gedaan bij patiënten die waren doorverwezen naar ARQ Nationaal Psychotrauma Centrum. Hoewel het verlies van een naaste waarschijnlijk een veel voorkomende stressor is bij patiënten die naar een psychotrauma kliniek worden verwezen, had nog geen enkele studie de aanwezigheid en de relaties tussen symptomen van PCRS, PTSS en een depressieve symptomen in een klinische populatie onderzocht. In totaal werden 1572 patiënten aangemeld bij ARQ (tussen 19 maart 2015 en 17 juli 2017); 642 (41%) patiënten rapporteerden een verlies van een naaste. Van deze patiënten vulden 458 (71%) de drie vragenlijsten in die in de huidige studie werden gebruikt binnen de eerste 3 maanden nadat ze waren aangemeld. We gebruikten latente klasse analyses om subgroepen van patiënten te identificeren die dezelfde combinatie van PCRS-, PTSS- en depressiesymptomen hadden. Vervolgens gebruikten we een netwerkanalyse om de relaties tussen deze symptomen en kenmerken van het verlies te onderzoeken. De meeste patiënten waren lid van een subgroep die verhoogde PCRS-symptomen hadden (65%). PCRS-, PTSS- en depressiesymptomen hingen samen als sterk overlappende maar goed te onderscheiden symptoomnetwerken. Symptomen gerelateerd aan 'sociaal isolement' en 'verminderd zelfgevoel' overbrugden deze symptoomnetwerken. Traumatisch verlies werd geassocieerd met 'moeite om het verlies te aanvaarden'. Het verlies van naaste familieleden werd het sterkst geassocieerd met 'moeite om verder te gaan met het leven'. Deze studie liet zien dat PCRS-symptomen vaak voorkomen bij aan trauma blootgestelde nabestaanden en dat deze symptomen nauw verbonden zijn met symptomen van PTSS en depressie. Dit illustreert het belang van het navragen van verlies van een naaste en PCRS-symptomen bij degenen die aangemeld worden voor een trauma behandeling.

In **hoofdstuk 7** onderzochten we een behandeling gericht op traumatische rouw (de beknopte eclectische psychotherapie voor traumatische rouw (BEP-TG)) in een vluchtelingen populatie. Onder vluchtelingen kunnen post-migratie stressoren een negatieve invloed hebben op de geestelijke gezondheid en de effectiviteit van psychologische behandelingen. In deze naturalistische studie bestudeerden wij 81 dossiers van opeenvolgende patiënten. T-tests werden gebruikt om de significantie van de symptoomreducties in PTSS- en PCBD-symptomen van de behandeling te testen. De aanwezigheid van post-migratie stressoren leidden wij af door een thematische kwalitatieve analyse van de patiëntendossiers. Daarnaast berekenden we de associaties tussen post-migratie stressoren en symptoomreducties evenals vroegtijdige afbreking van de behandeling. De studie toont aan dat, hoewel vluchtelingen meerdere post-migratie stressoren ervaren; ze toch significante

symptoomreducties na de traumatische rouwgerichte behandeling toonden. Asielzoekers zonder papieren hadden echter meer kans om de behandeling niet af te ronden. Aanhoudende conflicten in het land van herkomst en het totale aantal stressoren na migratie werden geassocieerd met kleinere symptoomreducties. De studie toont aan dat kennis over de effecten van post-migratie stressoren op behandeling, artsen en psychologen kan helpen om gerichte psycho-educatie te geven en realistische behandelingsverwachtingen te formuleren bij de behandeling van psychische stoornissen in vluchtelingenpopulaties.

Tot slot, in **hoofdstuk 8**, voerden wij een onderzoek uit in samenwerking met onderzoekers van de Udayana Universiteit op Bali in Indonesië. Het eiland Bali staat bekend om zijn speciale rituelen en zienswijzen rond verlies en rouw. Veel kwalitatieve studies hebben de unieke aanpassingsstijlen van Balinese mensen met tegenspoed beschreven. Er is echter nog geen kwantitatief onderzoek onder nabestaanden uitgevoerd om de prevalentie van PCRS, posttraumatische stressstoornis PTSS en depressie te bepalen. We onderzochten daarnaast de aanwezigheid van culturele kenmerken, zoals religie, uitvoering van de rituelen volgens de religie, doel van de rituelen en noties van posttraumatische groei (PTG). Ten derde waren wij benieuwd welke subgroepen van nabestaanden die op elkaar leken wat betreft combinatie van symptomen, konden worden geïdentificeerd en welke relaties er zouden bestaan tussen deze subgroepen en het verlies van naaste familieleden, laag opleidingsniveau, culturele kenmerken zoals het doel van de rituelen, en PTG onderzocht. Om deze vragen te beantwoorden hielden we interviews met nabestaanden van verkeersdoden. 301 familieleden van 108 verschillende verkeersdoden werden geïnterviewd over PCRS, PTSS en depressiesymptomen, socio demografische en culturele kenmerken en PTG. De hoofddoelen van de rituelen werden bepaald met een thematische kwalitatieve analyse van de antwoorden van de deelnemers. We voerden een latente klasse analyse uit en vervolgens berekenden we de odds ratio's tussen het lidmaatschap van de subgroepen en de verschillende kenmerken met een multivariate 3step analyse. Deze studie liet zien dat de prevalentie van PCRS (0%), PTSS (1%) en matige depressie (2%) erg laag waren. Ter vergelijking: de prevalentie van PTSS na verkeersincidenten in studies van andere lage- en middeninkomenslanden (Iran en Ethiopië) wordt geschat op ongeveer 20-30%. De meeste deelnemers volgden de rouwrituelen die kenmerkend zijn voor de Balinese cultuur. Het doel van deze rituelen waren voornamelijk uitingen van de zorg voor de overledene. Drie subgroepen van nabestaanden met vergelijkbare combinaties van symptomen werden gevonden: een subgroep met weinig symptomen (73%) en twee kleinere klassen, één gekenmerkt met PCRS-symptomen (11%) en een andere met

PTSS-symptomen (13%), respectievelijk. Interessant is dat de symptomen 'afstand voelen tot andere mensen, 'zelfverwijt' en 'suïcidale ideeën' helemaal niet werden gerapporteerd. Verlies van een kind of partner werd geassocieerd met het lidmaatschap van de PTSS-klasse. Deze studie liet de verrassend lage prevalentiepercentages van PGD, PTSS en depressie zien in de Balinese gemeenschap in vergelijking met de prevalentiepercentages in andere landen. De deelnemers bleken behoorlijk homogeen te zijn in het volgen van hun religieuze en culturele gewoonten. Onze bevindingen kunnen suggereren dat bepaalde aspecten van de Balinese cultuur de getroffen persoon beschermen voor het ontwikkelen van psychische problemen. Het zou mogelijk kunnen worden gebruikt om rouwrituelen en zienswijzen in andere culturen te kunnen veranderen.

Discussie

De samenhang tussen gecompliceerde rouw, posttraumatische stress en depressie bij nabestaanden na traumatische en niet-traumatische verliezen

We hebben geprobeerd de bevindingen van het proefschrift als een geïntegreerd geheel weer te geven in Figuur 1.

Het figuur kan op de volgende manier worden geïnterpreteerd. We zien netwerken van de symptomen (blauwe stippen staan voor gecompliceerde rouw symptomen, rode stippen staan voor posttraumatische stress symptomen, en zwarte stippen voor depressieve symptomen). Het lichter worden van de kleur betekent een daling van de ernst van de symptomen. Hoofstuk 4 en 5 lieten zien dat nabestaanden met hevige PCRS en PTSS-som scores waarschijnlijk ook hoge PCRS en PTSS-som scores in het tweede jaar hebben en nabestaanden met lage PCRS en PTSS-som scores hebben meer kans op lage PCRS en PTSS-som scores in het tweede jaar. In het figuur vertonen daarom de eerste twee netwerken van de verschillende subgroepen dezelfde intensiteit van kleuren.

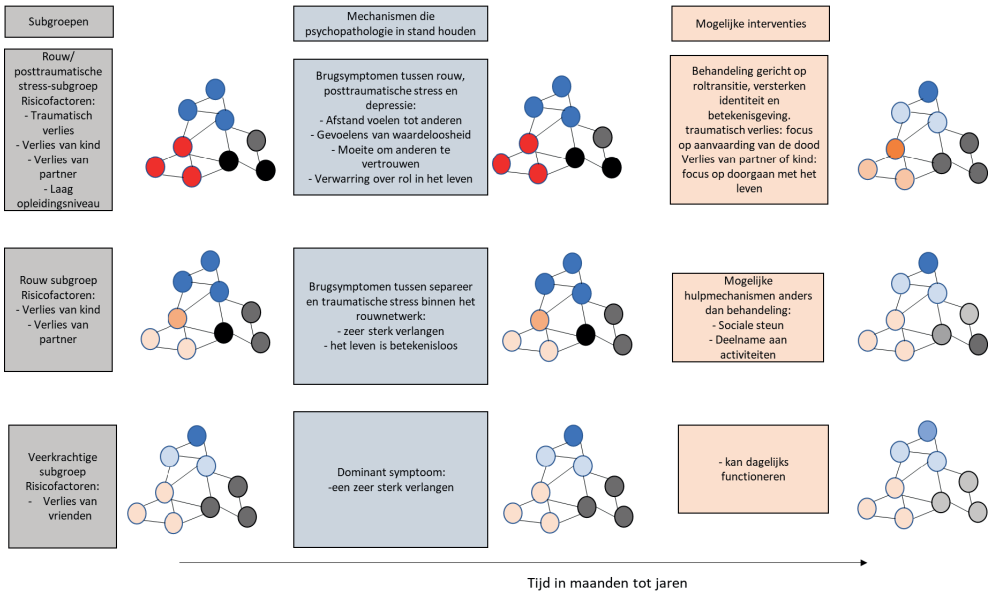
In de figuur maakten we een driedeling. Er is een subgroep weergegeven die voornamelijk PCRS en PTSS-symptomen rapporteert, een subgroep die voornamelijk PCRS-symptomen rapporteert en een subgroep zonder dominante symptomen van PCRS, PTSS of depressie.

Psychopathologie en functionele beperkingen zijn het zwaarst onder nabestaanden die zowel PCRS en PTSS-symptomen rapporteren; deze mensen lijken ook vaker psychologische hulp in gespecialiseerde psychotrauma klinieken te zoeken, zoals we in hoofdstuk 6 aantoonden. De resultaten van hoofdstuk 5 en 6 suggereren dat behandeling van PCRS-symptomen mogelijk ook PTSS-symptomen zouden kunnen verminderen. Naast een rouwbehandeling suggereren onze resultaten dat patiënten die een traumatisch verlies hebben geleden, wellicht een

speciale focus op 'aanvaarding van het verlies' nodig hebben en patiënten die hun partner of kind hebben verloren, meer focus op 'door te gaan met het leven'.

Voor de subgroep van personen die voornamelijk PCRS-symptomen hebben, constateerden we dat de symptomen 'een zeer sterk verlangen' en 'leven is betekenisloos zonder hem/haar' belangrijk zouden kunnen zijn in het voortduren van de symptomen binnen het PCRS-netwerk. We hebben enkele aanwijzingen dat deze subgroep van individuen het meest gebaat is bij ondersteuning van familie en vrienden of eerstelijns rouwbehandeling of hulp, zodat verwijzing naar een gespecialiseerde psychotraumakliniek niet nodig is (zie hoofdstuk 3 en 6).

De meeste nabestaanden zullen na het overlijden geen ernstige rouwsymptomen ervaren en kunnen als veerkrachtig worden beschouwd voor de ontwikkeling van psychopathologie. Voor de veerkrachtige subgroep vonden we 'een zeer sterk verlangen' als meest centrale symptoom. We vonden geen aanwijzingen dat de veerkrachtige groep speciale interventies nodig heeft of moet worden opgevolgd (zie hoofdstuk 3 en 4).



Blauwe stippen: gecompliceerde rouwsymptomen; Rode stippen: posttraumatische stresssymptomen; zwarte stippen: depressiesymptomen. Vervagende kleuren betekenen een afname van de ernst van de symptomen.

Figuur 1. Hypothetische samenhang van de dynamische wisselwerking van de ontwikkeling, de behandeling en de achteruitgang van traumatische rouw bij nabestaanden.

Implicaties

Onze bevindingen hebben de volgende klinische implicaties:

- De meeste nabestaanden zijn veerkrachtig na het verlies van een geliefde en hebben geen psychotherapeutische hulp nodig.
- Een traumatisch verlies is niet exclusief verbonden met psychische klachten met een co-morbiditeit van PCRS, PTSS en depressiesymptomen. Het verlies van een partner of kind en een laag opleidingsniveau zijn bijvoorbeeld ook voorspellers voor deze co-morbiditeit. Het is daarom belangrijk om als clinicus bewust te zijn van het bestaan van PCRS, PTSS en depressieve symptomen bij nabestaanden met psychische klachten, ongeacht de doodsoorzaak.
- Het is belangrijk om bewust te zijn van (de ontwikkeling van) PTSS-symptomen in het tweede jaar bij nabestaanden met hoge PCRS-symptoom niveaus in het eerste jaar na het verlies.
- Overweeg bij patiënten die zowel PCRS als PTSS-symptomen hebben de behandeling te starten die zich op rouwverwerking richt. Belangrijke onderwerpen kunnen de nieuwe rol in het leven en betekenisgeving zijn. Verder kunnen sociale ondersteuning, acceptatie van het verlies en toekomstperspectieven ook belangrijke onderwerpen zijn.
- Een behandeling voor traumatische rouw kan bij vluchtelingen ook effectief zijn, zelfs wanneer er meerdere post-migratie stressoren aanwezig zijn.
- Rituelen en zienswijzen met betrekking tot het overlijden en rouw kunnen een rol spelen bij versterking van veerkracht bij nabestaanden.
- Risicogroepen zouden al vroeg na rouw kunnen worden geïdentificeerd. Hypothetisch gezien, wanneer nabestaanden hoog scoren op de symptomen, 'een zeer sterk verlangen', 'gevoel van verbijstering over de dood', 'het leven is betekenisloos zonder hem/haar', 'bitterheid of boosheid over de dood' of ‘moeite hebben met door te gaan met leven', kan dit betekenen dat deze patiënten moeten worden opgevolgd.

Dit proefschrift schept mogelijkheden voor de ontwikkeling van preventiestrategieën gericht op gecompliceerde rouw symptomen in het eerste jaar na een verlies om de ontwikkeling van co-morbide posten traumatische stresssymptomen in het tweede jaar te voorkomen. De risicogroep kan bijvoorbeeld psycho-educatie of online hulp worden geboden. De focus voor deze preventietool zou kunnen zijn acceptatie van het verlies, het doorbreken van sociaal isolement’ en het formuleren van toekomstperspectieven. Verder, wanneer mensen zich presenteren met co-morbide PCRS- en PTSS-symptomen, zou de eerste keuze van

psychotherapie gericht kunnen zijn op de PCRS-symptomen. Deze kennis is nog niet algemeen bekend bij clinici. Workshops en implementatie van richtlijnen om bewustzijn te creëren zijn daarvoor noodzakelijk.

Conclusie

In dit proefschrift hebben we laten zien dat bij complexe vraagstukken, zoals co-morbiditeit van psychische klachten bij nabestaanden het nuttiger kan zijn om te focussen op symptomen, in plaats van op gehele psychische stoornissen. Toekomstige studies kunnen deze focus op symptoom niveau gebruiken om verdere screening tools, preventiestrategieën en therapeutische interventies te ontwikkelen voor mensen die getroffen zijn door verlies en trauma. Professionals en onderzoekers zouden meer rekening moeten houden met persisterende complexe rouwklachten, wanneer zij werken met mensen die trauma en verlies hebben meegemaakt.

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About the author

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Manik Djelantik was born January 21st in 1984 in Utrecht. She grew up in Utrecht, Male (the Maledives) and Gouda. During her youth, she spent many long summer holidays on the island of Bali, Indonesia, visiting the family of her father. After her high school graduation (cum laude), Manik moved back to Utrecht to study Medicine at the University Medical Centre of the University Utrecht (UMCU). She combined her studies with several research projects; a public health research investigating aids clinics in Zambia, a qualitative research at the medical ethical department, and her thesis included a quantitative research at the Amsterdam Born Children and their Development (ABCD) cohort study of the department of Public Health of the Academic Medical Centre of Amsterdam. Her thesis was nominated for the Best Student Award of the Dutch Epidemiological Society (VvE).

Finishing her studies in 2010, she started working as a medical doctor at the Child and Adolescent Psychiatry department of the UMCU. After this, she worked one year as a medical doctor at the Emergency Department of the Gemini Hospital in Den Helder. Following this, she started the psychiatry residency program of the UMCU. During her residency at the Military Hospital, Manik worked with veterans with posttraumatic stress disorder (PTSD). She became fascinated by this mental health phenomena and decided to spend her elective residency at ARQ National Psychotrauma Centre (Equator Foundation) where she mainly worked with refugees and victims of human trafficking. During this time in 2015, she started a research project about traumatic grief, which ultimately turned into this dissertation. Next to her work, she specialized as a psycho traumatherapist of the Dutch Psychotrauma Society (NTVP) and completed the Graduate School Social and Behavioural Sciences, track Data Science. In 2018, one of her published papers was elected as Editor's Choice of Comprehensive Psychiatry and she was nominated for the best poster prize of the Dutch Association for Psychiatry (NVVP) congress. In 2019, she was selected as a member of the European Society for Traumatic Stress Studies (ESTSS) Future International Leadership Group.

In 2016-2018, Manik collaborated with Balinese researchers of the Udayana University, the faculty of Medicine, departments Public Health and Psychiatry in Bali to conduct the research project: "Traumatic grief in Bali". In 2017-2019, she collaborated with dr. Don Robinaugh and worked various periods as a visiting researcher at the Harvard Medical School/ Massachusetts General Hospital,

department Psychiatry, Center for Anxiety and Traumatic Stress Disorders and Complicated Grief.

Currently, Manik is finishing her residency program at the UMCU and works as a researcher for ARQ National Psychotrauma Centre.

International peer-reviewed publications

Djelantik, A. A. A. M. J., Smid, G. E., Mroz, A., Kleber, R. J., & Boelen, P. A. (2020). The prevalence of Prolonged Grief Disorder in bereaved individuals following unnatural losses: Systematic review and meta-regression analysis. *Journal of Affective Disorders.* doi: 10.1016/j.jad.2020.01.034

Djelantik, A. A. A. M. J., Robinaugh, D. J., Kleber, R. J., Smid, G. E., & Boelen, P. A. (2019). Symptomatology following loss and trauma: Latent class and network analyses of prolonged grief disorder, posttraumatic stress disorder, and depression in a treatment-seeking trauma-exposed sample. *Depression and Anxiety*. doi:10.1002/da.22880

Djelantik, A. A. A. M. J., Smid, G. E., Kleber, R. J., & Boelen, P. A. (2018). Do prolonged grief disorder symptoms predict post-traumatic stress disorder symptoms following bereavement? A cross-lagged analysis. *Comprehensive Psychiatry, 80*, 65-71. doi:10.1016/j.comppsych.2017.09.001

Djelantik, A. A. A. M. J., Smid, G. E., Kleber, R. J., & Boelen, P. A. (2017a). Early indicators of problematic grief trajectories following bereavement. *European Journal of Psychotraumatology, 8*(sup6), 1423825. doi:10.1080/20008198.2018.1423825

Djelantik, A. A. A. M. J., Smid, G. E., Kleber, R. J., & Boelen, P. A. (2017b). 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. doi:10.1016/j.psychres.2016.11.023

Djelantik, A. A. A. M. J., Kunst A.E., van der Wal M.F., Smit H.A., Vrijkotte T.G. (2012). Contribution of overweight and obesity to the occurrence of adverse pregnancy outcomes in a multi-ethnic cohort: population attributive fractions for Amsterdam. *BJOG an International Journal of Obstetrics & Gynaecology. 119*(3), 283-290. doi: 10.1111/j.1471-0528.2011.03205.x

Eidhof, M. B**., Djelantik, A. A. A. M. J.**, Klaassens, E. R., Kantor, V., Rittmansberger, D., Sleijpen, M., . . . ter Heide, F. J. J. (2019). Complex posttraumatic stress disorder in patients exposed to emotional neglect and traumatic events: Latent class analysis. *Journal of Traumatic Stress, 32*(1), 23-31. doi:https://doi.org/10.1002/jts.22363

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. doi:10.1080/07481187.2018.1480546

Lenferink, L. I. M., de Keijser, J., Smid, G. E., **Djelantik, A. 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. doi:10.1080/20008198.2017.1298311

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. doi: 10.1080/20008198.2017.1375335.

Boelen, P. A., Reijntjes, A. H. 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*, 358-363. doi:10.1016/j.psychres.2016.04.012

Manuscripts submitted for publication

Djelantik, A. A. A. M. J., de Heus, A., Kuiper, D., Kleber, R. J., Boelen, P. A., & Smid, G. E. (2019). Post-migration stressors and their association with symptom reduction and non-completion during treatment for traumatic grief in refugees. *Submitted*

Manuscripts in preparation

Djelantik, A. A. A. M. J., Putu, A., Boelen, P. A., Lesmana, C. B. J., & Kleber, R. J.. Prolonged grief disorder, posttraumatic stress disorder and depression following traffic accidents among bereaved Balinese family members: Latent class analysis and cultural correlates. *In Preparation*.

Djelantik, A. A. A. M. J., Robinaugh D. R., Boelen, P. A. The course of psychiatric symptoms in the first 27 months following bereavement: A detailed latent trajectory analysis of grief, posttraumatic stress, and depression. *In Preparation.*

Djelantik, A. A. A. M. J.[*], van Es. M. C.[*], Lahuis, A. M.[*], Mooren, N.[*]. The challenges of conducting mental health research among resettled refugee populations: an ecological framework from a young-researchers perspective. *In Preparation.* [*]authors contributed equally.

Soydas, S., Smid, G. E., Lenferink, L. I. M., **Djelantik, A. A. A. M. J.**, Goodfellow, B., Wilson, R., & Boelen, P. A., (2020). Psychopathology following bereavement by homicide: Latent class analysis. *In Preparation*.

Robinaugh, D. J., Toner, E., **Djelantik, A. A. A. M. J.** The phenomenology of grief. *In Preparation.*

Dutch peer-reviewed publications

Djelantik M., Tijdink J., Bloemkolk D. (2015). Wernicke Encephalopathy: A case report. *Tijdschrift voor Psychiatrie,* 57. *57*(3), 210-214.

Book chapters

Smid, G. E., & **Djelantik, A. A. A. M. J.** (2018). Psychofarmacologische en neurobiologische aspecten van traumatische rouw. In J. Keijser, P. Boelen, & G. Smid (Eds.), *Handboek Traumatische Rouw* (pp 217-224). Amsterdam: Boom Uitgevers.

Smid, G. E., **Djelantik, A. A. A. M. J.,** de Heus, A., Bos, J. B. A., & Boelen, P. A. (2018). Beknopte Eclectische Psychotherapie voor Traumatische Rouw (BEP-TG). In G. Claes, J. Maes & H. Modderman (Eds.), *Ruimte maken voor verlies en rouw in therapie*. Leuven: Acco.

de Heus, A., Hengst, S. M. C., de la Rie, S. M., **Djelantik, A. A. A. M. J**., Boelen, P. A., & Smid, G. E.. Day patient treatment for traumatic grief: preliminary evaluation of a one-year treatment. In Ricciardelli, S. Bornstein, A. Hall, R.N. Carleton R. (Eds), *Handbook of posttraumatic stress: psychosocial, cultural and biological perspectives*. In press**.**

Oral presentations

Djelantik A. A. A. M. J. *Traumatic Grief.* Invited speaker at the National Network day for Regional Medical Emergency Preparedness and Planning, and Psychosocial Help for the Dutch Community Health Services (GGD). RIVM, de Bilt, Nov 7th, 2019.

Djelantik A. A. A. M. J.. *Multiple timepoint trajectories of Prolonged Grief Disorder, Post Traumatic Stress Disorder and depression in the first two year after a loss of a loved one and the development of individual symptoms.* Invited speaker at New York University Langone Health, dep Psychiatry, lab of prof. N. Simon. Oct 1st, 2019.

Djelantik, A. A. A. M. J. *Understanding Traumatic Grief.* Invited speaker at Harvard Medical School/Massachusetts General Hospital, dep Psychiatry. Center for Anxiety and Traumatic Stress Disorders and Complicated Grief, Sept 30th, 2019.

Djelantik, A. A..A. M. J., de Heus A., *Traumatic Grief: clinical workshop*. Invited speaker at the Special Interest Group (SIG) meeting at the European Society for Traumatic Stress Studies (ESTSS), Rotterdam, June 15th 2019.

Djelantik, A. A. A. M. J., Smid G. E., Kleber, R. J., Mroz A., Boelen, P.A. *Prolonged Grief Disorder in bereaved individuals following unnatural losses: preliminary findings* at the symposium "*Prevalence matters: the influence of socio-demographic and loss-related variables on the development of Prolonged Grief Disorder*." Chair/organizer and presenter at this symposium at the European Society for Traumatic Stress Studies (ESTSS), Rotterdam, June 14th 2019. Co-presenters: Soydas S., prof. Wagner B., dr. Killikelly C.

Djelantik, A. A. A. M. J., Smid, G. E., Kleber, R. J., & Boelen, P. A. (2018). *Early indicators of problematic grief trajectories following bereavement.* Paper presented at the European Society for Traumatic Stress Studies (ESTSS), Rotterdam, June 15th 2019.

Djelantik, A. A. A. M. J., Putu A., Lesmana C. K., Boelen P. A., Kleber R. J. *Traumatic grief in Bali: socio-demographic and cultural correlates.* Invited speaker at the symposium "Inclusive approach to mental well-being: strengthening continuum of mental health care." Udayana University, Denpasar, Indonesia, May 23rd 2019.

Djelantik, A. A. A. M. J., Smid G. E., Kleber R. J., & Boelen P. A. *Prolonged grief, post-traumatic stress, and depression after a loss: co-occurrence, key symptoms and the use of Latent Class Analyses*. Invited speaker at the Donders Discussions 2018, Radboud University Nijmegen, Oct 11th 2018.

Djelantik, A. A. A. M. J., Smid, G.E., Kleber, R.J., & Boelen, P.A. *Prolonged grief, post-traumatic stress, and depression symptoms after a loss*. Poster presented by dr. M. Kennis at the American Psychiatry Association (APA) congress, New York, May 5th 2018.

Interview by Kennis platform Integratie en Samenleving (KIS; 2018). *https://www.kis.nl/artikel/traumatische-rouw-bij-vluchtelingen-zo-veel-meer-dan-rouw-alleen*

Djelantik, A. A. A. M. J. *Traumatic Grief in refugees.* Invited speaker at Psychotraumacentrum Zuid-Nederland Reinier van Arkel. May 17th 2018.

Djelantik, A. A. A. M. J., Smid G.E., Kleber, R.J., & Boelen, P.A. *Prolonged grief, post-traumatic stress, and depression symptoms after a loss*. Poster presented at the Dutch Association for Psychiatry (NVVP) congress April 12th 2018.

Djelantik, A. A. A. M. J. *Traumatic Grief in refugees.* Invited speaker at National Symposium "Psychotrauma and refugees and asylum seekers". Euroregionaal Congresbureau. March 8th, 2018.

Djelantik, A. A. A. M. J., van Wageningen E.**,** Smid, G. E., Boelen, P. A. *Traumatic Grief*: *training in BEP-TG*. Utrecht, the Netherlands. Summerschool Utrecht University, July 20th 2017

Djelantik, A. A. A. M. J., Smid, G. E., Kleber, R. J., & Boelen, P. A. *Symptoms of prolonged grief, posttraumatic stress, and depression after loss in a Dutch community sample: Latent class and cross-lagged analyses.* Odense, Denmark. Paper presented at the European Society for Traumatic Stress Studies (ESTSS), 1-4 June 2017

Djelantik, A. A. A. M. J., Smid, G. E., Kleber, R. J., & Boelen, P. A. *Symptoms of prolonged grief, posttraumatic stress, and depression after loss in a Dutch community sample: A latent class analysis.* Cape Town, South Africa. Paper presented at the World Psychiatric Association International Congress (WPA) 18-22 November 2016.

Djelantik, A. A. A. M. J., Smid, G. E., Kleber, R. J., & Boelen, P. A. *Symptoms of prolonged grief, posttraumatic stress, and depression after loss in a Dutch community sample: A latent class analysis.* Paper presented at the Dutch Association for Cognitive Behavioural Therapy (VGCT) 13 November 2016.

Djelantik, A. A. A. M. J. , Smid, G. E., Reijntjes, A. H. A., Kleber R. J., Boelen, P. A. Presentation *Does traumatic grief exist? A latent class analysis in a sample of Dutch bereaved*. Paper presented by GE Smid at Dutch Association for Psychiatry (NVVP) congress April 2016.

Djelantik M. , Remmelzwaal A. Workshop *Medical ethical dilemmas in the psycho-trauma care for undocumented refugees*. Presented at the Dutch Association for Psychotrauma (NTVP) congress 14 November 2014.

Djelantik A. A. A. M. J., Kunst, A. E., van der Wal, M. F., Smit, H. A., Vrijkotte, T. G. *Contribution of overweight and obesity to the occurrence of adverse pregnancy outcomes in a multi-ethnic cohort: population attributive fractions for Amsterdam.* Thesis presented at the Dutch Epidemiology Conference (WEON) Congress July 2010

Manik Djelantik

Toward an integrated understanding of traumatic grief

Connecting prolonged grief, posttraumatic stress, and depression symptoms in traumatically and non-traumatically bereaved individuals

Losing a loved one is a stressful and life-changing experience. Mental health problems following bereavement have been extensively described, with the distinction, generally speaking, of three sets of disorders: prolonged grief disorder, posttraumatic stress disorder, and depression. The connection and co-occurrence between the symptoms of these three disorders, however, remain subject for debate and were the focus of the empirical studies in this book.

We found that traumatically bereaved individuals have a five times higher chance to develop prolonged grief disorder, compared with non-traumatically bereaved individuals. Furthermore, they were more likely to experience both prolonged grief and posttraumatic stress. Sixty-five percent of bereaved patients referred to a psychotrauma clinic experience both types of distress. Treatment for prolonged grief and posttraumatic stress symptoms at the same time may be effective, even in refugees with multiple post-migration stressors. Lastly, we found a surprisingly low prevalence rate of grief, posttraumatic stress, and depression among bereaved families following traffic accidents in the Indonesian island of Bali, compared to other countries. This suggests that, in different cultural contexts, grief may be experienced differently and that societal and religious factors may contribute to preventing the development of mental health issues. Finally, we attempted to establish an integrated understanding of the risk factors, maintaining mechanisms and possible treatment mechanisms among the types of distress following bereavement

This dissertation suggests that clinicians and researchers should be aware of prolonged grief to adequately capture psychopathology among those affected by trauma and loss. We showed that to understand the intersection between prolonged grief, posttraumatic stress, and depression, it may be more beneficial to focus on the occurrence and co-occurrence of symptoms, rather than on the occurrence and co-occurrence of disorders.

Manik Djelantik, M.D., works as a researcher for ARQ National Psychotrauma Centre and is finishing her psychiatry residency program at the University Medical Centre of Utrecht. This book is based on her dissertation regarding traumatic grief at ARQ and Utrecht University.

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