

Fluctuations of prolonged grief disorder reactions in the daily life of bereaved people: An experience sampling study

Authors	Lenferink,L.I.M.; Terback,E.; van Eersel,J.H.W.; Zuidersma,M. et al
Published in	Current Psychology
DOI	10.1007/s12144-024-06987-2
Publication Date	2024-12
Document Version	publishersversion
Link	https://research.tilburguniversity.edu/en/publications/9d36922e-9756-4a66-a3c6-e78837362226
Citation	Lenferink, L I M, Terback, E, van Eersel, J H W, Zuidersma, M, Franzen, M & Riese, H 2024, 'Fluctuations of prolonged grief disorder reactions in the daily life of bereaved people : An experience sampling study', Current Psychology, vol. 43, pp. 35821–35832. https://doi.org/10.1007/s12144-024-06987-2
Download Date	2026-04-17 15:54:24
Rights	<p>General rights</p> <p>Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.</p> <ul style="list-style-type: none"> - Users may download and print one copy of any publication from the public portal for the purpose of private study or research. - You may not further distribute the material or use it for any profit-making activity or commercial gain - You may freely distribute the URL identifying the publication in the public portal" <p>Take down policy</p> <p>If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.</p>



Fluctuations of prolonged grief disorder reactions in the daily life of bereaved people: an experience sampling study

L. I. M. Lenferink^{1,2,3} · E. Terbrack¹ · J. H. W. van Eersel^{2,4} · M. Zuidersma⁵ · M. Franzen⁶ · H. Riese⁵

Accepted: 7 November 2024 / Published online: 28 November 2024
© The Author(s) 2024

Abstract

Loss-adaptation has been described as being characterized by ‘waves of grief’, which may result in a Prolonged Grief Disorder (PGD). Although this assumption about the fluctuating nature of grief is supported by theoretical work, it is not (yet) supported by empirical work. We are the first to explore to what extent PGD reactions fluctuate in everyday life and whether fluctuations in PGD reactions are related to overall PGD levels using experience sampling methodology (ESM). Data from 38 bereaved individuals (74% women, on average 6 years post-loss, 47% lost a parent) were analyzed. For two weeks, five times per day, participants reported on the severity of 11 PGD reactions in the past three hours (ESM-PGD). At baseline, overall PGD severity (B-PGD) in the past two weeks was assessed with telephone-interviews using the Traumatic Grief Inventory–Clinician Administered. Root Mean Square of Successive Differences (RMSSD) were calculated to reflect fluctuations in ESM-PGD. Spearman correlations between RMSSD values of the 11 ESM-PGD reactions and B-PGD scores were computed. Mean B-PGD scores were below the clinical cut-off. Some fluctuations in ESM-PGD reactions were found, as indicated by varying RMSSD values, but also floor effects were detected. B-PGD levels were related to RMSSD values for ESM-PGD (ρ between 0.37 and 0.68, all $p < .05$; and between 0.36 and 0.63 after removal of floor effects). We found that (some) ESM-PGD reactions fluctuated in everyday life. This may offer new theoretical insights into loss-adaptation, which may result in optimizing PGD treatment.

Keywords Prolonged grief · Bereavement · Fluctuations · Experience sampling methodology · Ecological momentary assessment · Daily life

Early theoretical work described a grief process using a stage-model, which prescribes that people have to work through a fixed sequence of stages, namely denial, anger, bargaining, and depression, in order to reach acceptance of the loss (Kübler-Ross, 1969). Those ‘stuck’ in these stages may benefit from psychological care to resolve these

disturbed grief reactions. Disturbed grief reactions, labelled as a Prolonged Grief Disorder (PGD¹), entered the most

¹ Throughout this article, ‘PGD’ is used as an umbrella term for disturbed grief reactions, whereas “DSM-5-TR PGD” refers to PGD criteria as defined in DSM-5-TR.

✉ L. I. M. Lenferink
l.i.m.lenferink@utwente.nl

¹ Department of Psychology, Health & Technology, Faculty of Behavioural Management and Social Sciences, University of Twente, P.O. Box 217, Enschede 7500 AE, The Netherlands

² Department of Clinical Psychology, Faculty of Social and Behavioural Sciences, Utrecht University, P.O. Box 80140, Utrecht 3508 TC, The Netherlands

³ Department of Clinical Psychology and Experimental Psychopathology, Faculty of Behavioral and Social Sciences, University of Groningen, Grote Kruisstraat 2/1, Groningen 9712 TS, The Netherlands

⁴ Department Human Resources Studies, Faculty of Social and Behavioral Sciences, Tilburg University, P.O. box 90153, Tilburg 5000 LE, The Netherlands

⁵ Department of Psychiatry, Interdisciplinary Center Psychopathology and Emotion regulation (ICPE), University of Groningen, University Medical Center Groningen, Hanzeplein 1, Groningen 9713 GZ, The Netherlands

⁶ Department of Psychology, Education & Child Studies, Erasmus School of Social and Behavioural Sciences, Erasmus University Rotterdam, Rotterdam 3062 PA, The Netherlands

recent edition of the Diagnostic and Statistical Manual of Mental Disorders in 2022 (DSM-5-TR; American Psychiatric Association, 2022). DSM-5-TR PGD is characterized by long-lasting intense grief reactions, described in ten separate symptoms (i.e., intense longing for the deceased, preoccupation with thoughts/memories of the deceased, identity disruption, disbelief, avoidance of loss-reminders, intense emotional pain (e.g., sorrow or anger), difficulty reintegrating into one's relationships/activities, emotional numbness, feeling life is meaningless, and intense loneliness), that cause significant distress in daily functioning at least 12 months after the death of a loved one. About 3% of bereaved people met criteria for PGD in a representative sample of German bereaved people (Rosner et al., 2021). It has been estimated that PGD rates are four times higher when the loss has occurred unexpectedly (e.g., due to accidents; Doering et al., 2022).

While this stage-model of grief is still often cited in scientific and popular media, it lacks empirical support (for overviews see: Avis et al., 2021; Stroebe et al., 2017). In fact, research has shown that PGD symptoms manifest themselves in multiple ways (Boelen & Lenferink, 2020; Lenferink & Eisma, 2018) and that these symptoms are not sequentially ordered (Maciejewski et al., 2007). Moreover, latent trajectory studies have shown that at least three subgroups can be distinguished in terms of the course of PGD severity in the first years after the death of a loved one (Kristensen et al., 2020; Lundorff et al., 2020; Malgaroli et al., 2018; Nielsen et al., 2019; Smith & Ehlers, 2020; Sveen et al., 2018). These three subgroups, ordered from most common to least common, are characterized by (1) stable low grief reactions, (2) initial high grief levels that gradually decrease, and (3) acute severe grief reactions that do not diminish over time. The most common reactions to loss are stable low grief reactions, which contrasts early stage-models on grief stating that all bereaved people experience acute grief reactions that gradually decrease over time.

These prior trajectory studies provide valuable insights into differences in the course of overall PGD severity across months or years after loss, they, however, do not provide insights in possible changes in PGD symptomatology on a daily basis within individuals. This is a missed opportunity, as zooming in on symptom fluctuations in daily life can yield relevant insights in PGD. For instance, losing a loved one has been described as being characterized by 'waves of grief' (Arizmendi & O'Connor, 2015) or 'acute pangs of grief' (Layne et al., 2002). These waves of grief might be triggered by reminders of the loss, for instance, feeling sad when realizing your deceased partner is not next to you when waking up. While this assumption about the fluctuating nature of grief reactions is supported by theoretical and anecdotal work, it appears not to rest on a solid

empirical basis (Arizmendi & O'Connor, 2015; Stroebe & Schut, 1999; Wilson et al., 2021). Current grief research is dominated by cross-sectional studies that inherently lack the ability to study the potential fluctuating nature of daily grief reactions. By using experience sampling methodology (ESM), we can for the first time test this assumption.

ESM is an intensive longitudinal data-collection methodology, whereby participants are asked to complete a brief set of items multiple times per day (e.g., on their mobile phone). ESM data have been used to gain insights into the fluctuating nature of feelings, such as negative affect, whereby fluctuations can be quantified by calculating the Mean Square of Successive Differences (MSSD or its square root RMSSD). A meta-analysis indicated that larger fluctuations (i.e., larger MSSD values) in negative as well as positive feelings were related to worse mental health outcomes, such as depression, anxiety, and borderline personality disorder (Houben et al., 2015). We are the first examining to what extent these findings generalize to bereaved people.

Accordingly, we assessed PGD reactions using ESM-items (i.e., ESM-PGD), that each correspond to one of the ten DSM-5-TR PGD symptoms, five times per day for two weeks in a sample of Dutch- and German-speaking bereaved individuals. In this study sample, our research group already showed that ESM is a feasible and acceptable method to assess PGD reactions in daily life (Lenferink et al., 2022a). In this exploratory study, we examined (1) to what extent each ESM-PGD reaction fluctuates in daily life of bereaved individuals and (2) to what extent fluctuations in ESM-PGD reactions are related to PGD severity at baseline (B-PGD). Because this is the first study exploring fluctuations in PGD reactions, we examined fluctuations in each ESM-PGD reaction separately.

Methods

Participants

This study is part of a larger project, titled 'Grief-ID', that aims to study and treat PGD in daily life using ESM (Lenferink et al., 2022a). Bereaved Dutch- or German-speaking adults were eligible to participate when they have lost a partner, family member, or friend. People who were highly suicidal, had been diagnosed with a psychotic disorder, or were bereaved less than three months earlier (all assessed during baseline interview) were not eligible to participate to avoid raising distress levels. Possible participants were recruited in social networks of members of the research team and by sharing recruitment materials on websites for bereaved people. To avoid possible bias, the participants recruited from the social network of the researchers were

not interviewed by the person who recruited them, but were interviewed by a fellow team member. Data were collected between January and March 2022. Participants could participate in a raffle and win a €50 voucher. A preprint of the submitted first version of this manuscript has been published on ResearchGate.

Procedures

Participation in this study consisted of three parts. At baseline, prior to the ESM-phase, a 45-minutes telephone-interview took place by trained master-level clinical psychology university students. After the baseline-interview, participants were watching an instruction video explaining how to download and use the Ethica app on their smartphone (*Ethica Data*, n.d.) for completing the ESM-items. The ESM-phase included completing a short survey five times per day, for two weeks (design analog to Schoevers et al., 2020). At semi-random time-intervals participants received a beep on their phone; beeps occurred between 8.30–9.30AM, 11.30AM–12.30PM, 2.30–3.30PM, 5.30–6.30PM and 8.30–9.30PM. Reminders were sent after 10 and 20 minutes if the participants had not responded yet. Participants had 60 min to complete the ESM-items after receiving the first beep. When a participant missed three or more measurements on one day, the interviewer contacted the participant via telephone or email and encouraged the participant to complete future measurements. Throughout the entire study period, participants were able to contact members of the research team in case they needed support/information regarding their participation. Within two days after the two-week ESM-period, another similar telephone-interview took place by the same interviewer as the baseline-interview (the results of this second interview are not analyzed in this study). For more information about the study procedures see our earlier work using this study sample (Lenferink et al., 2022a).

Measures

Baseline PGD levels (B-PGD)

The Traumatic Grief Inventory-Clinician Administered (TGI-CA; Lenferink et al., 2023) was used to assess interview-based B-PGD severity. The TGI-CA consists of 22 items (download for free from: <https://osf.io/a6hmc/>) in which people are asked to rate the frequency of their symptoms during the past months (but for the purpose of this study adjusted to the past two weeks) on a five-point scale (1= ‘never’, 2= ‘rarely’, 3= ‘sometimes’, 4= ‘frequently’, 5= ‘always’). This measure was developed to assess multiple criteria-sets for disturbed grief (i.e., DSM-5 persistent

complex bereavement disorder, DSM-5-TR PGD, and ICD-11 PGD). An example item is: “In the past two weeks, did you feel bitterness or anger related to the death of [____]?” A selection of 11 items (i.e., item 1–3, 6, 8–11, 18–19, and 21) were summed to represent DSM-5-TR PGD severity. One PGD symptom (‘Intense emotional pain (e.g., anger, bitterness, sorrow)’) was assessed with two items (item 2 and 8). The highest score on one of these items was used as indicator for this specific symptom. Total DSM-5-TR PGD scores ranged from 10 to 50. In adults, a total score of ≥ 33 is indicative for probable DSM-5-TR PGD caseness (Lenferink, Eisma, Lenferink et al., 2022b). The Dutch and German TGI-CA has shown to have adequate psychometric properties (Lenferink et al., 2023). Cronbach’s alpha in this study was 0.86.

ESM-items to assess daily PGD reactions (ESM-PGD)

ESM-items were developed to assess PGD reactions during the day with input from grief and ESM experts (for more details see Lenferink et al. (2022a)). The 11 ESM-PGD items correspond to the 10 DSM-5-TR PGD symptoms (see Supplementary Table 1); i.e., one DSM-5-TR PGD symptom (i.e., ‘Intense emotional pain (e.g., anger, bitterness, sorrow) related to the death’) was captured with two ESM items, namely: ‘In the past three hours, I felt bitterness or anger because of his/her death’ and ‘In the past three hours, I felt sad because of his/her death’. Participants rated the frequency of each ESM-PGD reaction experienced in the past 3 hours prior the beep on a scale from 0 is ‘not at all’ through 6 is ‘very much’. We chose to refer to the past three hours in each ESM-item, as it matches the time-intervals between the beeps during daytime. Therefore, we were able to measure ESM-PGD experiences during the day.

Background and loss-related characteristics

At baseline the following background characteristics were assessed during the interviews: gender (0=man, 1=woman, 2=other), age (in years), country of birth (0=Germany, 1=the Netherlands, 2=other), and level of education (0=other than college/university, 1=college/university). Loss-related characteristics were coded as follows: cause of death (0=natural death (e.g., illness), 1=suicide, 2=homicide, 3=accident, 4=other), relationship to the deceased (the deceased is... 0=parent, 1=spouse, 2=child, 3=sibling, 4=grandparent, 5=friend, 6=grandchild, 7=other), and time since loss (in years).

Statistical analysis

Data cleaning

Due to a technical error, 51 out of 80 people (64%) did not receive beeps on the last day (i.e., day 14) of the ESM-phase. We therefore analyzed data from day 1 through day 13 only (i.e., resulting in a maximum of 65 instead of 70 ESM time-points per person). For a flowchart of participants see Fig. 1. Eighty people were eligible to participate and completed the baseline interview and started the ESM-phase. Following prior research (Conner & Lehman, 2012; Kraiss et al., 2022), participants who completed less than 50% of ESM-items (i.e., < 33 time-points) were excluded ($n=26$, 33%). Our retention rate of 68% is slightly higher than the retention rate of 65% reported in earlier work using this dataset, because in earlier work we calculated this rate by counting how many people completed $\geq 50\%$ of all 70 (instead of 65) time-points. Additionally, we excluded participants who had more than three times missing data on two or more successive ESM time points ($n=16$). Following prior research (Schoevers et al., 2020), this additional exclusion criterion was used to prevent successive missing data to influence the RMSSD values. In total, data of 38 individuals were included in our analyses who completed on average 51.26 ($SD=6.65$) out of the 65 ESM time points.

Those who were excluded from the analyses due to too many missing data ($n=42$) were compared with those who were included in our analyses ($n=38$) in terms of background (i.e., gender, age, country of birth, and level of education) and loss-related characteristics (i.e., cause of death, kinship to the deceased, and time since loss) and B-PGD severity. Binary logistic regression analyses were used to compare these two groups. A two-sided alpha level of 0.05 was used.

Calculation of fluctuations in prolonged grief reactions in daily life

Fluctuations in ESM-PGD reactions were quantified by calculating the RMSSD values for each of the eleven ESM-PGD items separately. The RMSSD value is composed of two components that capture fluctuation (Bos et al., 2019; Jahng et al., 2008; Schoevers et al., 2020). This first component is variability, which is described by the within-person variance (WPV; which has also been referred to as dispersion), and captures to what extent a symptom varies within one person. Higher WPV represents greater extremity in fluctuations. The second component is temporal dependency, which is quantified by the autocorrelation. A higher autocorrelation represents greater resistance to change (which has also been referred to as inertia). Larger RMSSD values reflect larger

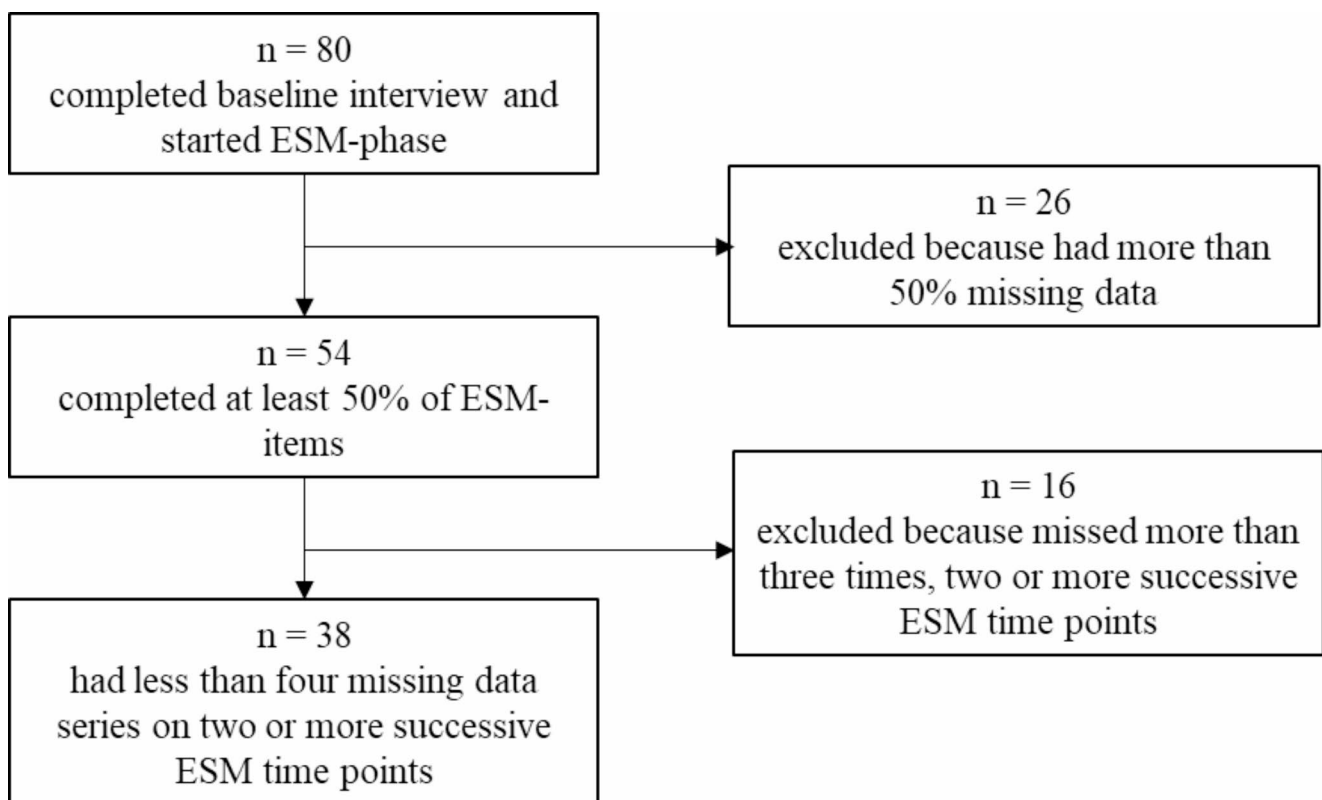


Fig. 1 Flowchart of participants. *Note.* ESM = experience sampling methodology.

fluctuations. For a more detailed description of RMSSD values and the formula we used see Schoevers et al. (2020; pp. 3–5). Calculating RMSSD values were performed using the psych package in R (version 2022.12.0). The RMSSD value for each of the eleven ESM-PGD items were reported for each participant separately. This allowed us to explore for the first time to what extent ESM-PGD items differ in their susceptible to change from moment-to-moment. For descriptive purposes, these participant-specific RMSSD's were pooled by calculating means and standard deviations (SDs) for each ESM-PGD item.

Within-person versus between-person variability in prolonged grief reactions

To the best of our knowledge, guidelines for interpreting the effect size of RMSSD values are not available. To facilitate interpretation of the within-person fluctuations in ESM-PGD items, we followed procedures used in prior research

Table 1 Characteristics of participants assessed during baseline interview ($N=38$)

Gender, N (%)	
Man	10 (26)
Woman	28 (74)
Other	0 (0)
Age in years, M (SD)	41.76 (16.49)
Country of birth, N (%)	
Germany	22 (58)
The Netherlands	15 (40)
Other	1 (3)
Level of education, N (%)	
Other than college/university	15 (40)
College/university	23 (61)
Cause of death, N (%)	
Natural (e.g., illness)	32 (84)
Suicide	3 (8)
Homicide	1 (3)
Accident	0 (0)
Other	2 (5)
Deceased relative is my..., N (%)	
Parent	18 (47)
Spouse	5 (13)
Child	0 (0)
Sibling	3 (8)
Grandparent	5 (13)
Friend	2 (5)
Grandchild	0 (0)
Other	5 (13)
Time since loss in years, M (SD)	6.13 (7.08)
B-PGD severity, M (SD)	19.18 (6.89)

Note. B-PGD severity = interview-based prolonged grief severity assessed at baseline. B-PGD = baseline PGD severity (B-PGD) in the past two weeks assessed with telephone-interviews using the Traumatic Grief Inventory–Clinical Administered

(Zdanowski et al., 2022). More specifically, we counted how many participants showed participant-specific RMSSD values that exceeded the between-person SDs for each ESM-PGD item separately. We considered within-person variability in an ESM-PGD item clinically relevant when the participant-specific RMSSD value was greater than the between-person SD. The between-person SDs at the first ESM-timepoint was used for each ESM-PGD item (as was done in Zdanowski et al., 2022). For illustrative purposes, plots were generated for two participants; one participant showing the lowest fluctuations in an ESM-PGD item and one participant showing the highest fluctuations in an ESM-PGD item.

Fluctuations in ESM-PGD items in relation to PGD severity assessed retrospectively at baseline

Data on B-PGD severity and ESM-PGD reactions were not normally distributed. Spearman's rho correlation analyses were performed to examine the associations between B-PGD severity and the RMSSD values for the eleven ESM-PGD items using SPSS (version 28.0.1.0; IBM Corp, 2017). Correlation coefficients between 0.10 and 0.29 are considered weak, between 0.30 and 0.49 as moderate, and ≥ 0.50 as strong (Cohen, 1988). Sensitivity-analyses were conducted by repeating the analyses including people who completed at least 80% of the ESM-items ($N=20$; 25%) to test the extent to which our results were affected by missing data.

Results

Characteristics of participants

Table 1 gives the characteristics of the participants. Most participants identified as female, were born in Germany, and completed college/university. In most cases, the cause of loss was natural (e.g., due to illness) and in most cases it was a parent who died. On average the loss happened 6 years earlier. Average B-PGD levels were below the clinical cut-off of 33. Three people (7.9%) scored above the clinical cut-off for B-PGD (i.e., participant number 402, 604, and 901; see Supplementary Table 3).

Those who were excluded from the analyses ($N=42$) did not significantly differ from people who were included in the analyses ($N=38$) in terms of background and loss-related characteristics and B-PGD severity (see Supplementary Table 2 for details).

Fluctuations in prolonged grief reactions in daily life

There were substantial differences between persons and between ESM-PGD items in the level of fluctuations. Supplementary Table 3 shows the fluctuations, as quantified by the RMSSD value, for each ESM-PGD item per person. Supplementary Figs. 1–11 show heatmaps of the individual scores per ESM-PGD item.

Despite the presence of high fluctuations in some ESM-PGD items for some persons, the within-person mean for each ESM-PGD item was relatively low, pointing to floor effects (Table 2). The rate of people reporting floor effects

Table 2 Mean and standard deviations of within-person means and RMSSD values of each ESM-PGD item ($N=38$)

ESM-PGD item	Within person mean, mean (SD)	Within-person mean, range	RMSSD, Mean (SD)	RMSSD, range
In the past three hours,...				
I found myself yearning for him/her.	0.69 (1.08)	0–4.98	0.58 (0.48)	0–1.49
I had intrusive thoughts or images related to the person who died.	0.73 (0.94)	0–3.67	0.66 (0.60)	0–1.87
It felt as if a part of me has died along with the deceased.	0.48 (1.09)	0–5.70	0.21 (0.32)	0–1.04
It felt unreal that he/she is dead.	0.54 (0.89)	0–4.10	0.48 (0.51)	0–1.64
I avoided places, objects, or thoughts that reminded me that he/she is dead.	0.41 (0.73)	0–2.83	0.31 (0.48)	0–1.76
I felt sad because of his/her death.	1.00 (1.31)	0–5.82	0.76 (0.57)	0–2.07
I felt bitterness or anger because of his/her death.	0.44 (0.81)	0–3.46	0.27 (0.39)	0–1.33
It was difficult for me to do something (e.g., social activities, studying, working, sports, hobbies) because of his/her death.	0.50 (1.05)	0–5.53	0.32 (0.37)	0–1.16
I felt emotionally numb because of his/her death.	0.42 (0.90)	0–4.23	0.21 (0.35)	0–1.69
I felt that life is unfulfilling or meaningless without him/her.	0.49 (1.16)	0–5.85	0.26 (0.36)	0–1.47
I felt alone or detached from other individuals because of his/her death.	0.51 (1.16)	0–5.80	0.23 (0.35)	0–1.30

ESM=Experience Sampling Methodology; PGD=Prolonged Grief Disorder; RMSSD=Root Mean Square of Successive Differences; SD=standard deviation

(i.e., people reporting the minimum score; in our case a RMSSD value of 0) varied between 16% and 61% for the separate ESM-items (Supplementary Table 3). The three ESM-PGD items with the largest proportion of floor effects were: ‘I felt emotionally numb’ ($n=23$, 61%), ‘I avoided places, objects, or thoughts that reminded me that he/she is dead’ and ‘It felt as if a part of me has died along with the deceased’ (both $n=22$, 58%).

Relatively, the highest fluctuations were found for the ESM-PGD item ‘I felt sad because of his/her death’, followed by the ESM-PGD items ‘I had intrusive thoughts or images related to the person who died’ and ‘I found myself yearning for him/her’. These three items also had the least number of people reporting floor effects ($n=6$, 16%, $n=8$, 21%, and $n=10$, 26%, respectively).

Lowest fluctuations, as indicated by the lowest mean RMSSD levels, were observed for the ESM-PGD items ‘It felt as if a part of me has died along with the deceased’ and ‘I felt emotionally numb because of his/her death’. Figure 2 shows an example of one participant with the lowest fluctuations in the ESM-PGD item ‘I felt sad because of his/her death’ and one participant with the highest fluctuations in this same ESM-PGD item.

Within-person versus between-person variability in prolonged grief reactions

For most participants and most ESM-PGD items, the RMSSD (indicating participant-specific variability) was smaller than one between-person SD on that item. For five ESM-PGD items, RMSSD values were below one between-person SD for all participants (see Table 3). For the other six ESM-PGD items (i.e., ‘I had intrusive thoughts or images related to the person who died’, ‘It felt unreal that he/she is dead’, ‘I avoided places, objects, or thoughts that reminded me that he/she is dead’, ‘I felt sad because of his/her death’, ‘I felt bitterness or anger because of his/her death’, and ‘I felt emotionally numb because of his/her death’), fluctuations were greater than one between-person SD for some participants. This indicates that most participants did not show fluctuations in PGD symptoms that exceeded the between-person differences.

Fluctuations in ESM-PGD items in relation to PGD severity assessed at baseline

All associations between fluctuations in ESM-PGD items and B-PGD levels were positive, moderate through strong, and significant, indicating that higher PGD levels, assessed retrospectively, at the start of the study were related to larger fluctuations in prolonged grief reactions in daily life

Fig. 2 Case examples of no versus high fluctuations in sadness. *Note.* The x-axis represents measurements and the y-axis represents the answer scale with 0 is ‘not at all’ through 6 is ‘very much’

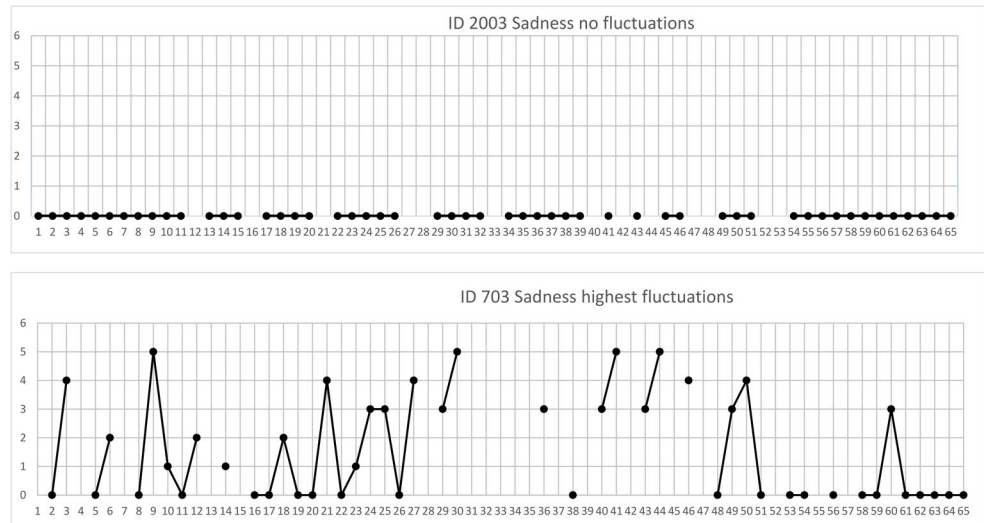


Table 3 Between-person mean and standard deviations (SDs) of PGD symptoms at time point 1 and number of participants whose within-person fluctuations exceeded between-person variability ($N=38$)

ESM-PGD item	Between-person mean and SD at ESM time-point 1	Number of participants whose fluctuations exceeded one between-person SD, N (%)
In the past three hours,...		
I found myself yearning for him/her.	1.06 (1.57)	0 (0)
I had intrusive thoughts or images related to the person who died.	1.32 (1.74)	2 (5.3)
It felt as if a part of me has died along with the deceased.	0.55 (1.41)	0 (0)
It felt unreal that he/she is dead.	0.94 (1.41)	3 (7.9)
I avoided places, objects, or thoughts that reminded me that he/she is dead.	0.71 (1.47)	1 (2.6)
I felt sad because of his/her death.	1.52 (1.84)	2 (5.3)
I felt bitterness or anger because of his/her death.	0.55 (1.03)	3 (7.9)
It was difficult for me to do something (e.g., social activities, studying, working, sports, hobbies) because of his/her death.	0.65 (1.36)	0 (0)
I felt emotionally numb because of his/her death.	0.55 (1.23)	1 (2.6)
I felt that life is unfulfilling or meaningless without him/her.	0.68 (1.51)	0 (0)
I felt alone or detached from other individuals because of his/her death.	0.74 (1.48)	0 (0)

ESM=Experience Sampling Methodology; PGD=Prolonged Grief Disorder; SD=standard deviation

Table 4 Spearman’s rho correlations between fluctuations in ESM-PGD items and PGD severity assessed at baseline ($N=38$)

ESM-PGD reactions	B-PGD severity
In the past three hours,...	
I found myself yearning for him/her.	0.60***
I had intrusive thoughts or images related to the person who died.	0.51***
It felt as if a part of me has died along with the deceased.	0.54***
It felt unreal that he/she is dead.	0.68***
I avoided places, objects, or thoughts that reminded me that he/she is dead.	0.44**
I felt sad because of his/her death.	0.50**
I felt bitterness or anger because of his/her death.	0.51***
It was difficult for me to do something (e.g., social activities, studying, working, sports, hobbies) because of his/her death.	0.63***
I felt emotionally numb because of his/her death.	0.37*
I felt that life is unfulfilling or meaningless without him/her.	0.59***
I felt alone or detached from other individuals because of his/her death.	0.49**

B-PGD=baseline PGD severity (B-PGD) in the past two weeks assessed with telephone-interviews using the Traumatic Grief Inventory–Clinical Administered; ESM=Experience Sampling Methodology; PGD=Prolonged Grief Disorder. * $p < .05$, ** $p < .01$, *** $p < .001$

(Table 4)². When repeating the analyses including only those who completed at least 80% of ESM measurements ($N=20$), no meaningful differences were found in terms of direction and strength (i.e., weak, moderate, and strong) of associations (see Supplementary Table 4). With one exception; the correlation coefficient between the RMSSD value of ‘I felt emotionally numb because of his/her death’ and

² In response to reviewer comments, we conducted post-hoc power analyses. Post-hoc power-analyses using G*power indicated that we achieved a power of 66% for the smallest correlation coefficient and a power of 99% for the largest correlation coefficient.

B-PGD severity changed from moderate ($\rho=0.37$, $p<.05$) to weak ($\rho=0.23$, $p>.05$) when including only those who completed at least 80% of ESM measurements.

Due to the major floor effects found in the RMSSD values of the ESM-PGD items (likely artificially inflating the found associations), additional post-hoc sensitivity analyses were carried out by rerunning the planned correlations analyses, but this time excluding participants with floor effects in fluctuation in ESM-PGD reactions. Again moderate to strong associations were found between fluctuation in the eleven ESM-PGD reactions and B-PGD severity (ρ between 0.36 and 0.63, all $ps<0.05$, except for one association; see Supplementary Table 5). Notably, three out of eleven correlation coefficients changed quite substantially in strength (i.e., change in $\rho\geq 0.20$). So after excluding participants with floor effects, the strength of the associations reduced substantially between B-PGD severity and the RMSSD value of the item ‘I found myself yearning for him/her’ and ‘It felt unreal that he/she is dead’ (from large to moderate effect size), while the association between the item ‘I felt emotionally numb because of his/her death’ substantially increased (from moderate to large effect sizes).

Discussion

The aim of this exploratory study was to examine (1) to what extent ESM-PGD reactions fluctuate in daily life of bereaved people and (2) to what extent fluctuations in ESM-PGD reactions are related to overall PGD severity assessed before the ESM-phase. This is, to the best of our knowledge, the first study examining fluctuations in PGD reactions in bereaved people using ESM. In doing so, 38 German and Dutch bereaved people rated the intensity of eleven grief reactions (in terms of PGD symptoms as defined in DSM-5-TR (American Psychiatric Association, 2022) in the past three hours, five times per day for 14 days, resulting in 2660 datapoints.

Our first main finding was that all eleven ESM-PGD reactions fluctuated to some extent, as evidenced by the variance in the within-person means and the RMSSD values of the ESM-PGD items. The fluctuations in some ESM-PGD reactions were, within some participants, even larger than one standard deviation difference between participants. This study therefore offers the first empirical support for earlier claims about the possible fluctuating nature of grief (Stroebe & Schut, 1999), such as bereaved people often describing their adjustment process as ‘waves or pangs of grief’ (Arizmendi & O’Connor, 2015; Layne et al., 2002). Our finding that ESM-PGD reactions, such as sadness, preoccupation with the deceased, and yearning for the deceased, may go up and down in daily life of bereaved people contrasts

earlier theories stating that grief is a static process in which people go through fixed stages before they reach acceptance (Kübler-Ross, 1969).

At the same time, we found that some participants did not experience any elevations in severity of ESM-PGD reactions during their daily life (as indicated by case example 1) as well as major floor effects (range 16–61%) in the distribution of the ESM-PGD items. This is not surprising given that the vast majority of our sample did not experience clinically relevant PGD severity. Thus, our findings offer additional support for the notion that the vast majority adapt well to loss (Bonanno & Malgaroli, 2020; Lenferink et al., 2020; Nielsen et al., 2019; Sveen et al., 2018).

Nevertheless, a small minority of our participants did experience fluctuations in ESM-PGD reactions. Those fluctuations were positively and moderately to strongly related to overall PGD severity at baseline. This finding mirrors findings indicating that fluctuations in positive and negative affect were larger for people with depression and/or anxiety disorder than for people in remission (Schoevers et al., 2020). And the latter group showed higher fluctuations in affect than people who were never diagnosed with depression or anxiety. The fact that we found higher RMSSD values being related to higher B-PGD severity suggest that PGD reactions may fluctuate even more in people with PGD.

Zooming in on specific symptoms, we found that, on average, the largest RMSSD values, and thus largest fluctuations, were observed for the item ‘I felt sad because of his/her death’, followed by ‘I had intrusive thoughts or images related to the person who died’ and ‘I found myself yearning for him/her’. We now showed that these hallmark symptoms of PGD also seem to show the largest variation within people. This finding may indicate that retrospectively recalling these key symptoms of PGD using a one time-point assessment might be more difficult due to its fluctuating nature. Indeed, in an earlier study, using the same data-set, we found lower aggregated ESM-PGD severity levels for the items ‘I had intrusive thoughts or images related to the person who died’ and ‘I found myself yearning for him/her’ compared to recalling these symptoms over the past two weeks (Lenferink et al., 2022a). Using ESM-PGD items may therefore yield a more accurate assessment of the dynamic nature of PGD. Moreover, the fact that we found that these ESM-items fluctuated the most in our sample, of whom the vast majority did not experience PGD, may suggest that fluctuations in these grief reactions are not indicative of poor bereavement outcomes per se, but may even reflect adequate adjustment to loss. This aligns with findings from item response theory (Kokou-Kpolou et al., 2022) and latent class analyses, indicating that the ability of these items to distinguish people

with probable PGD from people without probable PGD is relatively poor (Boelen, 2021; Heeke et al., 2022).

The lowest fluctuations were observed for the ESM-PGD items ‘I felt as if a part of me has died along with the deceased’ and ‘I felt emotionally numb because of his/her death’, potentially due to the floor effects found in three out of five participants. When these findings replicate in a sample of people with PGD, this may indicate that these PGD reactions do not tend to fluctuate and are therefore less suitable for ESM-research. Meanwhile, one could also argue that the limited fluctuations of these items in our particular sample (i.e., a non-clinical sample) provide preliminary evidence for the discriminant value of the symptoms these items represent. Prior research showed that these two items are one of the least frequently (retrospectively) reported PGD symptoms, e.g., these two symptoms were both present in 7% of a representative German bereaved sample, while the ‘yearning’ symptom was present in 17% (Trembl et al., 2022). It may therefore not be a surprise that these items fluctuated the least in our sample.

These differences in the extent to which each ESM-PGD item fluctuates would have gone unnoticed when looking at composite scores only. A composite score may reduce measurement error compared to single-item scores (Bolger & Laurenceau, 2013). Yet, a valid and reliable scale to assess PGD (e.g., using multilevel confirmatory factor analysis) in daily life suitable for ESM research remains to be developed. Furthermore, information regarding the fluctuating nature of single items would be lost when looking at composite scores.

Study limitations

Our study is the first examining fluctuations in PGD reactions in bereaved people using ESM and our findings therefore allow for first insights into individual differences in the grief process in daily life. At the same time, our study also has drawbacks. First, about half of our sample was excluded from analyses due to too many missing data on ESM-items. We not only excluded people from our analyses who completed less than 50% of the ESM time-points, which is common practice in ESM-research (Conner & Lehman, 2012), but we also excluded people who missed two successive ESM time-points more than three times. While our approach may have led to a more accurate assessment of the possible dynamic pattern of ESM-PGD reactions, it also resulted in a reduced retention rate possibly introducing attrition bias. We tried to explore possible attrition bias by examining whether those who were included in the analyses differ from those who were excluded from the analysis in terms of background- and loss-related characteristics, as well as baseline grief severity. No differences were found

between the groups, suggesting that other factors, that we did not measure, may have compromised compliance in our study. It should be noted that participants did not receive individual compensation for study participation, but had the opportunity to participate in a raffle for one voucher. Compensation, such as providing personalized feedback at the end of the ESM period or a monetary reward (with a mean value of €64 for on average 60 ESM-measurements across 11 days as found in a meta-analysis) are the main design factors related to lower attrition (Vachon et al., 2019). Compensating participants in future ESM-studies is therefore highly recommended to increase compliance and retention.

A second limitation is related to our sample composition. Due to convenience sampling, our sample included only three people with probable PGD, which likely resulted in the floor effects of the ESM-responses. Furthermore, people who identified as women and who have lost their parent due to a physical illness were overrepresented in our sample and, on average, the loss took place six years earlier. Moreover, none of the participants lost a child. The loss of a child, experiencing a sudden or violent death of a loved one, identifying as a woman, and (to a lesser extent in terms of effect size) experiencing the loss more recently have been identified as risk factors for PGD (Burke & Neimeyer, 2013; Doering et al., 2022). Our sample composition may have affected our results such that the found fluctuations are underestimating the potential fluctuating nature of PGD symptoms when compared to people who are more affected after loss (cf. Schoevers et al., 2020). More research is therefore needed in larger samples of people with PGD, people with other gender identities, people bereaved by unnatural causes, and people who are more recently bereaved to draw firm conclusions about the fluctuating nature of ESM-PGD reactions in bereaved people.

Third, due to technical errors we were unable to analyze data from the last day of our sampling schedule, resulting in analyzing a maximum of possible 65 time-points, instead of 70. While technical errors should be prevented at all costs in future research, we expect that this unforeseen error did not have a substantial impact on our findings regarding the fluctuating nature of PGD reactions, because there was still a relatively large number of measurement occasions analyzed per participant. To illustrate, the number of measurement occasions in our study is higher than the mean number of 60 ESM measurements occasions across 11 days as found in a meta-analysis including 79 ESM-studies (Vachon et al., 2019).

Fourth, our post-hoc power-analyses showed that we had limited statistical power for some of the correlation analyses that we conducted, which may have increased type I and/or type II error rates. Given that including larger samples in ESM-research is often challenging, Bayesian instead of a

frequentist data-analytic approach seems valuable to tackle the issue of statistical power in future ESM-research (Dora et al., 2024). For instance, the Bayesian approach has minimum requirements regarding sample size and number of time-points per participant and can handle heavily skewed data well (Leijon et al., 2023).

Suggestions for future research

It seems worthwhile to further explore the fluctuating nature of ESM-PGD reactions, and if it relates to overall PGD levels, in a larger and more diverse samples including people with PGD. In addition, more research is needed as for reasons why grief reactions vary in intensity within the daily life of bereaved people. It is likely that those who are more sensitive to loss reminders have less helpful ways of regulating grief symptoms. Examples of how loss reminders trigger grief reactions are: being overwhelmed with sadness when hearing your loved one's favorite song on the radio, or feeling intense loneliness when you go to bed and realize your partner is not next to you. Moreover, it seems valuable to examine what factors have buffering effects on adaptation to loss in daily life, such as feeling less lonely when having supportive interactions with others or being less preoccupied with the loss when being at work (Lenferink et al., 2018; Scott et al., 2020). Examining the associations between ESM-PGD reactions and contextual factors, such as who you are with (e.g., alone vs. with others), where you are (e.g., at home or at work), or what activity you are doing (e.g., socializing or listening to music), including the perceived satisfaction with these interactions and activities, are needed to further our understanding about how grief may unfold in the daily life of bereaved people. Understanding fluctuations in PGD reactions better may create a window of opportunity to intervene in daily life, which has yielded promising preliminary effects in treatment of a variety of disorders not related to bereavement (Kramer et al., 2014; Myin-Germeys et al., 2018; van Os et al., 2017). For instance, zooming in on daily life by examining when bereaved people feel better (e.g., less ESM-PGD intensity when being with others or when physical exercising) or worse (e.g., increase in ESM-PGD severity when being home alone) can provide input for tailored interventions in daily life (e.g., exercise or contact friends more often when grief reactions intensify).

Conclusion

The current exploratory study is, to our knowledge, the first study offering preliminary evidence for the notion about the potential fluctuating nature of grief reactions. We found that ESM-PGD reactions may fluctuate in bereaved

people. Moreover, larger fluctuations in ESM-PGD reactions seem to be related to increased retrospective recalling of PGD symptom severity. However, our findings are based on a non-clinical sample, which limited the generalizability of our findings to people with PGD. Pending replication of our findings in larger and more diverse samples, preferably including people diagnosed with PGD, we tentatively conclude that examining how PGD reactions unfold in daily life of bereaved people using ESM may offer new theoretical insights into how bereaved people adapt to the loss of a loved one, which ultimately may result in optimizing treatment for PGD.

Supplementary Information The online version contains supplementary material available at <https://doi.org/10.1007/s12144-024-06987-2>.

Acknowledgements We would like to thank Andreea Pana, Bente Lauxen, Giulia Micheli, Hanneke Bos, Hans van Essen, Lara Urban, Michelle Todorovic, Sophie Becker, Esta Terbrack, and Tom van Die for their support in recruiting participants and collecting the interview-data.

Funding This publication is part of the project 'Toward personalized bereavement care: Examining individual differences in response to grief treatment' [ID: VI.Veni.211G.065] of the research programme [NWO Talent Programme 2021 - Veni] which is financed by the Dutch Research Council (NWO) and awarded to Lonneke I.M. Lenferink.

Data availability Data and codes used for main analyses are available using this link: <https://osf.io/kvfmz/>

Declarations

This publication is part of the project ['Toward personalized bereavement care: Examining individual differences in response to grief treatment' [ID: VI.Veni.211G.065] which is financed by NWO Talent Programme 2021 - Veni and awarded to Lonneke I.M. Lenferink. The authors declare that they have no conflicts of interest. All participants signed consent forms. Ethical approval was granted by the faculty ethics committee of University of Twente, the Netherlands (ID: 211101).

Conflict of interest The authors declare that they have no conflict of interest related to this paper.

Open Access This article is licensed under a Creative Commons Attribution 4.0 International License, which permits use, sharing, adaptation, distribution and reproduction in any medium or format, as long as you give appropriate credit to the original author(s) and the source, provide a link to the Creative Commons licence, and indicate if changes were made. The images or other third party material in this article are included in the article's Creative Commons licence, unless indicated otherwise in a credit line to the material. If material is not included in the article's Creative Commons licence and your intended use is not permitted by statutory regulation or exceeds the permitted use, you will need to obtain permission directly from the copyright holder. To view a copy of this licence, visit <http://creativecommons.org/licenses/by/4.0/>.

References

- American Psychiatric Association. (2022). *Diagnostic and Statistical Manual of Mental Disorders, text revision DSM-5-TR*. Amer Psychiatric Pub Inc.
- Arizmendi, B. J., & O'Connor, M. F. (2015). What is normal in grief? *Australian Critical Care: Official Journal of the Confederation of Australian Critical Care Nurses*, 28(2), 58–62; quiz 63. <https://doi.org/10.1016/j.aucc.2015.01.005>
- Avis, K. A., Stroebe, M., & Schut, H. (2021). Stages of grief portrayed on the internet: A systematic analysis and critical appraisal. *Frontiers in Psychology*, 12, 772696. <https://doi.org/10.3389/fpsyg.2021.772696>
- Boelen, P. A. (2021). Symptoms of prolonged grief disorder as per DSM-5-TR, posttraumatic stress, and depression: Latent classes and correlations with anxious and depressive avoidance. *Psychiatry Research*, 302, 114033. <https://doi.org/10.1016/j.psychres.2021.114033>
- Boelen, P. A., & Lenferink, L. I. M. (2020). Comparison of six proposed diagnostic criteria sets for disturbed grief. *Psychiatry Research*, 285, 112786. <https://doi.org/10.1016/j.psychres.2020.112786>
- Bolger, N., & Laurenceau, J. P. (2013). Psychometrics of intensive longitudinal measures of emotional states. *Intensive longitudinal methods: An introduction to diary and experience sampling research* (pp. 127–142). The Guilford Press.
- Bonanno, G. A., & Malgaroli, M. (2020). Trajectories of grief: Comparing symptoms from the DSM-5 and ICD-11 diagnoses. *Depression and anxiety*, 37(1), 17–25. <https://doi.org/10.1002/da.22902>
- Bos, E. H., de Jonge, P., & Cox, R. F. A. (2019). Affective variability in depression: Revisiting the inertia–instability paradox. *British Journal of Psychology*, 110(4), 814–827. <https://doi.org/10.1111/bjop.12372>
- Burke, L. A., & Neimeyer, R. A. (2013). Prospective risk factors for complicated grief: A review of the empirical literature. *Complicated grief: Scientific foundations for health care professionals* (pp. 145–161). Routledge/Taylor & Francis Group.
- Cohen, J. (1988). *Statistical power analysis for the behavioral sciences*. Routledge.
- Conner, T. S., & Lehman, B. J. (2012). Getting started: Launching a study in daily life. *Handbook of research methods for studying daily life* (pp. 89–107). The Guilford Press.
- Doering, B. K., Barke, A., Vogel, A., Comtesse, H., & Rosner, R. (2022). Predictors of prolonged grief disorder in a German representative population sample: Unexpectedness of bereavement contributes to grief severity and prolonged grief disorder. *Frontiers in Psychiatry*, 13. <https://doi.org/10.3389/fpsyg.2022.853698>
- Dora, J., McCabe, C. J., van Lissa, C. J., Witkiewitz, K., & King, K. M. (2024). A tutorial on analyzing ecological momentary Assessment Data in Psychological Research with bayesian (generalized) mixed-effects models. *Advances in Methods and Practices in Psychological Science*, 7(1), 25152459241235875. <https://doi.org/10.1177/25152459241235875>
- Ethica Data*. (n.d.). [Computer software]. Retrieved June 29 (2022). from <https://ethicadata.com>
- Heeke, C., Franzen, M., Hofmann, H., Knaevelsrud, C., & Lenferink, L. I. M. (2022). A Latent class analysis on symptoms of prolonged grief, post-traumatic stress, and depression following the loss of a loved one. *Frontiers in Psychiatry*, 13. <https://doi.org/10.3389/fpsyg.2022.878773>
- Houben, M., Van Den Noortgate, W., & Kuppens, P. (2015). The relation between short-term emotion dynamics and psychological well-being: A meta-analysis. *Psychological Bulletin*, 141, 901–930. <https://doi.org/10.1037/a0038822>
- IBM Corp. (2017). *IBM SPSS statistics for Windows, Version 28.0 [Computer software]*. IBM Corp.
- Jahng, S., Wood, P. K., & Trull, T. J. (2008). Analysis of affective instability in ecological momentary assessment: Indices using successive difference and group comparison via multilevel modeling. *Psychological Methods*, 13(4), 354–375. <https://doi.org/10.1037/a0014173>
- Kokou-Kpolou, C. K., Lenferink, L. I. M., Brunnet, A. E., Park, S., Megalaki, O., Boelen, P., & Cénat, J. M. (2022). The ICD-11 and DSM-5-TR prolonged grief criteria: Validation of the traumatic grief inventory-self Report Plus using exploratory factor analysis and item response theory. *Clinical Psychology & Psychotherapy*, 29(6), 1950–1962. <https://doi.org/10.1002/cpp.2765>
- Kraiss, J. T., Kohlhoff, M., & ten Klooster, P. M. (2022). Disentangling between- and within-person associations of psychological distress and mental well-being: An experience sampling study examining the dual continua model of mental health among university students. *Current Psychology*. <https://doi.org/10.1007/s12144-022-02942-1>
- Kramer, I., Simons, C. J. P., Hartmann, J. A., Menne-Lothmann, C., Viechtbauer, W., Peeters, F., Schruers, K., van Bommel, A. L., Myin-Germeys, I., Delespaul, P., van Os, J., & Wichers, M. (2014). A therapeutic application of the experience sampling method in the treatment of depression: A randomized controlled trial. *World Psychiatry*, 13(1), 68–77. <https://doi.org/10.1002/wps.20090>
- Kristensen, P., Dyregrov, K., & Gjestead, R. (2020). Different trajectories of prolonged grief in Bereaved Family members after Terror. *Frontiers in Psychiatry*, 11, 545368. <https://doi.org/10.3389/fpsyg.2020.545368>
- Kübler-Ross, E. (1969). *On death and dying*. Macmillan. https://scholar.google.com/scholar_lookup?journal=On+Grief+and+Grieving+%3A+Finding+the+Meaning+of+Grief+through+the+Five+Stages+of+Loss%2E&author=K%3BC%BCb%20K%3BE%20&publication_year=2005
- Layne, C., Saltzman, W., & Pynoos, R. (2002). Grief reactions: A clinician's perspective. *Marriage and Families*, 8(1). <https://scholars.archive.byu.edu/marriageandfamilies/vol8/iss1/5>
- Leijon, A., von Gablenz, P., Holube, I., Taghia, J., & Smeds, K. (2023). Bayesian analysis of Ecological Momentary Assessment (EMA) data collected in adults before and after hearing rehabilitation. *Frontiers in Digital Health*, 5. <https://doi.org/10.3389/fdgth.2023.1100705>
- Lenferink, L. I. M., & Eisma, M. C. (2018). 37,650 ways to have persistent complex bereavement disorder yet only 48 ways to have prolonged grief disorder. *Psychiatry Research*, 261, 88–89. <https://doi.org/10.1016/j.psychres.2017.12.050>
- Lenferink, L. I. M., de Keijser, J., Piersma, E., & Boelen, P. A. (2018). I've changed, but I'm not less happy: Interview study among non-clinical relatives of long-term missing persons. *Death Studies*, 42(6), 346–355. <https://doi.org/10.1080/07481187.2017.1347213>
- Lenferink, L. I. M., Nickerson, A., de Keijser, J., Smid, G. E., & Boelen, P. A. (2020). Trajectories of grief, depression, and post-traumatic stress in disaster-bereaved people. *Depression and anxiety*, 37(1), 35–44. <https://doi.org/10.1002/da.22850>
- Lenferink, L. I. M., van Eersel, J. H. W., & Franzen, M. (2022a). Is it acceptable and feasible to measure prolonged grief disorder symptoms in daily life using experience sampling methodology? *Comprehensive Psychiatry*, 119, 152351. <https://doi.org/10.1016/j.comppsyg.2022.152351>
- Lenferink, L. I. M., Eisma, M. C., Smid, G. E., de Keijser, J., & Boelen, P. A. (2022b). Valid measurement of DSM-5 persistent complex bereavement disorder and DSM-5-TR and ICD-11 prolonged grief disorder: The traumatic grief inventory-self Report Plus (TGI-SR+). *Comprehensive Psychiatry*, 112, 152281. <https://doi.org/10.1016/j.comppsyg.2021.152281>

- Lenferink, L. I. M., Franzen, M., ten Klooster, P. M., Knaevelsrud, C., Boelen, P. A., & Heeke, C. (2023). The traumatic grief inventory-clinician administered: A psychometric evaluation of a new interview for ICD-11 and DSM-5-TR prolonged grief disorder severity and probable caseness. *Journal of Affective Disorders*, *330*, 188–197. <https://doi.org/10.1016/j.jad.2023.03.006>
- Lundorff, M., Bonanno, G. A., Johannsen, M., & O'Connor, M. (2020). Are there gender differences in prolonged grief trajectories? A registry-sampled cohort study. *Journal of Psychiatric Research*, *129*, 168–175. <https://doi.org/10.1016/j.jpsychires.2020.06.030>
- Maciejewski, P. K., Zhang, B., Block, S. D., & Prigerson, H. G. (2007). An empirical examination of the stage theory of grief. *Journal of the American Medical Association*, *297*(7), 716–723. <https://doi.org/10.1001/jama.297.7.716>
- Malgaroli, M., Maccallum, F., & Bonanno, G. A. (2018). Symptoms of persistent complex bereavement disorder, depression, and PTSD in a conjugally bereaved sample: A network analysis. *Psychological Medicine*, *48*(14), 2439–2448. <https://doi.org/10.1017/S003291718001769>
- Myin-Germeys, I., Kasanova, Z., Vaessen, T., Vachon, H., Kirtley, O., Viechtbauer, W., & Reininghaus, U. (2018). Experience sampling methodology in mental health research: New insights and technical developments. *World Psychiatry: Official Journal of the World Psychiatric Association (WPA)*, *17*(2), 123–132. <https://doi.org/10.1002/wps.20513>
- Nielsen, M. K., Carlsen, A. H., Neergaard, M. A., Bidstrup, P. E., & Guldin, M. B. (2019). Looking beyond the mean in grief trajectories: A prospective, population-based cohort study. *Social Science & Medicine*, *232*, 460–469. <https://doi.org/10.1016/j.socscimed.2018.10.007>
- Rosner, R., Comtesse, H., Vogel, A., & Doering, B. K. (2021). Prevalence of prolonged grief disorder. *Journal of Affective Disorders*, *287*, 301–307. <https://doi.org/10.1016/j.jad.2021.03.058>
- Schoevers, R. A., van Borkulo, C. D., Lamers, F., Servaas, M. N., Bastiaansen, J. A., Beekman, A. T. F., van Hemert, A. M., Smit, J. H., Penninx, B. W. J. H., & Riese, H. (2020). Affect fluctuations examined with ecological momentary assessment in patients with current or remitted depression and anxiety disorders. *Psychological Medicine*, 1–10. <https://doi.org/10.1017/S0033291720000689>
- Scott, H. R., Pitman, A., Kozhuharova, P., & Lloyd-Evans, B. (2020). A systematic review of studies describing the influence of informal social support on psychological wellbeing in people bereaved by sudden or violent causes of death. *Bmc Psychiatry*, *20*(1), 265. <https://doi.org/10.1186/s12888-020-02639-4>
- Smith, K. V., & Ehlers, A. (2020). Cognitive predictors of grief trajectories in the first months of loss: A latent growth mixture model. *Journal of Consulting and Clinical Psychology*, *88*(2), 93–105. <https://doi.org/10.1037/ccp0000438>
- Stroebe, M., & Schut, H. (1999). The dual process model of coping with bereavement: Rationale and description. *Death Studies*, *23*, 197–224. <https://doi.org/10.1080/074811899201046>
- Stroebe, M., Schut, H., & Boerner, K. (2017). Cautioning health-care professionals: Bereaved persons are misguided through the stages of grief. *OMEGA - Journal of Death and Dying*, *74*(4), 455–473. <https://doi.org/10.1177/0030222817691870>
- Sveen, J., Johannesson, K. B., Cernvall, M., & Arberg, F. K. (2018). Trajectories of prolonged grief one to six years after a natural disaster. *Plos One*, *13*(12), e0209757. <https://doi.org/10.1371/journal.pone.0209757>
- Tremblay, J., Brähler, E., & Kersting, A. (2022). Prevalence, factor structure and correlates of DSM-5-TR criteria for prolonged grief disorder. *Frontiers in Psychiatry*, *13*. <https://www.frontiersin.org/articles/https://doi.org/10.3389/fpsy.2022.880380>
- Vachon, H., Viechtbauer, W., Rintala, A., & Myin-Germeys, I. (2019). Compliance and retention with the experience sampling method over the continuum of severe mental disorders: Meta-analysis and recommendations. *Journal of Medical Internet Research*, *21*(12), e14475. <https://doi.org/10.2196/14475>
- van Os, J., Verhagen, S., Marsman, A., Peeters, F., Bak, M., Marcelis, M., Drukker, M., Reininghaus, U., Jacobs, N., Lataster, T., Simons, C., Investigators PhD, E. S. M. M. E. R. G. E., Lousberg, R., Gülöksüz, S., Leue, C., Groot, P. C., Viechtbauer, W., & Delespaul, P. (2017). The experience sampling method as an mHealth tool to support self-monitoring, self-insight, and personalized health care in clinical practice. *Depression and Anxiety*, *34*(6), 481–493. <https://doi.org/10.1002/da.22647>
- Wilson, D. M., Underwood, L., & Errasti-Ibarrondo, B. (2021). A scoping research literature review to map the evidence on grief triggers. *Social Science & Medicine*, *282*, 114109. <https://doi.org/10.1016/j.socscimed.2021.114109>
- Zdanowski, S., Tiekens, A., Jeronimus, B. F., & Zuidersma, M. (2022). Intra-individual variability in cognitive performance can befuddle the study of cognitive impairments and decline. *Journal of Alzheimer's Disease: JAD*, *85*(2), 519–525. <https://doi.org/10.3233/JAD-210304>

Publisher's note Springer Nature remains neutral with regard to jurisdictional claims in published maps and institutional affiliations.