

**The relationship between optimism and grief symptom fluctuations examined with
ecological momentary assessment**

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Abstract

Introduction: The current study sought to examine the relationship between optimism and the prolonged grief disorder, by examining to what extent optimism relates to fluctuations in daily life of grief symptoms “avoidance” and “difficulty moving on”, and to what extent optimism relates to symptoms levels of the prolonged grief disorder.

Methods: An experience sampling method study was conducted. Bereaved people underwent a clinical interview after which they answered grief-related questions for two weeks, five times a day, on the Ethica app.

Results: The results indicated that participants with higher trait optimism showed less fluctuations in grief symptoms “avoidance” and “difficulty moving on” of the prolonged grief disorder according to the DSM- 5-TR. Furthermore, the results showed that there was a negative correlation between optimism and overall symptom level of the prolonged grief disorder.

Conclusion: The results of the current study could have important clinical implications for enhancing our understanding of mechanisms of distress following loss and the potential usefulness of optimism in treatment of the prolonged grief disorder.

Keywords: Prolonged grief disorder, optimism, grief, experience sampling method

The relationship between optimism and grief symptom fluctuations examined with ecological momentary assessment

The loss of a loved one can be a profoundly painful and disruptive experience (Zisook et al., 2014), and is one of the most stressful life experiences (Rozalski et al., 2017).

Nonetheless, the majority of individuals have sufficient internal resources and social support to cope with their loss (Lundorff et al., 2017). Most individuals undergo a grieving process where the grief is most intense immediately after a loss and thereafter subsides over a period of months (Arizmendi et al., 2015; Prigerson, Boelen et al., 2021; Lundorff et al., 2017).

However, a significant minority of bereaved people experience severe grief reactions that may become dysfunctional and is abnormally persistent (Bonanno & Malgaroli, 2019; Prigerson, Boelen et al., 2021; Lenferink et al., 2021; Lundorff et al., 2017). Approximately 10% of bereaved individuals develop Prolonged grief disorder (PGD), with an even higher risk following the death of a loved one to unnatural or violent circumstances (Boelen & Smid, 2017a; Lundorff et al., 2017; Malgaroli et al., 2018).

The core symptoms of PGD include a persistent preoccupation with the deceased or a pervasive yearning, accompanied with intense emotional pain, at least 12 months after the loss (APA, 2020; Lenferink et al., 2021; Rosner et al., 2021). Furthermore, PGD is characterized by impairment of the social and occupational functioning, difficulties in social activities, reduced positive mood, and difficulties accepting the loss of a loved one (APA, 2020; Lenferink, Boelen et al., 2021; Lundorff et al., 2017). PGD has been associated with psychiatric comorbidity, increased suicidality, and deteriorated health (Rosner et al., 2018; Rosner et al, 2014), including increased risk for high blood pressure and heart disease, cancer, and disturbed eating patterns (Rosner et al., 2014). Moreover, more severe PGD symptoms are associated with greater hospital-based service utilization (Holland et al., 2016). Essentially, the quality of life with PGD is severely interfered (Johns et al., 2020).

Research addresses few modifiable risk or protective factors against PGD. However, a possible protective factor against PGD is optimism (Boelen, 2015; Jaaniste et al., 2017), and low optimism can be considered a risk factor for prolonged grief (Lundorff et al., 2020). Optimism is defined as a personality construct that reflects the individual differences to which people hold generalized favorable expectancies for their future, across different life domains (Renaud et al., 2018; Boelen, 2015). Optimism is associated with lower concurrent and future levels of prolonged grief, indicating the protective impact of optimism on psychological functioning (Boelen, 2015). Behavioural mechanisms such as active coping and social support account for the relationship between optimism and well-being (Uchida et al., 2018). Optimism is associated with active-based coping which can lead to more favorable outcomes. Moreover, optimism is seen as socially desirable, leading to greater availability of social support (Jaaniste et al., 2017). Examining optimism as a protective factor is important for potential utility of optimism in treatment following loss and enhancement of our understanding of the underlying mechanisms (Boelen, 2015).

Optimism is associated with active coping and flexible engagement with stressful circumstances. Active coping are behavioral or psychological responses, used to change the stressor itself or how one thinks about it (Lacour et al., 2020). An important relationship with both optimism and active coping is high perceived social support. Perceived social support is defined as subjectively believing in the availability of resources and adequate help from members of his or her social network (Chapman & Chi, 2017; McDougall et al., 2016; Kleiman & Riskind, 2013). Optimism is seen as a positive resource for social networks and close relationships (Carver & Scheier, 2017). Research shows that optimists use their social support more often in stressful times, which is related to active coping as well. High perceived social support strongly correlates with both active coping and social support (Chapman & Chi, 2017).

Active coping is thought to be a better way of dealing with adverse life events than avoidant coping (Lacour et al., 2020). Optimism is associated with lower avoidance coping (Carver, 2015; Jaaniste et al., 2017), and avoidant coping styles are risk factors in PGD (Harper et al., 2014), including “anxious avoidance” and “depressive avoidance”. Anxious avoidance refers to purposely avoiding reminders associated with the loss, driven by the fear of what will happen (Boelen et al., 2006; Boelen & Eisma, 2015). A symptom of PGD related to anxious avoidance is C3; “avoidance of reminders that the person is dead”. Optimism promotes active and persistent coping behavior which results in reduced anxiety symptoms (Dolcos et al., 2016). Depressive avoidance refers to inhibition of usual social, recreational, and occupational activities motivated by the assumption that these activities are useless and unfulfilling (Boelen et al., 2006; Boelen & Eisma, 2015). A symptom of PGD related to depressive avoidance is C5; “difficulty with reintegration into life after the death (e.g., problems engaging with friends, pursuing interests, planning for the future)”. Optimism reflects generalized favorable expectancies for the future (Renaud et al., 2018; Boelen, 2015; Lundorff et al., 2020), and the absence of future positive thinking might be predictive of prolonged grief (Lundorff et al., 2020).

A meta-analysis of Houben et al. (2015) shows that low psychological well-being is associated with more instability, variability, and inertially in emotions. Fluctuations in emotions reflects how people cope with changes in the environment and their emotional regulation, which both contribute to psychological well-being (Houben et al., 2015). The dual-process model (DPM) assumes that grief is a dynamic process of avoidance and confrontation that can change from moment to moment, but also during the duration of bereavement (Stroebe & Schut 2010; Stroebe & Schut, 1999). However, this assumption has not yet been examined on a daily basis. A way to assess experiences, behaviors, and moment-to-moment changes in mental states in daily life is the Experience Sampling Method (ESM;

Verhagen et al., 2016). ESM provides a more accurate assessment by capturing symptoms as they occur and helps obtain a deeper understanding of how symptoms unfold in daily life over time (Myin-Germeys et al., 2018).

The present study is an ESM study examining grief symptom instability in daily life. Research about the role of optimism in psychological functioning following the loss of a loved one is scarce (Boelen, 2015; Jaaniste et al., 2017). Moreover, the lack of understanding of grief within a clinical framework is a barrier to the development of effective treatment interventions (Wenn et al., 2015). More knowledge about this topic is important for enhancing our understanding of mechanisms of distress following loss and the potential usefulness of optimism in treatment of PGD (Boelen, 2015). Given that change in emotional experiences over time provides unique information for psychological well-being (Houben et al., 2015), it is of importance to examine fluctuations in symptoms of grief.

The aim of the current study is to examine the relationship between optimism and PGD. This will be done by examining to what extent optimism relates to fluctuations of grief symptoms C3 and C5 and to what extent optimism relates to symptoms levels of PGD. Optimism is associated with lower avoidance coping (Carver, 2015; Jaaniste et al., 2017), higher active coping (Jaaniste et al., 2017), and higher perceived social support (Carver & Scheier, 2017; Chapman & Chi, 2017), having a protective impact on psychological functioning (Boelen, 2015). Therefore, it is expected that optimism relates to lower fluctuations of grief symptoms C3 and C5 (Hypothesis 1) and that optimism relates to a lower symptom level of PGD (Hypothesis 2).

Methods

Design

The present study was an ESM study examining grief symptom instability in daily life. This study was part of a larger study.

Procedure

The study received approval on the 29th of September 2021 by the Behavioural, Management and Social Sciences (BMS) ethical committee of the University of Twente (reference number 211167).

Recruitment took place from November 2021 till March 2022, with exclusion of the Christmas period. The method of recruitment was based on a convenience sample. Participants were recruited using recruitment material, such as messages on social media (e.g., LinkedIn and Facebook) and by using the research sites of Utrecht University, Twente University and University of Groningen. Students from these universities had the opportunity to earn Credits by completion of the study. The participants had a chance to win a 50 Euro gift card. Additionally, all the participants received a personal report of their grief reactions after completing the study.

Participants signed up for the study via an online secured environment, which included the information letter and the informed consent form. After reading the information letter and signing the informed consent form, participants were contacted to plan the clinical interview (T1). The clinical interview was conducted by four Dutch and five German Psychology master students. All the students followed a training day for conducting the clinical interview. This interview took approximately 30 minutes and was conducted by phone. The researchers all followed the same script and filled in the answers in an online secured environment, using a unique participant number.

After T1, instructions on how to download and use a research platform called the Ethica app using an instruction video, was send to the participants. Additionally, when participants did not download the app after two days, a researcher reached out by mail, offering assistance. Participants signed up for the study using a registration code in the app. When the app was installed, the participants received the first questions the following day,

between 8:30 and 9:30 AM. The app permitted 60 minutes to complete the questions and sent a reminder after 10 and 20 minutes. Participants had to answer the questions five times a day, every three hours, for 14 days. Furthermore, participants also got contacted by one of the researchers when they did not fill in the questions in the app.

Participants

Participants had to meet the following inclusion criteria: being at least 18 years of age, having lost a significant other such as a partner, family member or friend, the loss was at least 3 months ago, having a moderate proficiency of the Dutch or German language, and owning a smartphone. The exclusion criteria were: a diagnosis with a psychotic disorder and being highly suicidal. Characteristics of the participants sample is shown in Table 1. The choice for nationality was made by the larger study that this study was part of.

Table 1

Sociodemographic characteristics of the participants

Characteristics	<i>n</i>	(%)
Gender		
Female	33	70.2
Male	14	29.8
Nationality		
Dutch	19	40.4
German	28	59.6
Education		
High school	7	14.9
Vocational	13	27.7
Higher vocational / university	27	57.4
Kinship		
Parent	25	53.2
Grand Parent	9	19.1

Characteristics	<i>n</i>	(%)
Partner	5	10.6
Sibling	2	4.3
Grandchild	1	2.1
Friend	1	2.1
Other	4	8.5
Cause of death		
Physical illness	42	89.4
Suicide	1	2.1
Homicide	1	2.1
Other	3	6.4

Note: $N = 47$. Participants were on average 39.2 years old ($SD = 16.18$). Time since the loss was on average 74.81 months ($SD = 92.86$).

Measures

Demographics

Assessment of the demographics included age, gender, education, country of birth, psychological help, suicidality, and the present of a diagnosis of a psychotic disorder.

Life Orientation Test – Revised (LOT-R)

For the current study the Dutch version (ten Klooster et al., 2010) and the German version (Glaesmer et al., 2008) of the Life Orientation Test-Revised (LOT-R; Scheier et al., 1994), was used. The LOT-R is one of the most popular instruments for measuring optimism, both in psychological and medical research (Carver & Scheier, 2014; Garcia Cadena et al., 2021). The short version of the LOT-R is a 6-item self-report measure, assessing generalized expectancies for positive versus negative outcomes, and was used to assess optimism.

Respondents need to indicate their extend of agreement with each item, using 5-point scale; 0 = *strongly disagree*, 4 = *strongly agree*. Therefore, the overall optimism score can range from 0 to 24. The LOT-R consists of statements such as: “In uncertain times, I usually expect the best” (Scheier et al., 1994).

The LOT-R has an internal consistency of $\alpha = .70$, which is an acceptable level of reliability (Field, 2018). Therefore, it can be used for research questions (Glaesmer et al., 2008; Klooster et al., 2010).

In the current study the LOT-R was administered by an interview conducted over the telephone. Consequently, the statements had to be modified to questions. For example, item 1; “In uncertain times, I usually expect the best”, was modified to: “Do you in uncertain times, usually expect the best?”.

Traumatic Grief Inventory - Clinical Administered (TGI-CA)

PGD symptoms were assessed using the TGI-CA (Lenferink et al., in prep), which is based on the self-report questionnaire Traumatic Grief Inventory – Self Report + (TGI-SR+; Lenferink et al., 2022). The TGI-SR+ consists of 18 statements measuring symptoms of persistent complex bereavement disorder (Reitsma et al., 2021; Boelen & Smid, 2017b). The items of the TGI-CA measures PGD symptoms corresponding with the DSM-5 (APA, 2013), The ICD-11 (WHO, 2018), and the DSM-5-TR (Prigerson, Kakarala et al., 2021; APA, 2020) (Reitsma et al., 2021). The TGI-CA consists of 22 items and is scored using a 5-point scale; 1 = *never*, 5 = *always* (Lenferink et al., in prep). The TGI-CA, DSM-5-TR PGD version, has an internal consistency for this study of $\alpha = .88$, which is a good level of reliability (Field, 2018).

Items of the TGI-CA were phrased into questions and the reference “the past four weeks” was replaced by “the past two weeks”. Furthermore, the reference “the deceased” was replaced by the name of the deceased loved one or the kinship (Becker, 2021; Vranken Lorenzo, 2020; (Lenferink et al., in prep). For the current study the Dutch and German version of the TGI-CA were used to assess PGD symptoms.

ESM Contextual items in the app

For the current study, the Ethica app was used for the daily measurements of grief symptoms and contextual items. The grief and contextual items in the app were developed by

the research team. For the development and validation of the items, three ESM experts and three experts on the subject of grief, were interviewed by a Master student from the University of Twente. Cognitive interviewing was used to examine the items. Participants had to answer 17 items per observation. The answer options were on a 6-point scale; 0= *totally not*, 6= *totally*. For this study, “in the past three hours” has been put in front of the items. The item for symptom C3 goes as following: “In the past three hours, I avoided reminders that the person is dead”. The item for symptom C5 goes as following: “In the past three hours, I had difficulty moving on”.

Data-analysis

For participants to be included in the data-analyses, they had to have at least three completed observations per day, for at least seven days. Therefore, 20 participants were excluded, see Figure 2. An independent-samples t-test was conducted to compare the excluded sample with the study sample that was analysed. There were no significant differences in the scores for the excluded sample ($M = 20.55$, $SD = 7.24$) and analysed sample ($M = 21.47$, $SD = 7.55$); $t(65) = 0.461$, $p = .646$, on the TGI-CA. There were no significant differences in the scores for the excluded sample ($M = 16.90$, $SD = 3.66$) and analysed sample ($M = 16.19$, $SD = 4.08$); $t(65) = -0.670$, $p = .505$, on the LOT-R. There were no significant differences on the sociodemographic variables between the analysed and excluded sample, see Table 2.

Table 2

Differences between the analysed and excluded sample on sociodemographic characteristics

Sociodemographic variable	<i>t</i>	<i>df</i>	<i>p</i>
Gender	-1.394	65	.170
Age	-.140	65	.889

Education	.360	65	.720
Kinship	-.816	65	.417
Cause of death	-.769	65	.445
Time since death	-.385	65	.701
Grief support	-.372	65	.711
Nationality	.411	65	.682

The observations for symptom C3 had 28.9% missing values and the observations for symptom C5 had 29.1% missing values. Missing values were not imputed in the analyses. Imputation of missing values are not required for the Root Mean Squared Successive Differences (RMSSD), due to the small effect on RMSSD estimation (Rossi et al., 2020).

The data has been analyzed using the program Statistical Package for the Social Sciences (SPSS) 28 and RStudio has been used to calculate the grief fluctuations. The data has been checked for the assumptions of linearity, independence, heteroscedasticity, and normality. No assumptions were violated.

The root mean squared successive difference (RMSSD)

The patterns of fluctuations over time in C3 and C5 were assessed with RMSSD. The Mean Squared Successive Difference (MSSD; von Neumann et al., 1941) quantifies changes over time from one observation to the next, capturing temporal aspects of change over time. MSSD measures instability in grief in ESM data (Houben et al., 2015; Jahng et al., 2008; Schoevers et al., 2021). However, RMSSD is suggested to be a preferred index for instability, due to the inclusion of both temporal dependency and variability (Jahng et al., 2008; van Roekel et al., 2016). High temporal instability is characterized by a high level of variability and low temporal independency (van der Krieke et al., 2016). Higher scores of the RMSSD are indicative of higher levels of instability (van Roekel et al., 2016). MSSDs were calculated using individual item scores from the five daily measurement, analyzed longitudinal, which were added together to derive a personal mean score of every day, after which the RMSSD

was calculated. The formula used to calculate the RMSSD goes as following (Schoevers et al., 2021):

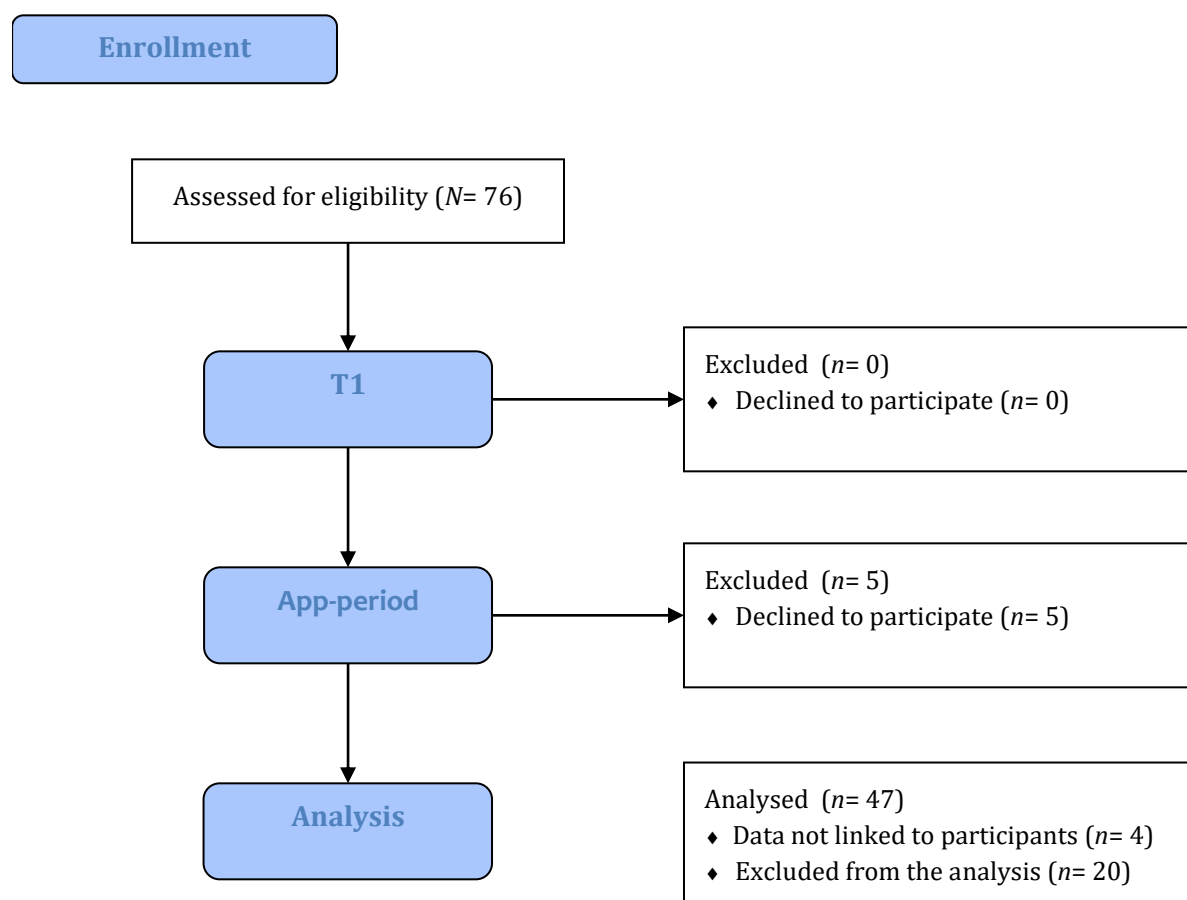
$$\text{RMSSD} = \sqrt{\frac{1}{N-1} \sum_{i=1}^{N-1} (x_{i+1} - x_i)^2}$$

The x stands for the variable of interest, the N stands for the total number of observations and the i for the individual observations.

The association between optimism and fluctuation in grief symptoms were examined using a linear regression analysis. Furthermore, the association between optimism and overall symptom level of PGD have been examined using correlation analysis.

Figure 2

Consort Flowchart of the participants



Results

RMSSD

Fluctuations of the grief symptoms C3 and C5 were assessed with the RMSSD. Characteristics of the RMSSDs are described in Table 3. ANOVA revealed no effect of gender $F(1, 46) = 1.268, p = .266$ for C3 and no effect of gender $F(1, 46) = 0.371, p = .546$ for C5.

Table 3

Characteristics of the RMSSDs

RMSSD	Minimum	Maximum	<i>M</i>	<i>SD</i>
Avoidance (C3)	0	1.76	0.21	0.40
Difficulty Moving On (C5)	0	1.24	0.23	0.32

Note. RMSSD = root mean square successive difference

Regression analyses

It was expected that optimism relates to lower fluctuations of grief symptoms C3 and C5 (Hypothesis 1). To examine to what extent optimism is related to fluctuations of grief symptoms C3 and C5, linear regression analyses were performed. The results indicated that participants with higher trait optimism showed less fluctuations in grief symptom C3, ($F(1, 45) = 5.211, p = .027, 95\% \text{ CI } [-0.060, -0.004], \text{ with } R^2 = .104$). It was found that optimism significantly predicted lower fluctuations of symptom C3 ($\beta = -.032, p = .027$). The results indicated that participants with higher trait optimism showed less fluctuations in grief symptom C5, ($F(1, 45) = 10.938, p = .002, 95\% \text{ CI } [-0.056, -0.014], \text{ with } R^2 = .196$). It was

found that optimism significantly predicted lower fluctuations of symptom C5 ($\beta = -.035, p = .002$).

Correlation analysis

It was expected that optimism relates to a lower symptom level of PGD (Hypothesis 2). To examine the association between optimism and overall symptom level of PGD, a correlation analysis was performed. The results indicated that there was a negative correlation between optimism and overall symptom level of PGD $r = -.516, p < .001$.

Discussion

The aim of this study was to examine the relationship between optimism and PGD, by examining to what extent optimism relates to fluctuations of grief symptoms C3 and C5 and to what extent optimism relates to symptom levels of PGD. It was expected that optimism is related to lower fluctuations of grief symptoms C3 and C5 and that optimism relates to a lower symptom level of PGD.

In accordance with the first hypothesis, it was found that people with higher levels of optimism showed lower fluctuations of the grief symptoms C3 and C5. Fluctuations in emotions reflects how people cope and is related to psychological well-being. Low psychological well-being is associated with more instability, variability, and inertially in emotions (Houben et al., 2015). Optimism reduces anxiety symptoms, by promoting active and persistent coping behavior (Dolcos et al., 2016). Furthermore, optimism reflects generalized favorable expectancies for the future (Renaud et al., 2018; Boelen, 2015; Lundorff et al., 2020), and the absence of future positive thinking might be predictive of prolonged grief (Lundorff et al., 2020). Therefore, optimism might be a protective factor against the PGD symptoms C3 and C5, which is in line with the results of the current study.

In accordance with the second hypothesis, it was found that people with higher levels of optimism have an overall lower symptom level of PGD. This is in line with prior research

examining optimism and psychological functioning of bereaved people. Specifically, the study of Boelen (2015) revealed that optimism is associated with lower concurrent and future levels of prolonged grief. Moreover, Xiang et al. (2016) found optimism to be a predictor of the psychosomatic status of bereaved survivors of the Wenchuan Earthquake, scoring lower on optimism than non-bereaved survivors. Finally, Harper et al. (2014) found lower grief symptoms to be associated with high levels of optimism among parents who lost a child. The results of the current study indicate that optimism is a protective factor against PGD.

Limitations

This study had several limitations. The first limitation is that the study was conducted shortly after the Christmas period. Christmas can be a difficult and painful time for bereaved people, due to the dissonance between how you feel and how the outside world expects you to feel (Paul et al., 2020). The Christmas period is related to a decrease in life satisfaction and emotional well-being (Mutz, 2016). A review of Friedberg (1990) found a rise in dysphoric mood following the Christmas period. A study of Carr et al. (2014) examining psychological distress of widowed people after special occasions, showed that widowed people, interviewed post-Christmas in January, experienced heightened psychological distress. All of the 47 participants of the current study started T1 and the app-period in January, 37 of the 47 participants started the T1 and the app-period within the first two weeks of January. This could have influenced the data due to heightened psychological distress and a decrease in emotional well-being.

The second limitation is that the grief symptoms C3 and C5 were both measured with a single item. There are a number of concerns regarding single-item measures. First, multi-item measures produce replies that are more consistent and cancel out the random error of measure, they are more stable, precise, and reliable in comparison with single-item measures. Second, single-item measures have the advantage of simplicity, however they are unable to

fully capture complex constructs. Last, single-item measures have lower reliability and validity than multi-item measures (Jovanović & Lazić, 2020; Bowling, 2005). However, items used in cross-sectional questionnaires are unsuitable for repeated assessment in daily life (Verhagen et al., 2016). In this study the participants needed to answer the items five times a day for two weeks, and repeated answering of the same items is frustrating. Moreover, answering the items should not take too long. The reliability of single-items in ESM studies can be improved by combining different aspects such as mood, activity and company and by measuring the same items over time (verhagen et al., 2016), which was done in the current study.

A last limitation is that the study did not impute missing values for the missing data. Missing data may present various problems. First, it can reduce the statistical power of the study (Kang, 2013). Second, it can suggest sample bias due to a difference between the answers of responders and non-responders (Pampaka et al., 2016). Consequentially, the representativeness of the target population will be reduced (Kang, 2013; Pampaka et al., 2016).

Implications

The results of this study could have important clinical and scientific implications. The present study is an ESM study examining grief symptom instability in daily life. ESM provides a more accurate assessment by capturing symptoms as they occur and helps obtain a deeper understanding of how symptoms unfold in daily life over time (Myin-Germeys et al., 2018). Cross-sectional data limits research to a single time point, disregarding fluctuations in experiences, behaviors, and attitudes over time. The data that ESM provides are multilevel, the data is nested within individuals, and longitudinal, the data is collected by the same individuals on different assessments points. Therefore, ESM helps bridge the gap between theories on within-person processes, states, or behavior and research designs (Yu et al., 2021).

Furthermore, this is the first study examining grief as a dynamic process, by examining grief fluctuations on a daily basis. The assumption of the DPM that grief is a dynamic process of avoidance and confrontation that can change from moment to moment and during the duration of bereavement (Stroebe & Schut 2010; Stroebe & Schut, 1999), has not yet been examined on a daily basis. Given that change in emotional experiences over time provides unique information for psychological well-being (Houben et al., 2015), it is of importance to examine fluctuations in symptoms of grief. More knowledge about this topic is important for enhancing our understanding of mechanisms of distress following loss and the potential usefulness of optimism in treatment of PGD (Boelen, 2015). Findings from a meta-analysis showed that psychological interventions can increase optimism (Mallouff & Schutte, 2017). It would be interesting for future studies to examine such interventions for the treatment of people with PGD.

Conclusion

The present study was an ESM study examining grief symptom instability in daily life. Notwithstanding the limitations of this study, the current results showed that participants with higher trait optimism showed less fluctuations in grief symptoms C3 and C5 of PGD according to the DSM- 5-TR. Furthermore, the results showed that people with higher levels of optimism have an overall lower symptom level of PGD. The results of this study indicate that optimism might be a protective factor against the PGD symptoms C3 and C5 and that optimism is a protective factor against PGD. These results could have important clinical implications for enhancing our understanding of mechanisms of distress following loss and the potential usefulness of optimism in treatment of PGD.

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