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RISK FACTORS OF PROLONGED GRIEF DISORDER (PGD) DURING PANDEMIC COVID-19 IN DUTCH AND SWEDISH REPRESENTATIVE SAMPLES

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Abstract

Background. The loss of a loved one during the pandemic COVID-19 may lead to intense grief reactions which is named as Prolonged Grief Disorder (PGD). Identifying grievers at risk of PGD during pandemic COVID-19 may allow for targeted prevention measures. The current study investigated the predictors of PGD based on sociodemographic and loss-related variables in two samples drawn from European Society of Traumatic Stress Studies (ESTSS) pan-European study.

Methods. Participants in this study were 188 Dutch and 338 Swedish people who lost loved one during pandemic COVID-19. Because two different PGD instruments were used: TGI-SR+ in the Dutch sample and PG-13-R in the Swedish sample, we first had to test the two samples with measurement invariance (MI) to determine whether it was justified to combine these samples for testing risk factors of PGD. To test MI across two samples, confirmatory factor analysis (CFA) and multiple group CFA (MGCFA) were employed. Following the MI analysis, the PGD risk factors were assessed using multiple linear regression.

Results. The results in MI revealed a noninvariant model (CFI >.02) between metric and scalar invariance, so we separated both samples in the following analysis. The findings in multiple linear regression analysis showed positive associations between higher score of PGD and the loss of a child or a partner, as well as history of mental health problem in both samples. Female gender was found to be significantly correlated with higher PGD score in the Dutch sample, but negatively correlated with higher level of PGD in the Swedish sample.

Conclusion. Our findings lend support to the prevention of PGD cases in targeted groups and the improvement of grief-specific interventions, particularly during the pandemic COVID-19.

Keywords: Confirmatory factor analysis, measurement invariance, TGI-SR+, PG-13-R, risk factors, grief, prolonged grief disorder

Introduction

The death of a loved one is an unavoidable event in everyone's life. People who have lost an important person may have to deal with intense grief, especially during pandemic coronavirus (COVID-19). COVID-19 has emerged as one of the most lethal and widespread virus infection in the last century. Over 400 million confirmed cases and six million deaths worldwide have occurred just two years after the pandemic's outbreak in March 2020. (The New York Times, 2022). Its impact surpasses even the most devastating natural disasters of previous decades, such as the South-East Asia Tsunami and the Haiti Earthquake. Governments have implemented policy measures such as social distancing and restrictions on gathering and travel to combat the spread of COVID-19. This resulted in significant societal changes that had an impact on many aspects of people's daily lives, including the inability to provide appropriate funeral rituals for loved ones and the inability to receive social support. These circumstances can increase levels of grief-related distress to the bereaved, such as prolonged grief disorder (PGD) (Dragan et al., 2021; Eisma & Tamminga, 2020).

PGD formerly known as complicated grief (CG), is the most recent term for grief that persists in intensity beyond a time frame in which some form of adjustment is expected and to such an extent that it is significantly disruptive to a person's life (Smith, et al., 2009). PGD in DSM-5-TR is distinguished by distressing and incapacitating yearning for the deceased and/or preoccupation with the deceased, which is accompanied by anger, guilt, and other symptoms of intense emotional pain felt for at least 12 months after the loss (APA, 2022). A recent quantitative study demonstrated that people bereaved because of COVID-19 experience higher acute grief levels than people bereaved because of natural causes but not compared with those bereaved because of unnatural causes (Eisma et al., 2020). As acute grief is one of the strongest predictors of future disturbed grief (Boelen & Lenferink, 2020), this supports the prediction that prevalence of PGD will rise because of the pandemic within this specific population.

However, the prediction that PGD may be more severe among bereaved people who experience losses unrelated to COVID-19 during the pandemic yet remains untested.

In order to inform PGD researchers and to provide preventative treatments to those at high risk for PGD, particularly during pandemic COVID-19, it is important to identify the risk factors for PGD. Several studies have identified potential factors that are associated with an increased risk of PGD. One of these was demographic factors like gender, which was identified as a risk factor for developing CG (Kersting et al., 2011). A systematic overview identified female gender as a potential risk factor for intense and complicated grief reactions (Burke & Neimeye, 2013), and cross-sectional studies informed by the ICD-11 guidelines showed how female gender was positively associated with PGD symptom-severity (Killikelly et al., 2019; Zhou et al., 2020). A meta-analysis demonstrated a small positive association between female gender and prolonged grief adults exposed to violent loss (Heeke et al., 2019). The traditional gender-based roles of responsibility and caring may explain why many studies found a positive correlation between female gender and PGD (Titlestad & Dygrov, 2022). According to the findings, women in Western cultures are more frequently preoccupied with intense relationships, emotional expression, and caring, which are referred to as communal traits. (Stelzer et al., 2019). The intense caring and emotional closeness pre-death with the deceased are associated with an increased risk of CG (Bonanno et al., 2002; Carr et al., 2001; Christiansen et al., 2020; Prigerson et al., 2000). Aside from increased responsibility and caregiving prior to death, women's proclivity to ruminate more than men (Johnson & Whisman, 2013) may also be relevant.

Prior research on the age of the bereaved as a risk factor for PGD reported mixed findings. Kersting et al., (2011) reported significant association between older age group and PGD prevalence. A quantitative study of bereaved Chinese adults discovered that age of deceased was a statistically significant predictor of PG symptoms, with younger deceased

associated with more severe grief reactions. (He et al., 2014). Moreover, another study of complicated grief symptom in bereaved college students found that bereaved young adults were at greater risk for complicated grief symptomatology relative to those whose loved ones died from natural causes (Hardison et al., 2005). Nevertheless, two meta-analyses reporting non-significant findings (Djelantik et al., 2020; Heeke et al., 2019), one review reporting a significant negative association (Burke & Neimeyer, 2013) and one meta-analysis a negative statistical trend [p = 0.075] (Lundorff et al., 2017). Another well-established risk factor for PGD is a relationship with the deceased. People who had lost a child or spouse had significantly higher CG prevalence rates than people who had lost another relative (Kersting et al., 2011). A German study also showed similar results, with the loss of a child as the most influential risk factor, followed by lost a spouse (Doering et al., 2022). Furthermore, a longitudinal hierarchical cluster study related to spousal bereavement showed a high risk of CG in older adults who lost their spouse (Ott et al., 2007).

A German study related to predictors of PGD during pandemic COVID-19 showed that 55% of the sample reported having experienced the death as unexpected (Doering et al., 2022). According to Doering et al. (2022), unexpectedness of death is a risk factor that will likely become even more relevant in the aftermath of the COVID-19 pandemic, because COVID-19-related deaths are likely to be perceived as unexpected. Deaths from COVID-19 could be traumatic because people may perceive the pandemic as a disaster. Survivors of unnatural deaths, such as disasters, are more likely to experience prolonged grief/acute grief (Djelantik, 2020); and according to Eisma et al. (2021), people who experienced COVID-19-related bereavement experienced more severe grief than people who experienced natural losses. We expected that COVID-19-related bereavement would be a positive predictor of PGD based on these theoretical considerations.

Systematic reviews have documented that a short time since the loss is predictive of PG (Burke & Neimeyer, 2013; Djelantik et al., 2020; Hardison et al., 2005; Heeke et al., 2019; He et al., 2014; Lobb et al., 2010). Using the diagnostic tool Prolonged-Grief-13 (PG-13) in a population of bereaved adults in China, He et al. (2014) found that increased PG-13 scores were significantly related to a short time since the loss. Furthermore, Titlestad & Dyregrov (2022) also found similar results of the positive association between the short time since loss and PGD. Given the strong correlation found in many previous studies, we predict that shorter time since loss will be a significant risk factor for PGD. PG levels were also higher in people who had current depressive symptoms, with studies showing that 36-55 percent of people with PG have comorbid depression (Sung et al., 2011). People who had a comorbid mood or anxiety disorder were more severely ill, with more functional impairment, sleep disturbance, depression, trauma, and general anxiety symptoms, as well as higher levels of grief (Simon et al., 2007). Furthermore, in line with previous research on trauma and bereavement, the age of onset of psychiatric comorbidity occurred before bereavement, implying that preexisting psychiatric illness, such as a history of mood or anxiety disorder, may exacerbate PG symptoms (Bromet, Sonnega, & Kessler, 1998; Simon et al., 2007). Based on the theoretical frameworks mentioned, we anticipated that sociodemographic variables (gender, age, prior mental health) and loss-related variables (kinship to the deceased, time since loss, cause of death) would be significant risk factors for PGD.

It should be noted that the current study used two different instruments to assess PGD score in two different populations. TGI-SR+ was used to measure PGD score in the Dutch sample, while PG-13-R was used in the Swedish sample. TGI-SR+ contains 22 items that assess PGD and PCBD, with 12 items measuring PGD symptoms based on DSM-5-TR PGD. However, we did not include item 13 (or criteria D in DSM-5-TR) in the analyses; item 13 is only included as an endorsement of PGD diagnostic criteria. TGI-SR+ is regarded as a reliable

and valid self-report instrument for assessing DSM-5-TR PGD and ICD-11 PGD criteria sets comprehensively (Lenferink et al., 2022). While, PG-13-R is the new version of PG-13 that measure PGD, and it was found to be a valid and reliable measure of the PGD construct in English-speaking populations in the United States and the United Kingdom, as well as in a Dutch-speaking population (Prigerson et al., 2021). The ten items were included as part of the analysis, but three gatekeeper items were not included in the analysis.

Aim of Study

Due to the large numbers of people who have been bereaved due to the loss of a loved one during a pandemic COVID-19, the field is in urgent need of knowledge about the risk factors of PGD during a pandemic COVID-19. The study will employ multiple linear regression to determine which risk factors are important in explaining high-level PGD symptoms. However, because we used different instruments, we will first perform measurement invariance (MI) to determine whether combining two samples for evaluating PGD risk factors is justified. Assume the MI analysis fits the hypotheses; in which both instruments measure identical constructs with the same structure across two groups, analysis for risk factors in both groups will be evaluated concurrently. If instruments do not measure similarly across groups, we will evaluate PGD risk factors separately.

Methods

Data were drawn from European Society of Traumatic Stress Studies (ESTSS) pan-European study, that initiated a study on the effects of intrusive experiences on the well-being of people, known as the 'ADJUST study.' The ADJUST study looks at the long-term associations between risk and protective factors, stressors, and adjustment disorder symptoms in eleven European countries, including the Netherlands and Sweden, during the COVID-19 pandemic (Lotzin, et al, 2021). In the Netherlands, there is an association study called

CONNECT, which is part of an ADJUST study. All parties in CONNECT study are partners of an ESTSS study. The data from the Netherlands has been approved by the Ethics Committee of Utrecht University (20-360; TM), Leiden University (2020-09-10; JM-V1-2619), the University of Groningen (PSY-1920-S-0517; LL) and Radboud University Nijmegen (ECSW-2020-127; ME) (Lenferink et al., 2021). While, in Sweden, the data has been approved by the Swedish Ethical Review Authority, 2020-03217 (Lotzin et al., 2021).

Participants and Procedure

Participants were recruited from the general populations of the European countries that took part in the study, and only participants from the Netherlands and Sweden were included in this study. Data collection from the Netherlands only included from the second wave of CONNECT study, and it was taken from 15 February to 17 June 2021. While, data in Sweden was taken from the first wave of the ESTSS longitudinal ADJUST study from June 2020 to November 2020 (Lotzin et al., 2021). The inclusion criteria were as follows: (1) being at least 18 years old, (2) being able to read and write in the respective language, and (3) being willing to participate in the study. Aside from those inclusion criteria, most importantly, we only included participants from those who lost loved one during pandemic COVID-19. It was reported that 188 Dutch participants and 338 Swedish participants met the criteria to participate in the study. Socio-demographic and loss-related information was collected based on individuals who are bereaved during pandemic COVID-19. We began by cleaning the Swedish and Dutch data from the ADJUST and CONNECT study. Following that, we employed CFA and MI to analyze the construct of the instruments across two language groups. Finally, we examined PGD risk factors using multiple linear regression.

Measures

In the Dutch sample, TGI-SR+ was used to assess PGD symptomatology. We included 11 items of PGD as defined in DSM-5-TR (see supplemental Table 1). On a five-point Likert-

type scale, for each item respondents were asked to rate regarding their emotion and experienced of losing a loved one, with a response format (1 = never, 2 = seldom, 3 = sometimes, 4 = frequently, 5 = all the time). The items correlated with PGD contains of 12 items, but only 11 items were included to assess PGD symptomatology; with item 2 and 8 are based on criteria C4 'intense emotional pain'. For two items with the same criteria, we determined by the highest scores between two items. Item 13 was not included in the analysis, but was included as endorsement to assess PGD diagnostic criteria. Study of the TGI-SR+ psychometric properties found strong support for internal consistency and temporal stability, as well as convergent validity and known-group validity (Lenferink et al., 2022). Cronbach's alpha level of the 13 PGD items of the TGI-SR+ was .95 in the current sample.

PG-13-R was introduced during the development of PGD diagnostic criteria for inclusion in the DSM-5-TR. The scale contains 13 items that can be used for both the dual purposes of continuously assessing grief intensity on a dimensional scale and diagnosing PGD using the proposed criteria. The three-country study looked at the ten symptoms listed in both the DSM 5-TR and the PG-13-R (yearning, preoccupation, identity disruption, disbelief, avoidance, intense emotional pain, difficulty with reintegration, emotional numbness, feeling that life is meaningless, and intense loneliness) (Prigerson et al., 2021). The PG-13-R contains three gatekeeper items that ask whether the respondent has lost a significant other (Q1), how long ago the death occurred (Q2), and impairment associated with the aforementioned symptoms (Q13) (see Figure 1). The scale ranges from 1 to 5, with values labeled as follows: 1 = never, 2 = rarely, 3 = occasionally, 4 = frequently, and 5 = always. Cronbach's alpha level of the 13 PGD items of the PG-13-R was .88 in the current sample. Supplemental Table 1 in the appendix shows how items of the TGI-SR+ and the PGD-13-R map onto symptoms of each criterion set in DSM-5-TR PGD.

Correlates of PGD

In order to analyze PGD risk factors, we include questions about age, gender, prior mental health problems, kinship to the deceased, cause of death, and month since loss. We dichotomized questions with multiple answer options. Gender options included male, female, and other; however, because the sample size was small, we did not include "other" in the analysis, we dichotomized 0 = male and 1 = female. Kinship to the deceased has multiple answers of loss of child, spouse, parent, sibling, other family member, friend, and other. We classified them as 0 = loss of child/spouse and 1 = loss of other than child/spouse. There are three options for cause of death: not due to covid, yes due to covid, and I don't know. We dichotomized them as 0 = due to covid and 1 = other than covid, and did not include the "I don't know" answer. Prior mental health problem has multiple answers of no mental health problem, has been recovered from mental health problem, and currently suffering from mental health problem. We distributed them into two categories: 0 = recovered/current suffering and 1 = no mental health problem.

Statistical Analysis

Descriptive statistics

We began by testing for differences in background and loss-related characteristics between the language groups (0 = Dutch, 1 = Swedish). For dichotomized variables, chi-square tests were used (i.e., gender, kinship to the deceased, cause of death, and prior mental health problem). For continuous variables, the T-test was used (i.e., age and month since loss). We also employed skewness and kurtosis to determine the normality of each PGD item. Absolute skewness value between -3 and +3 and absolute kurtosis between -10 and +10 for large sample in SEM study (Brown, 2006).

Confirmatory factor analysis and measurement invariance

All factor analyses were conducted using M*plus* ver. 8 (Muthén & Muthén, 1998-2017). A preliminary step before conducting measurement invariance (MI) testing is to conduct Confirmatory factor analysis (CFA). CFA was used to evaluate the factor structure and model fit separately for each sample. Model fit was evaluated based on traditionally accepted standards (Barret, 2007) and utilized the root mean square error of approximation (RMSEA), comparative fit index (CFI), Tucker–Lewis index (TLI), and standardized root mean square residual (SRMR). RMSEA is a measure of the average of the residual variance and covariance; good models have RMSEA values that are at or less .10, and values below .05 indicated an excellent fit (Kline, 2011). CFI and TLI are incremental fit indices that fall between 0 and 1, CFI should be ≥ .80 (Byrne & Campbell, 1999), and TLI ≥ .85 indicated good fit and > .80 mediocre fit (Carlback & Wong, 2018); and CFI and TLI more than .90 shows good fit indices (Kline, 2011). Standardized root mean square residual (SRMR) values less than .05 indicated excellent fit, and values below .10 indicated a good fit (Kline, 2011). Once the CFA is found to have acceptable data-model fit, MI were conducted to evaluate configural invariance, metric invariance, and scalar invariance (Brown, 2006). MI models were evaluated using the CONFIGURAL METRIC SCALAR command in M*plus*, which tests all three levels of invariance within a single analysis.

The first step in the MI ladder is configural invariance which designed to test whether the constructs have the same pattern of free and fixed loadings across groups. If configural invariance is supported, the next step is to test for metric invariance, or equivalence of the item loadings on the factor. Metric invariance means that each item contributes to the latent construct to a similar degree across groups. Metric invariance is tested by constraining factor loadings to be equivalent in two groups. If full or partial metric invariance is supported, the next step is to test for scalar invariance, or equivalence of item intercepts. Scalar invariance means that mean differences in the latent construct capture all mean differences in the shared

variance of the items. Scalar invariance is tested by constraining the item intercepts to be equivalent in the two groups (Putnick & Bornstein, 2016). According to previous research (Chen, 2007; Gloster et al., 2021; Putnick & Bornstein, 2016), a difference in CFI of ≤ .02 and a non- significant χ^2 value ($p > .05$) demonstrated invariance for the more constrained model. However, some have expressed concern that the Chi-square difference test is too strict, favoring less constrained models (van de Schoot et al., 2012). As a result, we relied on the difference in CFI values to test MI.

Prevalence rates of PGD caseness

PGD caseness frequencies were determined using DSM-5-TR diagnostic scoring rules (APA, 2020). We count the number of participants who meet criteria for probable caseness of PGD by considering TGI-SR+ and PG-13-R items with a 4 or 5 response as symptom endorsed by DSM-5-TR and counting the number of participants who meet criteria for DSM-5-TR PGD with ≥1 B criterion symptom and ≥ 3 C criterion symptoms, plus endorsement of functional impairment criterion in D criterion.

Multiple linear regression

A multiple linear regression is performed using IBM SPSS Statistics version 26 (IBM Corp, 2019). In case MI could not be demonstrated, these analyses were run separately for each sample. PGD score as dependent variable will be analyzed with the predictors age, gender, kinship to the deceased, time since loss (in month), cause of death, and prior mental health problem. The predictors age and time since loss were entered as continuous variables. The nominal variables were dummy coded: gender with the reference category of males (vs. females), kinship to the deceased with the reference category loss of other (vs. child or partner), prior mental health problem with the reference of no prior mental health problem (vs. recovered

or currently suffering from mental health problem), and cause of death with the reference of not due to covid (vs. due to covid).

Result

Sample Characteristics

Table 1 summarizes the demographic characteristics of two samples (Dutch and Swedish). In total of 526 participants, more than half of the sample was from Swedia (n =338, 64.26%). Participants were 52 years old on average with the Swedish sample older (M = 55.3, SD = 12.6) than Dutch sample (M = 46.0, SD = 18.0). Both samples were primarily female (66.8% to 77.38%), most of both samples never have prior mental health issue (> 60%). The prevalence of losing a child and a partner is less than three percent in both samples. More than quarter of populations in both samples lose someone they love due to COVID-19. Mean time since loss (in month) was longer in Dutch sample than Swedish sample, (M = 5.95, SD = 4) and (M = 4.95, SD = 3.5) respectively.

Table 1 | Sample characteristics

	Dutch sample (n = 188)	Swedish sample (n = 338)	Total (N = 526)	Differences between samples
Age, M (SD)	46 (18.0)	55.3 (12.6)	52.3 (15.2)	t(523) = -6.33, p = < .001
Gender, N (%)				$\chi^2(1, 518) = 5.88$, p = .015
Male	59 (32.1)	76 (22.5)	135 (25.9)	
Female	123 (66.8)	260 (76.9)	383 (73.4)	
Others*	2 (1.1)	2 (0.5)	4 (0.8)	
Kinship to the deceased, N (%)				$\chi^2(1, 525) = 0.04$, p = .839
Child	1 (0.5)	4 (1.1)	5 (1)	
Spouse	4 (2.1)	6 (1.7)	10 (1.9)	
Sibling	25 (13.3)	12 (3.5)	37 (7)	
Parent	20 (10.6)	46 (13.6)	66 (12.6)	
Other family member	75 (39.9)	192 (56.9)	267 (50.9)	
Friend	33 (17.5)	67 (19.8)	100 (19)	

Other	30 (15.9)	10 (2.9)	40 (7.6)	
Cause of death, N (%)				$\chi^2(1, 447) = 2.00, p = .157$
Due to covid	38 (26.6)	105 (31.1)	143 (29.8)	
Not due to covid	101 (70.6)	203 (60.2)	304 (63.3)	
I do not know*	4 (2.8)	29 (8.6)	33 (6.9)	
Month Since Loss, M (SD)	5.95 (4.0)	4.95 (3.5)	5.24 (3.68)	$t(454) = 2.64, p = .013$
Prior Mental Health Problem, N (%)				$\chi^2(1, 521) = 1.83, p = .175$
Recovered	33 (18)	92 (27.2)	125 (24)	
Currently suffering	28 (15.3)	41 (12.1)	69 (13.2)	
Never	122 (66.7)	205 (60.6)	327 (62.8)	

Note. The following variables were dichotomized: prior mental health problem (0 = recovered/currently suffering, 1 = never), kinship to the deceased (0 = child/spouse, 1 = other than child/spouse). *Not included in the analysis.

Distribution of normality

Table 2 shows the mean scores for each PGD symptom item. In the Dutch sample, they range from 1.5 to 2.5, while in the Swedish sample, they range from 1.2 to 2.8. Item 5 'avoidance' and item 9 'life is meaningless' were infrequent in the Swedish sample, where the mean score in general was low, and both of these items were not normally distributed based on skewness and kurtosis.

Table 2. PGD item performance from TGI-SR+ PGD symptom and PG-13-R and distribution of normality

		Dutch sample (N =188)			Swedish sample (N = 338)		
	PGD symptom item	Score, M (SD)	Skewness	Kurtosis	Score, M (SD)	Skewness	Kurtosis
1	Intense yearning/longing	2.3 (1.0)	0.42	-0.66	2.8 (1.1)	0.18	-0.84
2	Preoccupation with things	2.1 (1.0)	0.44	-0.90	1.4 (0.8)	2.24	4.82
3	Identity disruption	1.4 (0.8)	2.12	3.93	1.4 (0.8)	2.45	5.65
4	Marked sense of disbelief	2.5 (1.3)	0.27	-1.23	1.6 (1.0)	1.66	1.97
5	Avoidance of reminders	1.5 (0.8)	1.86	3.01	1.2 (0.7)	3.26	11.14

6	Intense emotional pain	2.5 (1.1)	0.07	-0.98	2.0 (1.2)	1.04	0.07
7	Difficulty with reintegration	1.5 (0.9)	1.74	2.33	1.6 (1.0)	1.90	2.75
8	Emotional numbness	1.7 (1.0)	1.30	0.74	1.6 (1.0)	1.78	2.41
9	Life is meaningless	1.5 (0.8)	1.46	1.26	1.2 (0.6)	3.77	15.34
10	Intense loneliness	1.6 (1.0)	1.48	1.41	1.5 (0.9)	2.00	3.49

Factor Structure

CFA was used to examine the factor structure of items representing symptoms of DSM-5-TR PGD. The fit indices of all factor models in both samples are shown in Table 3. Table 4 shows the standardized factor loadings for the best fitting models. A one-factor model for combined data samples yielded satisfactory fit indices, as indicated by good fit of CFI (>.85) and TLI (>.85), good fit of RMSEA (value less than .10), and SRMR (value ≤ .05). In both separated samples, acceptable fit indices are shown by a good fit of CFI (>.85), a mediocre fit of TLI (> .80). RMSEA value in Swedish sample indicated a good fit model (≤ .10), but in Dutch sample the value is greater than .10. Both samples showed that SRMR values are above .05.

Table 3. Fit indices confirmatory factor analysis

	χ^2 (df)	p-value	CFI	TLI	RMSEA (90 % CI)	SRMR
PGD 1-factor model Combined sample data	183.432* (35)	< .001	.896	.866	.090 (.078 - .103)	.052
PGD 1-factor model Dutch sample	129.044* (35)	< .001	.864	.825	.120 (.098 - .142)	.061
PGD 1-factor model Swedish sample	156.671* (35)	< .001	.867	.830	.102 (.086- .119)	.063

Note. PGD = Prolonged Grief Disorder

Table 4. Factor loadings 1-factor model

		Factor Loading 1-factor model (Combined sample data)	SE	Factor Loading 1-factor model (Dutch sample)	SE	Factor Loading 1-factor model (Swedish sample)	SE
1	Intense yearning/longing	.588	.028	.781	.044	.617	.030
2	Preoccupation with things	.733	.033	.688	.057	.792	.041
3	Identity disruption	.763	.030	.736	.039	.816	.036
4	Marked sense of disbelief	.584	.042	.671	.043	.501	.068
5	Avoidance of reminders	.658	.045	.596	.077	.684	.057
6	Intense emotional pain	.706	.027	.754	.046	.669	.037
7	Difficulty with reintegration	.645	.046	.669	.083	.642	.057
8	Emotional numbness	.704	.033	.747	.052	.661	.047
9	Life is meaningless	.738	.041	.816	.036	.669	.079
10	Intense loneliness	.702	.035	.661	.066	.717	.047

Note. PGD = Prolonged Grief Disorder; SE = Standard Error

Measurement invariance

Table 5 displays the fit indices for multiple group confirmatory factor analysis (MGCFA) used to test measurement invariance. Not all fit indices showed good fit for configural invariance; CFI indicated acceptable fit with a value greater than .80; TLI was less than .80; RMSEA and SRMR had values greater than .10. CFI and TLI indicated acceptable fit (> .80) in metric invariance, but RMSEA and SRMR showed unacceptable fit with values greater than 1.0. The majority of fit indices in scalar invariance did not show acceptable fit. The CFI difference between metric and configural was supported by ≤ .02, but it demonstrated non-invariance between scalar and metric models (> .02).

Table 5. Fit indices for MGCFA 1-factor model to test measurement invariance (*N*=522)

Dutch (*N* = 188) vs. Swedish (*N* = 334)

	CFI	TLI	RMSEA (90% CI)	SRMR	AIC	BIC	SS-BIC	DF	ΔCFI
Configural invariance	.812	.765	.127 (.115 - .140)	.264	12220.005	12466.950	12282.845	72	
Metric invariance	.832	.811	.114 (.102 - .127)	.216	12185.440	12398.324	12239.612	80	.02
Scalar invariance	.649	.649	.156 (.145 - .167)	.336	12587.597	12757.903	12630.934	90	.183

PGD caseness

According to the prevalence of PGD caseness in Dutch sample, 19 people (10.11%) met criteria for DSM-5-TR PGD. Meanwhile in Swedish sample, 10 people (2.96%) met criteria for PGD according to diagnostic criteria from DSM-5-TR PGD.

Correlates of PGD symptoms

To investigate which factor correlates with PGD, multiple linear regression analysis was conducted, with all demographic and loss-related variables were entered as independent variables. Significant regression equations were found in Dutch sample, $F (6, 122) = 5.49$, $p < .001$, with R^2 of .21, as well as in Swedish sample, $F (6, 315) = 9.64$, $p < .001$, with R^2 of .15.

In Dutch sample, age and time since loss were negatively correlated with PGD symptom level. Gender was positively associated with PGD level, with females were considered to have greater grief severity than males. People with a history of mental health issues, as well as those who have lost a child or spouse were significantly associated with PGD. Bereavement due to COVID-19 had negative association with PGD total score.

In the Swedish sample, age, gender, and time since loss were negatively associated with PGD symptom level. People with a history of mental health problem and who had lost a child

or spouse had positive correlations with PGD symptom level. COVID-19-related bereavement was negatively associated with PGD total score.

Table 6. Multiple regression analysis for Dutch and Swedish populations

Term	β	SE	*p*	95% CI Low	95% CI Up
Dutch Sample (*N* = 188)					
Age	.15	2.89	.067	-0.005	0.147
Gender (ref. Males)					
Females	.21	1.84	.012	1.045	8.355
Prior Mental Health Problem (ref. no)					
Recovered + Currently suffering	.28	1.33	.001	1.997	7.295
Kinship (ref. others)					
Child + Partner	.26	5.32	.002	6.377	27.466
Cause of death (ref. other)					
COVID-19	.08	1.48	.275	-0.1.312	4.565
Time since loss during covid (in month)	-.10	0.16	.222	-0.524	0.123
Swedish sample (*N* = 338)					
Age	-.04	0.02	.452	-0.078	0.035
Gender (ref. Males)					
Females	-.01	0.86	.818	-1.898	1.501
Prior Mental Health (ref. no)					
Recovered + Currently suffering	.19	0.74	<.001	1.279	4.226
Kinship (ref. others)					
Child + Partner	.34	2.15	<.001	9.954	18.435
Cause of death (ref. other)					
COVID-19	.07	0.76	.188	-0.496	2.515
Time since loss during covid (in month)	-.007	0.10	.899	-0.212	0.186

Discussion

The current study sought to examine risk factors for PGD. Data were gathered from community members in the Netherlands and Sweden who had lost loved ones during the COVID-19 pandemic. Because the grief instruments used in both samples were different, we

had to first test the two samples with MI to determine whether it was justified to combine these samples. CFA was first conducted, and tested separately for both samples. CFA determined that the unidimensional model for items assessing PGD in both instruments provided an acceptable fit indices for CFI and TLI. Furthermore, in measurement invariance, although metric against configural was supported, the overall model fit in the scalar invariance model is significantly worse than in the metric invariance model. The scalar invariance that is not supported could mean that at least one item intercept differs between groups (Putnick & Bornstein, 2016). For instance, the item of avoidance of remembering the deceased could indicate that bereaved people in one culture remember the deceased more intensely, but that intense remembrance is not associated with increased levels of PGD symptoms.

Because the PGD items in TGI-SR+ and PG-13-R did not measure similarly in both samples, we separated the samples when evaluating the risk factors for PGD using regression analysis. We started with the association between gender and PGD symptom. The gender associations with PGD symptom appeared to be different in both samples. Female gender was a significant predictor for PGD in Dutch sample, but not in Swedish sample. The fact that the results were different is somewhat surprising given that female gender has long been identified as a risk factor for PGD (Kersting et al., 2011; Burke & Neimeyer, 2012). Our contradictory finding could be due to the use of different measurement instruments. TGI-SR+ may be more prone to gender effect than the other instrument, thus, resulting significant association with PGD score. Nevertheless, a recent German study on gender as a predictor of PGD reported the same finding with Swedish sample which showed negative association between these two variables (Doering et al., 2022). Recent meta-analyses also reported non-significant effect on PGD prevalence both after natural and unnatural losses (Djelantik et al., 2020; Lundorff et al., 2017). The typical overrepresentation of females in bereavement research (Stroebe, Stroebe, & Schut, 2003) may complicate the investigation of gender effects in convenience samples,

contributing to disparate results. Reflecting the general reliance on convenience samples in the original studies, the meta-analyses are also partly based on studies from convenience samples. Population-representative samples are thus uniquely relevant for investigating this effect (Doering et al., 2022).

In two data samples, the age of the bereaved participant was not a risk factor for PGD, although the two samples covered a broad range of ages (18-± 85 years). This finding is similar to prior meta-analyses, which reported non-significant findings (Djelantik et al., 2020; Heeke et al., 2019), and other review reported a significant negative association (Burke & Neimeyer, 2013). Nevertheless, prior studies also reported contradiction findings. For instance, two quantitative studies of bereaved Chinese adults and college student in the US reported positive association between younger age and PGD (He et al., 2014; Hardison et al., 2005). Kersting et al., (2011), on the other hand, investigated the association between age groups and PGD prevalence, rather than age as a continuous variable, and discovered that participants aged over 61 years were more likely to experience PGD than other age groups. It is important to note that the study used age groups with broad ranges, for example, grouping participants aged 61 to 94 years into one category. The current study, on the other hand, used age as a continuous variable. This is a significant difference between the two analytical approaches and may have an impact on the results.

Due to minor bereaved participants who lost a child or spouse during pandemic COVID-19 were included in our sample, we combine these two categories because losing a child and a spouse are suggested as the most well-established predictors for PGD based on previous literatures. This association was also evident in our analysis. Compared to other losses, losing a child or spouse reported to be significantly correlated with higher level of PGD. This finding is consistent with a number of studies (Fernandez-Alcantara & Zech, 2017; He et al., 2014; Kersting et al., 2011), which have consistently shown that loss of a child or a spouse

might result in more intense or persistent grief than any other type of loss. Losing a child conveyed as the highest risk factor for PGD as demonstrated across different cultures (Doering et al., 2022; Fernandez-Alcantara & Zech, 2017; He et al., 2014; Kersting et al., 2011; Neria et al., 2007), followed by losing a spouse (Doering et al., 2022; Kersting et al., 2011).

In this study we also investigated the bereavement that caused by COVID-19 vs. other causes, whether natural or unnatural factor. According to our findings, there were non-significant correlation between COVID-19 related bereavement with higher-level of PGD symptom. Only few studies evaluating COVID-19 related bereavement as predictor for PGD. A study from China with all sample of bereaved people lost loved one due to COVID-19, revealed positive correlation on COVID-19 related death (vs. COVID-19 related complication) with PGD (Tang & Xiang, 2021). The study demonstrated that over one-third of COVID-19 related bereaved individuals suffered from PGD. A study by Eisma, Tamminga, & Boelen (2021) proposed that people who experienced COVID-19-related bereavement experienced more severe grief than people who experienced natural losses but did not experience more severe grief than people who were bereaved due to unnatural causes. This is because COVID-19-related deaths were identified as unexpected deaths (Doering et al., 2022), which may distress bereaved people due to being unprepared and overwhelmed as a result of funeral service restrictions.

Another well-established risk factor is shorter time since loss (Burke & Neimeyer, 2013; Djelantik et al., 2020; Hardison et al., 2005; Heeke et al., 2019; He et al., 2014; Lobb et al., 2010). However, our study reported negative association between time since loss and high-level of PGD symptom. This is in line with a recent meta-analysis that reported a non-significant association (Lundorff et al., 2017). In accordance with another study from German population-representative sample, shorter time since loss was a risk factor for PGD among participants whose loss dated back at least six months. However, the effect size of the

association between time since loss and PGD was relatively small in our sample and in other studies [e.g., (Bettina et al., 2011; Doering et al., 2022; Kersting et al., 2011)] and should not be overstated in its significance.

The study also looked at how prior and current mental health issue like depression and anxiety affected PGD manifestations on a symptom level in a bereaved sample. Both samples revealed positive associations between history of mental health problem and PGD symptom levels, indicating that a history of mental health issue is a risk factor for PGD. Unfortunately, few studies have looked into the mental health comorbidity in PGD patients. Simon (2007) discovered that patients with prolonged grief who had at least one psychiatric comorbidity such as mood or anxiety disorders had higher levels of grief symptomatology and were more severely ill with depression, trauma, and general anxiety symptoms. His results suggested that comorbid disorders may comprise a risk factor for PGD. Furthermore, in line with previous research on trauma and bereavement, the age of onset of psychiatric comorbidity occurred before bereavement, implying that preexisting psychiatric illness, such as a history of mood or anxiety disorder, may exacerbate PG symptoms (Bromet, Sonnega, & Kessler, 1998; Simon et al., 2007).

Strengths and Limitations

One of the current study's strengths is that it used MI to evaluate two different instruments before analyzing risk factors for PGD in two samples. Furthermore, the study assessed PGD risk factors using multiple predictors. There are only a few studies that evaluate risk factors for PGD during pandemic COVID-19, and this study is one of those few studies that includes COVID-19 related bereavement as a predictor for PGD. Certain limitations, however, must be acknowledged. The results revealed a non-invariance in the scalar model, but we did not investigate what caused it. Furthermore, due to the small number of participants who met the criteria for possible PGD, we were unable to investigate participant estimation

based on categories that met the criteria for PGD. Few studies have evaluated and reviewed PGD during the pandemic COVID-19, resulting in a limited number of references used, specifically literatures related to COVID-19-related bereavement.

Implication and Future Research

Our findings have clinical implications as well as implications for future research. More understanding of the risk factors for PGD can aid in the identification of bereaved people at risk for PGD and the refinement of grief-specific interventions, especially during pandemic COVID-19. A targeted group that requires more support could be identified based on the associated factors reported in this study. Although our study found some well-established risk factors for PGD (such as a history of mental health problems and the loss of a child or spouse), other risk factors need to be reconsidered (e.g., age, gender, cause of death, and time since loss). More representative population may be required in future research to support the study's findings. For example, the number gender (women vs. men), cause of death (COVID-19 related bereavement vs other cause), and kinship to the deceased (child/spouse vs. loss of other) need to be equal. A future study also could look at the moderation variables that exist between the PGD score total and the predictor variables.

Taken together, our study identified risk factors for PGD during pandemic COVID-19 as the main aim of the study, and testing MI of two different instruments used in both samples as the second aim. MI showed noninvariant in the scalar model, thus, regression analysis for testing risk factors for PGD tested separately for both samples. According to our findings, significant risk factors for high-level of PGD symptom in both samples include a history of mental health problems and the loss of a child or spouse. In the Dutch sample, female gender was positively correlated with high-level of PGD symptom, but in the Swedish sample on the other hand, non-significant correlation was found.

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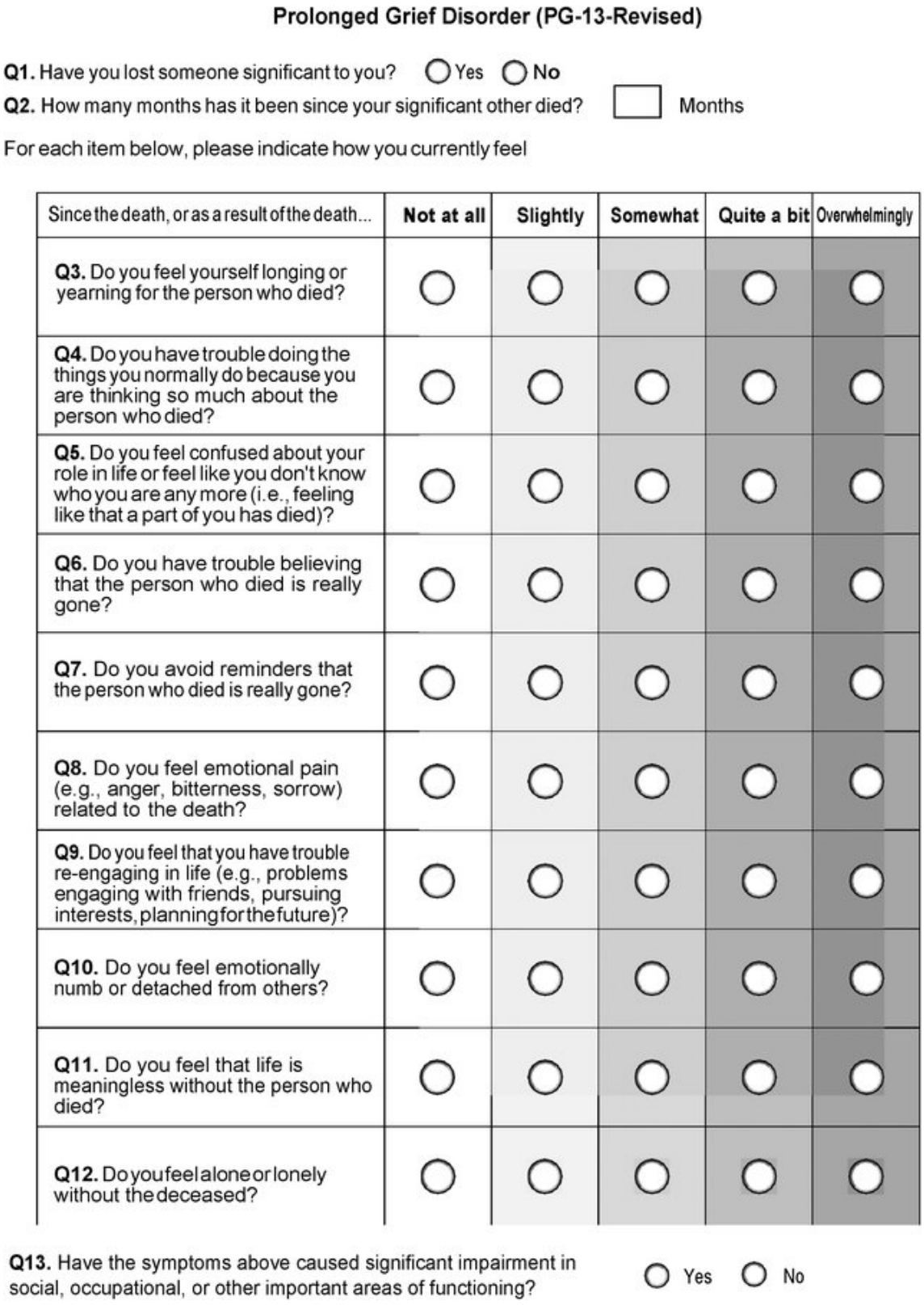
Appendices

Supplemental Table 1

		DSM-5-TR	Item	PG-13-Revised	Item	TGI-SR+
PGD1	B1	Intense yearning/longing for the deceased person	3	Do you feel yourself longing or yearning for the person who died?	3	I found myself longing or yearning for the person who died.
PGD2	B2	Preoccupation with thoughts or memories of the deceased person (in children and adolescents, preoccupation may focus on the circumstances of the death)	4	Do you have trouble doing the things you normally do because you are thinking so much about the person who died?	1	I had intrusive thoughts or images related to the person who died.
PGD3	C1	Identity disruption (e.g., feeling as though part of oneself has died)	5	Do you feel confused about your role in life or feel like you don't know you are anymore (i.e., feeling like that a part of you has died)?	21	It felt as if a part of me has died along with the deceased.
PGD4	C2	Marked sense of disbelief about the death	6	Do you have trouble believing that the person who died is really gone?	19	It felt unreal that he/she is dead.
PGD5	C3	Avoidance of reminders that the person is dead (in children and adolescents, may be characterized by efforts to avoid reminders)	7	Do you avoid reminders that the person who died is really gone?	6	I avoided places, objects, or thoughts that reminded me that the person I lost has died.
PGD6	C4		8		2	I experienced intense emotional pain, sadness, or pangs of grief.

		Intense emotional pain (e.g., anger, bitterness, sorrow) related to the death		Do you feel emotional pain (e.g., anger, bitterness, sorrow) related to the death?	8	I felt bitterness or anger related to his/her death.
PGD7	C5	Difficulty with reintegration into life after the death (e.g., problems engaging with friends, pursuing interests, planning for the future)	9	Do you feel that you have trouble re-engaging in life (e.g., problems engaging with friends, pursuing interests, planning for the future	9	I felt that that moving on (e.g., making new friends, pursuing new interests) was difficult for me.
PGD8	C6	Emotional numbness (i.e., absence or marked reduction in the intensity of emotion, feeling stunned) as a result of the death	10	Do you feel emotionally numb or detached from others?	10	I felt emotionally numb.
PGD9	C7	Feeling that life is meaningless as a result of the death	11	Do you feel that life is meaningless without the person who died?	11	I felt that life is unfulfilling or meaningless without him/her.
PGD10	C8	Intense loneliness (i.e., feeling alone or detached from others) as a result of the death	12	Do you feel alone or lonely without the deceased?	18	I felt alone or detached from other individuals.

Figure 1.



Prolonged Grief Disorder (PG-13-Revised)

Q1. Have you lost someone significant to you? ○ Yes ○ No

Q2. How many months has it been since your significant other died? ☐ Months

For each item below, please indicate how you currently feel

Since the death, or as a result of the death...	Not at all	Slightly	Somewhat	Quite a bit	Overwhelmingly
Q3. Do you feel yourself longing or yearning for the person who died?	○	○	○	○	○
Q4. Do you have trouble doing the things you normally do because you are thinking so much about the person who died?	○	○	○	○	○
Q5. Do you feel confused about your role in life or feel like you don't know who you are any more (i.e., feeling like that a part of you has died)?	○	○	○	○	○
Q6. Do you have trouble believing that the person who died is really gone?	○	○	○	○	○
Q7. Do you avoid reminders that the person who died is really gone?	○	○	○	○	○
Q8. Do you feel emotional pain (e.g., anger, bitterness, sorrow) related to the death?	○	○	○	○	○
Q9. Do you feel that you have trouble re-engaging in life (e.g., problems engaging with friends, pursuing interests, planning for the future)?	○	○	○	○	○
Q10. Do you feel emotionally numb or detached from others?	○	○	○	○	○
Q11. Do you feel that life is meaningless without the person who died?	○	○	○	○	○
Q12. Do you feel alone or lonely without the deceased?	○	○	○	○	○

Q13. Have the symptoms above caused significant impairment in social, occupational, or other important areas of functioning? ○ Yes ○ No

Figure 2.

Traumatic Grief Inventory – Self Report Plus (TGI-SR+)

Below several grief reactions are listed. Please indicate how often you have experienced each reaction in the past month in response to the death of your loved one.

		never	rarely	sometimes	frequently	always
1	I had intrusive thoughts or images related to the person who died	☐	☐	☐	☐	☐
2	I experienced intense emotional pain, sadness, or pangs of grief	☐	☐	☐	☐	☐
3	I found myself longing or yearning for the person who died	☐	☐	☐	☐	☐
4	I experienced confusion about my role in life or a diminished sense of self	☐	☐	☐	☐	☐
5	I had trouble accepting the loss	☐	☐	☐	☐	☐
6	I avoided places, objects, or thoughts that reminded me that the person I lost has died	☐	☐	☐	☐	☐
7	It was hard for me to trust others	☐	☐	☐	☐	☐
8	I felt bitterness or anger related to his/her death	☐	☐	☐	☐	☐
9	I felt that that moving on (e.g., making new friends, pursuing new interests) was difficult for me	☐	☐	☐	☐	☐
10	I felt emotionally numb	☐	☐	☐	☐	☐
11	I felt that life is unfulfilling or meaningless without him/her.	☐	☐	☐	☐	☐
12	I felt stunned, shocked, or dazed by his/her death.	☐	☐	☐	☐	☐
13	I noticed significant reduction in social, occupational, or other important areas of functioning (e.g., domestic responsibilities) as a result of his/her death	☐	☐	☐	☐	☐
14	I had intrusive thoughts and images associated with the circumstances of his/her death	☐	☐	☐	☐	☐
15	I experienced difficulty with positive reminiscing about the lost person	☐	☐	☐	☐	☐
16	I had negative thoughts about myself in relation to the loss (e.g., thoughts about self-blame)	☐	☐	☐	☐	☐
17	I had a desire to die in order to be with the deceased	☐	☐	☐	☐	☐
18	I felt alone or detached from other individuals.	☐	☐	☐	☐	☐
19	It felt unreal that he/she is dead	☐	☐	☐	☐	☐
20	I put an intense blame on others because of his/her death	☐	☐	☐	☐	☐
21	It felt as if a part of me has died along with the deceased	☐	☐	☐	☐	☐
22	I had difficulties experiencing positive feelings	☐	☐	☐	☐	☐