A Confirmatory Factor Analysis of Combined Models of the Harvard Trauma Questionnaire and the Inventory of Complicated Grief-Revised: Are We Measuring Complicated Grief or Posttraumatic Stress?

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Abstract

The aim of this study was to assess the factorial structure of Complicated Grief (CG) and investigate the relationship between CG and Posttraumatic Stress Disorder (PTSD) through the assessment of models combining both constructs. The questionnaire was completed by elderly, married respondents with a history of at least one significant, interpersonal loss (145 males and 147 females, 60-81 years). Confirmatory factor analysis (CFA) supported a two-factor model of separation and traumatic distress in CG. To investigate the relationship between CG and PTSD three combined models were specified and estimated using CFA. A model where all five factors, the two factors of CG and the three factors of PTSD, as defined by the DSM-IV, were allowed to correlate provided the best fit. The results indicated a considerable overlap between the dimensions of CG and PTSD, and Complicated Grief is construct that appears to be largely accounted for by especially the intrusive component of PTSD.

Keywords: Complicated Grief, Confirmatory Factor Analysis, PTSD, ICG-R.

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Uncomplicated or natural grief consists of painful but moderate disruptions of daily life over the first months after the loss. Natural grief reactions are characterized by disturbances of cognitive, emotional, physical or interpersonal functioning (Bonanno & Kaltman, 2001). Studies estimate that 85-90% of bereaved adult individuals from Western societies go through an uncomplicated grieving process whereas 10-15% of the bereaved are likely to have detrimental complications following bereavement such as posttraumatic stress disorder (PTSD), depression, or anxiety disorders (Bonanno & Kaltman, 1999). During the last decade a considerable amount of research has been conducted on developing diagnostic criteria of Complicated Grief (CG) as a psychiatric disorder specific to the bereavement experience (Jacobs Mazure, & Prigerson, 2000; Prigerson et al. 1995a). The Inventory of Complicated Grief-R (ICG-R) has been found to be a measure of CG that produces reliable scores. Items from the ICG-R closely correspond to the symptoms contained in the diagnostic proposal of CG (Jacobs et al., 2000, Prigerson et al. 1995a). The definition of CG, and the measures used to asses it, have undergone several changes during the last decade (Prigerson et al. 2009), and the question is whether CG captures a disorder only specific to bereavement.

Complicated Grief

The diagnosis of CG was designed to capture grief reactions complicated enough to be considered pathological. CG as a bereavement specific disorder is argued to be clearly distinct from other complications of the natural grieving process such as Posttraumatic Stress Disorder (PTSD) and depression, and if left untreated CG can be associated with enduring mental and physical health morbidity (Jacobs, et al. 2000; Prigerson et al. 1995a; Boelen, van den Hout, & van den Bout, 2008). CG can be assessed six months after the loss, and is classified by three of four daily symptoms of separation distress, six of eleven daily symptoms of traumatic distress, a symptom-duration of six months, and significant impairment in social, occupational, or other important areas of functioning.

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Theoretically CG consists of two factors: Symptoms of separation anxiety as reactions to the irrevocable separation from the deceased and symptoms of traumatic distress relating to the impact of the loss experience (Jacobs et al. 2000; Prigerson et al. 1995a). However, findings from studies that have used exploratory factor analysis (EFA) to investigate the factorial validity of different measures of CG supported a one-dimensional structure where all the symptoms of CG load strongly on a single factor (Boelen, van den Bout, & de Keijser, 2003; Prigerson, et al.1995a; Prigerson et al.1996). A replication study using confirmatory factor analysis (CFA) on a large population of bereaved individuals found that complicated grief, bereavement related depression, and anxiety were distinct symptom clusters, and that symptoms of complicated grief mainly loaded on a single factor (Boelen & van den Bout, 2005). Thus, previous studies indicated that complicated grief may be best conceptualized within a single factor model, despite the theoretical framework pointing to a two-factor model.

Recently the diagnosis of CG has been further refined and renamed Prolonged Grief Disorder (PGD; Prigerson et al. 2009). In PGD, the symptom criterion has been reduced to one of two daily symptoms of separation distress and five of nine daily cognitive, emotional, or behavioural symptoms. While some of the original CG symptoms were excluded in PGD, two new symptoms were added: One of separation distress in relation to daily experiences of intrusive thoughts related to the lost relationship, and one of intense feelings of emotional pain, sorrow, or pangs of grief when confronted with the loss (Prigerson et al. 2009). It is noted that the symptoms of PGD must not be better accounted for by major depressive episodes, general anxiety disorder, or PTSD (Smith, Kalus, Russell, & Skinner, 2009). The two added symptoms in PGD have a remarkable resemblance with symptoms of intrusion in regard to PTSD as defined in DSM IV by "recurrent and intrusive recollection of the event, including images, thoughts, or perceptions" and "intense psychological distress at exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event" or "physiological reactivity on exposure to internal or external cues that symbolize or resemble an aspect of the traumatic event" (American Psychiatric Association, 1994, p. 468).

Bereavement and PTSD

PTSD has previously been identified as a type of complication that can arise after the loss of a loved person (Bonanno & Kaltman, 1999). The core symptoms required for a diagnosis of PTSD are; at least one of five symptoms of persistent intrusion of the traumatic event, at least three of seven symptoms of persistent avoidance or numbness, and at least two of five symptoms of persistent increased arousal. A duration criterion of one month and functional criterion are also included (American Psychiatric Association, 1994).

If the death of a loved one (criterion A1) is combined with a feeling of intense fear, helplessness, or horror (Criterion A2), the event fulfils criterion A and can be considered a possible traumatic event (American Psychiatric Association, 1994). That is, the death of a spouse may be considered traumatic if the bereaved person reacts with intense helplessness or fear in relation to the death, even when the spouse dies due to natural causes. This definition is in line with findings from recent studies of PTSD in bereaved adults. A review of associations between mood and anxiety disorders and widowhood found that 12% suffered from PTSD during the first year of bereavement (Onrust & Cuijpers, 2006). A number of studies of old age bereavement found a PTSD prevalence of 9-27% shortly after the death of the spouse (Brady, Acierno, Resnick, Kilpatrick, & Saunders, 2004; Elklit & O'Connor, 2005; Melhem et al., 2001; Zisook, Chentsova-Dutton, & Shuchter, 1998), whereas another study found a PTSD prevalence of 16% both at two months and 18 months post bereavement (O'Connor, in press).

Using CFA, Simms, Watson, and Doebbeling, (2002) proposed a new four-factor model of PTSD with intrusion, avoidance, dysphoria, and arousal factors which conceptualized the disorder better than the original DSM-IV three-factor model of PTSD. The validity of this model has been supported subsequently by a large-scale study of whiplash patients testing five different models of PTSD (Elklit & Shevlin, 2007), and in a study of bereaved adults testing another five models (Boelen, et al., 2008).

Complicated Grief and Posttraumatic Stress Disorder.

When arguing the case for CG as a distinct disorder, it has been noted that CG includes symptoms separate from those of depression, such as intense intrusive thoughts, avoidance of activity relating to the deceased, yearning and searching for the deceased, loneliness etc. (Horowitz, Siegel, Holen, & Bonanno, 1997; Prigerson, Frank, Kasl, & Reynolds, 1995b). However, these symptoms appear to overlap substantially with symptoms of PTSD. This observation is supported by a number of studies that found high correlations between CG and PTSD (e.g. Cohen, 2006; Ehlers, 2006; Lichtenthal, Creuss, & Prigerson, 2004). A study (Bonanno et al. 2007) using a nine item screening measure for CG reported high correlations between PTSD and CG (r = .66), PTSD and depression (r = .76), and a moderate correlation between CG and depression (r = . 49;). Looking at the sub-scale level of PTSD using the Simms 4-factor model based on the PTSD Symptom Scale (self-report), Boelen et al. (2008) found that the dysphoria (r = .76) and the intrusion (r = .70) factors of PTSD had higher correlations with a unidimensional measure of CG, than did the avoidance (r = .48) and arousal (r = 44) factors of PTSD.

While PTSD and CG share some of the same symptoms in relation to intrusion and dysphoria, CG has been argued to be theoretically distinct from PTSD in relation to separation distress (Lichtenthal et al. 2004; Prigerson et al. 2009). Furthermore, PTSD often involves more pronounced anxiety than CG when confronted with intrusive memories of the traumatic event, while in CG intrusive memories of the lost relationship may offer some elements of comfort (Lichtenthal et al.

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2004). These findings were supported by a study that compared CG, depression, and PTSD, and found that CG predicted functioning in the bereaved over and above PTSD and depression (Bonanno et al. 2007). They also found that PTSD at four months post loss predicted increased heart rate when confronted with the lost relationship, whereas CG predicted decreased heart rate (independent of depressive symptoms).

There seems to be some support in the literature that CG may in fact identify a specific bereavement related disorder. However, the above mentioned research evidence indicated a more substantial overlap between the two constructs than could be expected based on the theoretical distinctions between CG and PTSD, and when looking at the specific symptoms of CG and PTSD several similarities appear. Until now studies investigating the relationship between CG and PTSD mainly used EFA and have not been able to test specific hypotheses. However, CFA allow different models combining the two constructs to be tested and compared using objective statistical indices of model fit. It is proposed that testing alternative models may provide further knowledge about the nature of the relationship between CG and PTSD.

The objective of this study was to employ CFA to investigate the following hypotheses: (1) based on the theory behind CG this construct was expected to be best conceptualized as a two factor model, (2) Based on the previous findings in the literature, it was hypothesized that the combination of CG and PTSD was best conceptualized as a model including two very closely related but not completely overlapping constructs.

To investigate the factor structure of CG and the relationship between CG and PTSD, measured using the Harvard Trauma Questionnaire (HTQ: Mollica et al. 1992), the following three combined models were specified and estimated using CFA. Model 1 was a one-factor model with all items of ICG-R and HTQ loading on a single latent variable. This model was tested to allow for the possibility that ICG-R measures a set of symptoms that, though specific to the bereavement experience, also is accounted for by of PTSD. Model 2 was a five-factor model where ICG-R (correlated two-factor model) was uncorrelated with PTSD (correlated three-factor model). This model was specified to test the hypothesis that the two scales measure two fully independent groups of latent variables (CG and PTSD). In Model 3 the two ICG-R subscales were allowed to correlate with all three HTQ subscales, to allow for the possibility that CG and PTSD are two closely associated, but not completely overlapping constructs (Model 3). It was expected that the combination of CG and PTSD was best conceptualized by Model 3.

Method

Procedure

A general sample of married elderly people living in Aarhus County was randomly selected through the Danish Central Person Register (CPR). The CPR is a national register that includes information regarding age, marital status, name of partner, place of residence etc. on all people residing in Denmark. A general sample was chosen to avoid the bias that samples with specific types of loss experiences may produce. The potential participants received an information letter, a self-addressed and pre-paid response envelope, and a questionnaire.

Participants

Four hundred and eighty one people participated, representing a response rate of 41%. Relatively more of the participants were male (50%) than non-participants (male: 44%; $\chi 2 = 4.55$, $p < 0.05$) and the participants were significantly younger (M = 71 years) than non-participants (M = 72 years; F = 25.30; $p < .0005$). An ANOVA was performed and indicated no significant effect of gender on total-scores of HTQ (F (1,290) = 2.78;*ns*) and ICG-R (F (1,290) = 1.00; *ns*).Pearson correlations indicated

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no association between age and total-scores of HTQ (r = .01; *ns*) and ICG-R (r = .05; *ns*), respectively. Because no significant correlations or interactions were identified between age and gender in relation to the total-scores of HTQ and ICG-R, age and gender were not included as covariates in the subsequent analyses. A total of 189 participants were excluded either due to poor data quality (133 participants had more than 15% missing items) or because they reported not having experienced any significant interpersonal losses in their lifetime (56 participants). The excluded participants (M = 73 years) were older than the included participants (F = 21.87; $p < .0005$). The final sample had a mean of 1% missing values on the total amount of items from the included scales. The missing values were imputed using the Expectation Maximization Algorithm, which has been demonstrated to be an effective method of dealing with missing data (Bunting, Adamson, & Mulhall, 2002).

The mean age of the remaining 292 participants was 70 years (*SD* = 3.47; range 60 – 81 years). On average the participants had been married for 43 years (*SD* = 10; range 3-59), had 7.8 years of public schooling (*SD* = 1.4; range 1-11 years) and 4.6 years of further education (*SD* = 2.8; range 0 – 13 years). Ninety-five percent had children (M = 2.8; *SD* = 1.19; range 1 – 8 years). Thirty-five percent lived in villages or rural settings. The participants were asked to identify the most significant loss in their lifetime and base their response to the questionnaire on this experience. Losses chosen as the most significant were loss of: parent (63%), spouse (13%), sibling (12%), child (6%), and friend (5%). An average of 13.5 months (*SD* = 13.1; range 0 – 63 years) had passed since the loss. Sixty-nine percent experienced a period of illness preceding the death of their loved one, and 34% had participated in the daily care of the deceased. Sixty-four percent experienced a forewarning of death immediately before the death.

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Measures

The first part of the questionnaire contained a number of mainly Likert-scale type single items and short scales from which the following were selected: education, years of marriage, social support, use of medication and alcohol, sense of forewarning before the death, distress, death anxiety and helplessness in relation to the illness and death situation, course of illness of the deceased, religious activities, experience of meaning with life, etc. The collection of data was based on self-report questionnaires.

The ICG-R (Prigerson et al., 1995a; Jacobs et al. 2000) is a short version of the ICG originally consisting of 19 items. The ICG-R consists of 15 items focusing on separation distress and traumatic distress rated on a 5-point Likert scale (maximum range 15 - 75; ibid.). A functional criterion and a duration criterion of six months are also included in the ICG-R. The scale has been found to have good internal consistency (ibid.). The minimum score of 36 when fulfilling the criteria of separation distress and traumatic distress was used as cut off point for CG.

The Harvard Trauma Questionnaire-Part IV (Mollica et al. 1992) was used to estimate the occurrence of PTSD. The HTQ originally consisted of 31 items rated on a 4-point Likert scale ranging from *not at all* (1) to *very often* (4). In this study only the first 16 items closely corresponding to the DSM-IV symptoms of PTSD were used in the statistical analysis. All participants completed the HTQ in relation to their symptoms during the last month based on the loss chosen as the most significant in their lifetime. All participants fulfilling the three core DSM-IV criteria of intrusion, avoidance, and arousal with scores of three and above on each item were considered for a classification of PTSD. The Danish version of the HTQ has been found to produce reliable and valid scores (Bach, 2003), and HTQ ratings according to the DSM-III-R diagnostic criteria of PTSD showed an 88% concordance with interview-based estimates of PTSD (Mollica et al. 1992).

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Data Analysis

Cronbach's alpha and mean inter-item correlations (*MIIC*) were calculated to determine the internal consistency of the subscales of the ICG-R and HTQ items. The analyses were performed using SPSS 14 for Windows. CFAs were conducted using LISREL 8.8 (Jöreskog & Sörbom, 2006). A covariance matrix and asymptomatic weight matrix were computed using PRELIS 2.8. An asymptomatic weight matrix allows for weaker assumptions regarding the distribution of the observed variables and results in improved fit and test statistics (Curran, West & Finck, 1996; Satorra, 1992). In a preliminary analysis we specified and tested alternative CFA models of the ICG-r and HTQ. Subsequently, we estimated combined CFA models of ICG-R and HTQ to assess the conceptual distinctiveness of CG and PTSD. The models were estimated using robust maximum likelihood, and as suggested by Hoyle & Panter (1995), the goodness of fit for each model was assessed with a range of fit indices including the Satorra-Bentler scaled chi-square ($S\text{-}B\chi^2$), the Incremental Fit Index (IFI; Bollen, 1989), and the Comparative Fit Index (CFI; Bentler, 1990). A non-significant $S\text{-}B\chi^2$ and values greater than .95 for the IFI and CFI are considered to reflect acceptable model fit. Additionally, the Root Mean Square Error of Approximation (RMSEA; Steiger, 1990) with 90 % confidence intervals (CI) were reported, where a value less than .05 indicates close fit and values up to .08 indicates reasonable errors of approximation (Jöreskog & Sörbom, 1993). Further, we included the standard root mean-square residual (SRMR; Jöreskog & Sörbom, 1981) that has been shown to be sensitive to model mis-specification (Hu & Bentler, 1999). SRMR values less than .08 are considered to be indicative of acceptable model fit (Hu & Bentler, 1998). Moreover, the comparative fit was assessed using the Expected Cross Validation Index (ECVI; Brown & Cudeck, 1989), used for the purpose of model comparison with the smallest value being indicative of the best fitting model. No correlated errors were included in any of the models.

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Results

Prevalence and Internal consistency

The prevalence of CG in this study indicated by scores above the cut-off point of 36 was 9% (*M* = 21.78; *SD* = 9.74; range 16 - 40). The internal consistency of the scores were acceptable for ICG-R both on the total scale and subscales, and the *MIIC* were relatively high (Total score: $\alpha = .94$; *MIIC* = .52. Separation Anxiety: $\alpha = .89$; *MIIC* = .66. Traumatic Distress: $\alpha = .92$; *MIIC* = .50). The prevalence of participants meeting clinical cut-offs of the three core criteria of PTSD as measures by the HTQ was 6% (HTQ-total: *M* = 25.04; *SD* = 7.44; range 16-40). The internal consistency and the inter-item correlations of the HTQ scores on the total scale and subscales were acceptable (Total score: $\alpha = .88$; *MIIC* = .33. Intrusion: $\alpha = .76$; *MIIC* = .46. Avoidance: $\alpha = .78$; *MIIC* = .34. Arousal: $\alpha = .80$; *MIIC* = .45). Kappa analysis was used to determine the degree of co-morbidity between CG and PTSD. The analysis indicated a moderate degree of co-morbidity beyond chance ($\kappa = .48$, $p < .0005$)

Semi-partial correlations between HTQ and ICG-R total scores controlling for types of loss individually revealed little change in the strength of correlations between the two constructs. Only when controlling for loss of a parent and loss of a spouse a small fall in the strength of the correlation between HTQ and ICG-R was observed. This indicates that it is unlikely that the nature of the loss moderated the relationship between the two constructs.

Factor structure of Complicated Grief

In accordance with previous EFA of measures of CG, and the common use of the ICG-R, we tested a one-factor model of ICG-R that included all items. We also tested the theoretical derived two-factor model (correlated and uncorrelated) consisting of symptoms of separation anxiety and traumatic distress. The fit indices of the alternative models of ICG-R are reported in Table 1. On the basis of the

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criteria associated with RMSEA and SRMR, and IFI and CFI, the one-factor model and the correlated two-factor model were judged to exhibit reasonable model fit. The chi-square statistics were statistically significant, but this should not lead to rejection of the models, because the large sample size increases the power of the test (Tanaka, 1987). Comparing the one-factor model and the correlated two-factor model, the correlated two-factor model had a significant better fit (ΔS-B- χ^2 = 10.35; Δ*df=1*, *p* < .005). Also, the RMSEA, ECVI and SRMR values were in favour of the correlated two-factor model, as were the chi-square/*df* ratio (one-factor model: 2.93; two-factor-c model: 2.77), and the IFI and CFI values. Thus, it was judged that the two-factor model represented an adequate description of the data and is the best of the alternative models. The two factors correlated very highly correlated (*r* = .84) and factor loadings ranged from .60 to .66 on the separation anxiety factor and from .38 to .68 on the traumatic distress factor. The loadings can be seen in Table 2. All loadings were statistically significant (*p* < .05).

Factor structure of PTSD.

Three models of PTSD were tested using the HTQ. The original DSM-IV three-factor model consisting of intrusion, avoidance, and arousal, and a one-factor PTSD model were estimated. Following recent studies of the structure of PTSD symptoms, we also tested the alternative four-factor model proposed by Simms et al. (2002). The fit indices of the alternative models of HTQ are reported in Table 3. On the basis of meeting all criteria associated with RMSEA and SRMR, and IFI and CFI, the three-factor model and the four-factor model were judged to exhibit reasonable model fit. Again, the chi-square statistics were statistically significant. Comparing the three-factor model and the four-factor model, there where no significant difference in fit (ΔS-B χ^2 = 2.43; 3 Δ*df=3*, *p* = .49). However, the three-factor model had a lower chi-square/*df* ratio (2.00) compared with the four-factor model (2.21), lower RMSEA, ECVI and SRMR values, and slightly higher values for IFI and CFI. On that

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basis, and because of the preference of the most parsimonious model, it was judged that the three-factor DSV-IV model represents an adequate description of the data and a better model than the four-factor model. The three symptom clusters correlated highly (r = .65 - .81) and factor loadings ranged from .64 to .72 on the intrusion factor, from .39 to .71 on the avoidance factor and from .61 to .73 on the arousal factor. All loadings were statistically significant ($p < .05$).

Combined models

ICG-R and HTQ consisted of two completely separate sets of items reflecting a set of two and a set of three factors respectively. The univariate correlation between the HTQ and CG total scores was high and statistically significant (r = .68, p <.0005). To investigate the overall relationship between CG and PTSD three combined models were specified as described in the introduction of this study and estimated using the ICG-R and the HTQ.

The fit indices for these three models of ICG-R and HTQ are reported in Table 4. On the basis of meeting the criteria associated with RMSEA and SRMR only, Model 3 was judged to exhibit reasonable model fit. Comparing Model 3 with Model 1 (ΔS-Bχ^2 = 35.63; $\Delta df=10$, $p < .0005$) and Model 2 (ΔS-Bχ^2 = 20.49; 6 $\Delta df=6$, $p < .005$), Model 3 had a significantly better fit. Also, Model 3 had a lower chi-square/*df* ratio and ECVI values than Model 1 and Model 2. Moreover, Model 3 met the .95 criteria for the IFI and CFI, considered to reflect acceptable model fit. On that basis it was judged that Model 3 represents a reasonable description of the data, suggesting that CG and PTSD are two correlated, but different constructs. Looking at the specific formulation of items from the two scales, it appears that item 1 on the HTQ and item 15 on the ICG-R relate to recurrent thoughts about the death. Item 4 on the HTQ and item 21 on the ICG-R relate to feeling detached from other people, whereas item 14 on the HTQ and item 20 on the ICG-R relate to feeling there is no real future after the loss. Possible strong correlations between the above items must be considered when investigating the

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relationship between CG and PTSD. Therefore, in an additional analysis of Model 3, the three sets of almost identical items in the HTQ/ICG-R were allowed to correlate. This alteration did not result in a better fit (results not shown). Factor correlations of Model 3 ranged from r = .39 to r =.88 on the two CG factors and from r =.37 to r =.73 on the three PTSD factors. All correlations were statistically significant (p < .05).

The correlations between the five factors in Model 3 are shown in Figure 1. Traumatic distress was very highly correlated with intrusion (r = .87) and highly correlated with the two other clusters of PTSD symptoms (r = .49-.56). Separation anxiety was very highly correlated with intrusion and avoidance (r = .73-.86) and highly correlated with arousal (r = .56). The dependent correlations among the CG and PTSD factors (Model 3) were compared following the approach suggested by Steiger (1980). The association between separation anxiety and arousal was significantly weaker than the associations found between separation anxiety and avoidance (t = -7.3, p. < .001) and intrusion (t = -12.7, p. < .001) respectively. Moreover, a stronger association was found between separation anxiety and intrusion as compared to separation anxiety and avoidance (t = -6.8, p. < .001). Furthermore, traumatic distress was significantly more associated with intrusion than arousal (t = -15.4, p. < .001) and avoidance (t = -18.8, p. < .001). Finally, traumatic distress was more associated with avoidance than arousal (t = -2.1, p. < .05).

Discussion

Factor structure of Complicated Grief

In line with the theoretical definition of CG the results of this study indicated that the theoretical definition of CG consisting of two factors, separation distress and traumatic distress, conceptualize CG better than a uni-dimensional model. However, the two factors correlate highly and although significantly better, both the correlated two-factor model and the one-factor model were judged to

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exhibit reasonable model fit. Further investigation of the factor structure of CG and Prolonged Grief Disorder, especially in clinical samples, may lead to a better understanding of the factorial structure of complicated grief reactions. In addition, with Cronbach's alpha in excess of .80 on subscales and total scores, the results of this study indicate that the Danish version of ICG-R is a measure that produces reliable scores, and that it translates well into a Danish context. The MIIC's ranged between .50-.66 and were relatively high (Briggs & Cheek, 1986), indicating than some of the items on the scale may be redundant. It is possible that the recent refinement of CG into Prolonged Grief Disorder excludes the most redundant items from the ICG-R.

Factor structure of PTSD

Before investigating the combined factor structure of CG and PTSD the factor structure of PTSD was assessed. Surprisingly, the original three-factor DSM-IV model was the best representation of PTSD, fitting the data better and with a more parsimonious solution than the four-factor model proposed by Simms et al. (2002). Recently the Simms model has been found to provide superior fit than the DSM-IV three-factor model in a number of studies (Palimieri, Weathers, Difede, & King, 2007; Elklit & Shevlin, 2007; Boelen et al. 2008). The three-factor model of PTSD was introduced in DSM-III in 1980 based on studies of traumatized adults (American Psychiatric Association, 1980). The persons that the three factor structure was originally based on were adults at the time and most likely belong the elderly population of today. The cohort represented in this study are also elderly, and the finding of the three factor structure of PTSD as the best fitting model may thus be explained by a cohort effect. The non-clinical nature of this sample may be another possible explanation.

Combined models

The theory behind CG indicated that the traumatic distress factor would correlate highly with PTSD intrusion and avoidance but that separation anxiety would be unique to CG and therefore not

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correlate as highly with factors of PTSD. The findings of this study did not support this assumption. Instead, correlations as illustrated in Figure 1 were very high between intrusion, avoidance, and separation anxiety as well as between intrusion and traumatic distress and high between the remaining factors. The tests of difference between the correlations indicated that both separation anxiety and traumatic distress were significantly more strongly associated with the intrusive component of PTSD than with avoidance and arousal. The lowest correlations were found between separation distress, traumatic distress, and arousal, indicating that CG was less related to arousal than to the other factors of PTSD. This conclusion was further supported by these results and previous research that indicated that decreased hart rate was related to CG while physical arousal, as measured by increased hart rate, was related to PTSD (Bonanno et al. 2007).

The model which defined two factors of CG and three factors for PTSD and allowed all factors to correlate (Model 3, Table 4) was deemed the best fitting model for this data. Yet, a one dimensional model of CG and PTSD combined (Model 1, Table 4) was also a reasonable model. Moreover. the univariate correlation was high between the HTQ and ICG-R total scores (r = .68). Similar correlations have previously been found between measures of complicated grief and posttraumatic stress (Bonanno et al. 2007). Likewise, the two CG factors and the three PTSD factors were strongly associated. Furthermore, the nature of the loss was found not to mediate the relationship between CG and PTSD. In sum, these results indicate a very high (although not complete) level of overlap among the dimensions of CG and PTSD. As such, the present study indicate that the two constructs might share the same underlying and yet unidentified latent variable.

This study has some limitations. One is the relatively low response rate. However, low response rates in psychological survey studies of the bereaved are common (Stroebe, Hansson, Stroebe, & Schut. 2001). Likewise, response rates are known to decrease with increasing age (Ekwall, Sivberg, &

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Hallberg, 2004). The elderly sample in this study may result in unwanted bias in line with the above mentioned, as may the fact that the participants were relatively younger than both non-participants and excluded participants. Furthermore, the relatively great variations in the nature of the loss reported across the sample may be a potential limitation. Relatively more participants chose loss of a parent or loss of a former spouse as the most distressing loss in their lifetime leaving too few participants with other types of loss for more fine-grained analysis regarding the effect of the nature of the loss on the relationship between CG and PTSD. Future research may benefit from an investigation of how the nature of the loss affects this relationship.

The participants were recruited through the Danish CPR. This type of recruitment is likely to make the sample highly representative and provides information about the non-participants which is otherwise not available. Most previous bereavement research has been based on samples drawn from hospital records, memberships of associations, recruitment through obituaries, or active responses to newspaper adverts (Stroebe et al., 2001). These types of recruitment are less likely to provide a representative sample. Investigating bereavement related issues through a representative recruitment style can be considered a strength of this study, as can using CFA as compared to explorative factor analysis in relation to CG.

Clinical implications

Given the non-clinical nature of this sample with its low frequencies of CG and PTSD it is possible, that the measures used capture an underlying factor of individuals responses to loss (e.g. dysphoria or other factors of general distress), making it difficult to make any strong comments regarding diagnostic issues. Nevertheless, the results of this study indicate that CG and PTSD have a significant overlap, and this is important to keep in mind in the clinical work with the bereaved. The correlation between the two constructs is high and the results of this and other studies point towards that CG and PTSD are identified by very similar sets of symptoms. Taking into consideration the large overlap between the two constructs is possible that the same treatment strategies may be effective in case of both CG and bereavement-induced PTSD. Considering the strong relationship between intrusion and CG total-scores especially PTSD-specific interventions targeting symptoms of intrusion as suggested by Foa, Henbree, and Rothbaum (2007) may be relevant to apply. Unfortunately, this study did not provide information about the specific causes for the symptoms or the dynamics behind them. In other words the data does not allow conclusions on whether we are dealing with an attachment-related disturbance or a stress-response, although stress-alike intrusive symptoms seem to be very pronounced in both constructs. Clarifying the relationship between the CG and PTSD and investigating which treatment strategies that proves most efficient, therefore, may be an important objective in future clinical work with the bereaved.

In conclusion this study directly compared different models of CG and PTSD combined. A substantial overlap appears to exist between CG and PTSD, and it is possible that the symptoms known from CG or PGD may be well accounted for by especially the intrusive component of PTSD. It is therefore very likely that clear differentiation between CG or PGD and bereavement related PTSD will be difficult both in scientific and clinical settings. Furthermore, although good reasons have been given for including CG or PGD in DSM (Parkes, 2005-2006; Prigerson et al. 2009), PGD is not yet an established and recognized disorder in the psychiatric diagnostic systems. PTSD, however, is an established, non-specific mental disorder that may very well be able to identify CG as a traumatic bereavement reaction. In addition PGD must not be better accounted for by other major disorders such as PTSD (Smith et al. 2009). The results of this study points towards the possibility that CG may not capture a disorder specific only to bereavement and may in fact be well accounted for by PTSD. With this in mind, and before including PGD as a bereavement specific disorder in the DSM-V and ICD-11,

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care must be taken to investigate the overlap between PTSD and PGD in future research. Investigating of the diagnostic overlap of CG/PGD and PTSD using CFA in clinical samples with a higher frequency of psychiatric symptoms than seen in this elderly sample and combining self report scales with structured clinical interviews like the Structured Clinical Interview for DSM-IV-TR Axis 1 Disorders (SCID-1; First, Gibbon, Spitzer, & Williams, 2002) in clinical and non-clinical samples, are possible next steps to facilitate clarification of whether the symptoms of PGD are in fact better accounted for by PTSD.

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Figure Caption

Figure 1. Model 3 with standardized factor correlations. All correlations given are significant at $p < .05$.

Figure 1

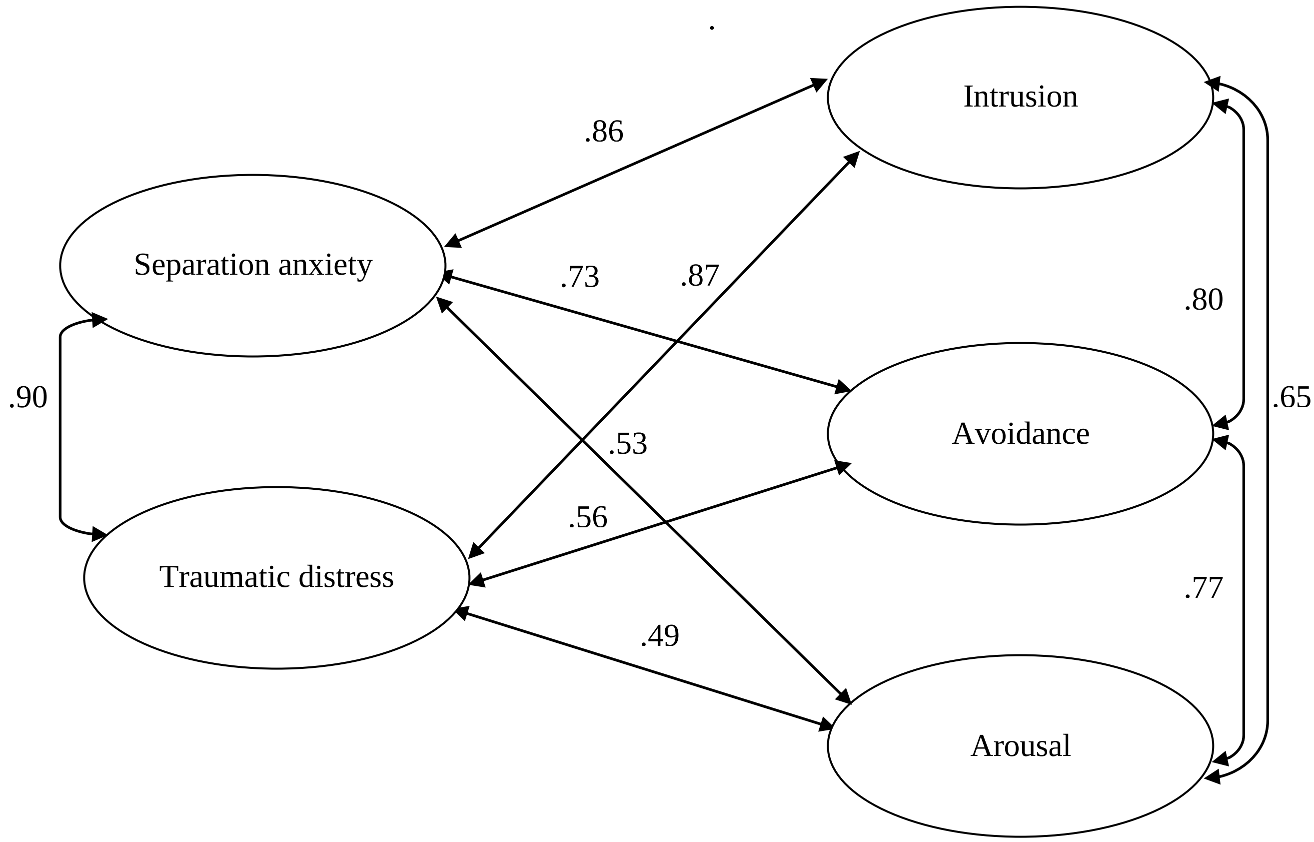

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Table 1

Fit Indices for the Alternative Models of the Inventory of Complicated Grief

Index	One-factor model	Two-factor model correlated	Two-factor model uncorrelated
S-Bχ^2 *df* (*p*)	263.44 90 (.00)	247.18 89 (.00)	302.42 90 (.00)
RMSEA 90 % CI	.081 (.070-.093)	.078 (.067-.090)	.090 (.079-.100)
ECVI 90 % CI	1.11 (.96-1.29)	1.06 (.91-1.24)	1.25 (1.08-1.44)
IFI	.95	.96	.94
CFI	.95	.96	.94
SRMR	.073	.071	.20

Note. S-Bχ^2 = Satorra-Bentler scaled chi-square; RMSEA = Root Mean Square Error of Approximation; ECVI = Expected Cross Validation Index; IFI = Incremental Fit Index, CFI = Comparative Fit Index; SRMR = Standard Root Mean-square Residual.

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Table 2

Standardized Factor Loadings for the Correlated Two-Factor Model of the ICG-R

Question	Separation anxiety	Traumatic distress
Q1	.60	
Q2	.65	
Q3	.66	
Q4	.66	
Q5		.42
Q6		.64
Q7		.68
Q8		.53
Q9		.63
Q10		.63
Q11		.65
Q12		.38
Q13		.65
Q14		.61
Q15		.56

Note. All factor loadings significant ($p < .05$).

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Table 3

Fit Indices for the Alternative Models of the Harvard Trauma Questionnaire

Index	One-factor model	Three-factor model (DSM-IV)	Four-factor model (Simms et al., 2002)
S-Bχ^2 *df* (*p*)	322.08 104 (.00)	201.84 101 (.00)	216.47 98 (.00)
RMSEA 90 % CI	.085 (.074-.095)	.059 (.047-.070)	.064 (.053-.076)
ECVI 90 % CI	1.33 (1.15-1.53)	.93 (.81-1.09)	1.01 (.87-1.16)
IFI	.95	.98	.97
CFI	.95	.98	.97
SRMR	.075	.064	.065

Note. S-Bχ^2 = Satorra-Bentler scaled chi-square; RMSEA = Root Mean Square Error of Approximation; ECVI = Expected Cross Validation Index; IFI = Incremental Fit Index, CFI = Comparative Fit Index; SRMR = Standard Root Mean-square Residual.

Table 4

Fit Indices for the Combined Models

Index	Model 1: One-factor model	Model 2: Five-factor model (ICG-R and HTQ uncorrelated)	Model 3: Five-factor model (ICG-R and HTQ correlated)
S-Bχ^2 *df* (*p*)	1489.27 434 (.00)	840.28 430 (.00)	756.14 424 (.00)
RMSEA 90 % CI	.091 (.086-.097)	.057 (.052-.063)	.052 (.046-.058)
ECVI 90 % CI	5.54 (5.15-5.96)	3.34 (3.07-3.64)	3.09 (2.84-3.37)
IFI	.95	.98	.98
CFI	.95	.98	.98
SRMR	.089	.24	.067

Note. S-Bχ^2 = Satorra-Bentler scaled chi-square; RMSEA = Root Mean Square Error of Approximation; ECVI = Expected Cross Validation Index; IFI = Incremental Fit Index, CFI = Comparative Fit Index; SRMR = Standard Root Mean-square Residual.