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ORIGINAL ARTICLE

Examination of factor structure of the inventory of complicated grief (ICG) in a sample of bereaved military family members with persistent and elevated grief

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Abstract

Knowledge about the effect of a US service member's death on surviving family members is limited. In order to identify their grief-related health care needs, a first step is to identify the characteristics of persistent and elevated grief in a military family sample. The present study identified military family members (n = 232) bereaved more than six months who endorsed an elevated level of grief. A confirmatory factor analysis and test of measurement invariance of factor structure were used to compare the factor structure of their Inventory of Complicated Grief (ICG) responses to that of a bereaved non-military-related clinical research sample with similar grief levels. Results confirmed an equivalent five-factor structure of the ICG in both the military family sample and the clinical research sample. The similarity in factor structure was present despite differences in demographic characteristics and bereavement experiences between samples. Thus, the ICG reliably measures persistent and elevated grief in military family samples and provides grief symptom profiles that facilitates better understanding of their grief-related needs.

KEYWORDS

bereavement, factor analysis, grief, inventory of complicated grief (ICG), military family

1 | INTRODUCTION

Symptoms of grief diminish over time for most bereaved individuals. However, a subset of bereaved individuals is affected by a clinically impairing condition in which grief is intense and prolonged, is associated with persistent functional impairment, and often is comorbid with psychological and physical health disorders (Kersting, Brähler, Glaesmer, & Wagner, 2011; Ott, 2003; Prigerson et al., 2009). Reports of prevalence rates range from 2.4 to 4.8% (American Psychiatric Association, 2013) and 6.7% in a cross-sectional random general population sample (Kersting et al., 2011) to as high as 41% in bereaved spouses (Horowitz et al., 2003).

This condition has been referred to by various names, including complicated grief (CG), prolonged grief disorder (PGD), and traumatic grief (Shear et al., 2011). Criteria for this condition (i.e. persistent

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complex bereavement disorder, PCBD) have also recently been proposed in the DSM-5 conditions for further study. Presently when criteria are met, the condition is coded as an unspecified trauma- and stressor-related disorder within the category of trauma- and stressor-related conditions (APA, 2013). While some of the specific criteria differ (Cozza et al., 2016), each proposed criteria set (CG, PGD, PCBD) defines a persistent grief condition that causes impairment and is distinct from major depressive disorder (MDD) and post-traumatic stress disorder (PTSD) (Barnes, Dickstein, Maguen, Neria, & Litz, 2012; Prigerson et al., 2009; Shear, 2012; Shear et al., 2011).

This persistent grief condition may be particularly relevant to bereaved military family members as they share several risk factors identified in non-military samples. For example, sudden and violent deaths that often occur in military populations have been associated with persistent intense grief and other comorbid mental health conditions in civilian survivor populations (e.g. Green et al., 2001; Kaltman & Bonanno, 2003; Murphy, Johnson, Chung, & Beaton, 2003). Military families may also experience delays in obtaining information about the death (particularly combat or other duty-related deaths), a circumstance associated with more severe grief symptoms (Kristensen, Weisæth, & Heir, 2010). When family members either blame the military for the death, or blame themselves, increased severity of grief may occur (Melhem, Moritz, Walker, Shear, & Brent, 2007; Melhem et al., 2004). In addition, surviving military spouses and siblings are typically young adults and the spouses are almost always female. Both are associated with higher grief severity (Kristensen et al., 2010; Melhem et al., 2004; Morina, Rudari, Bleichhardt, & Prigerson, 2010; Neria et al., 2007; Zisook & DeVaul, 1983). Higher levels of reported mental health difficulties in military spouses associated with deployment (De Burgh, White, Fear, & Iversen, 2011; Mansfield et al., 2010) could also impose additional risk for problematic grief outcomes (Melhem et al., 2004). Yet, it remains unclear whether persistent and elevated grief in bereaved military family members resembles that of bereaved individuals in the general population.

The Inventory of Complicated Grief (ICG; Prigerson et al., 1995), a 19-item self-report measure of grief symptoms, has been widely used as a tool to measure severity of grief (e.g. Boelen, de Keijser, van den Hout, & van den Bout, 2007; Kristensen et al., 2010; Melhem et al., 2007; Mitchell, Kim, Prigerson, & Mortimer-Stephens, 2004; Morina et al., 2010; Prigerson et al., 2009; Szanto et al., 2006). In practice and research, scores greater than 25 (Mitchell, Kim, Prigerson, & Mortimer, 2005) and equal or greater than 30 (Shear, Frank, Houck, & Reynolds, 2005) have been used as thresholds to identify clinically significant cases of complicated grief. In addition, the ICG has been analyzed to determine the structure of grief symptoms. For example, Simon et al. (2011) conducted factor analyses of the ICG in a sample of 782 bereaved individuals. Results identified six symptom clusters in a subset of highly symptomatic "CG cases" (n = 288): (1) yearning and preoccupation with the deceased, (2) anger and bitterness, (3) shock and disbelief, (4) estrangement from others, (5) hallucinations of the deceased, and (6) behavior change, including avoidance or proximity seeking. In order to determine whether a similar factor structure characterizes persistent and elevated grief in bereaved military family members, a comparable analysis is needed.

This study examined whether endorsement of the ICG in a sample of bereaved military family members with elevated grief would be similar to bereaved individuals in a non-military clinical research sample who have similar levels of grief. Thus, a confirmatory factor analysis (CFA) of ICG responses in a military family sample with high self-reported ICG scores (≥ 30) was conducted. In addition, patterns of ICG responses in bereaved military family participants were compared to patterns of responses in a non-military clinical research sample. Given that Simon et al. (2011) identified six clusters in a sample of individuals with high scores on the ICG, we hypothesized that ICG item responses in a military family sample with persistent and elevated grief would also cluster similarly.

2 | METHOD

2.1 | Participants

2.1.1 | Military family sample

Participants were recruited through grief support organizations, social media, online advertisements and word-of-mouth to participate in the National Military Family Bereavement Study (NMFBS; www.militarysurvivorstudy.org). Eligible participants for NMFBS were parents/step-parents/adoptive/legal guardians; siblings/step-siblings; spouses/ex-spouses/adult partners; children/step-children whose related service member had died by any circumstance of death (e.g. accident, homicide, illness, killed in action, suicide) while actively serving in any component (active duty, National Guard or reserve) of the US military (Army, Navy, Air Force, Marines, or Coast Guard) after September 11, 2001. Individuals with persistent and elevated grief were identified from the first 612 NMFBS participants. "Persistence" was defined by having lost a family member at least six months prior to completing the survey (dates of death ranged from September 2001 to November 2012) and "elevated" was operationalized by identifying those who had scored 30 or higher on the ICG. This procedure resulted in a sample of 232 bereaved military family participants for the present analyses.

2.1.2 | Clinical research sample

Clinical research sample participants were individuals who presented with persistent and elevated grief as a primary complaint and were evaluated for participation in one of three National Institute of Mental Health (NIMH)-funded treatment studies of CG (Shear et al., 2005; Shear et al., 2014; Shear et al., 2016). Participants who scored 30 or higher on the ICG at their initial assessment and had lost a family member at least six months prior were selected, resulting in a sample of 780 bereaved adults (Shear et al., 2005: n = 198; Shear et al., 2014: n = 237; Shear et al., 2016: n = 345). Although approximately one-third of these participants (n = 288) were also used in the Simon et al. (2011) analyses, the majority of the sample (n = 492) had not been previously analyzed in this way.

2.2 | Procedure

2.2.1 | Military family sample

Participants provided online consent and completed an online survey accessed through the NMFBS website (www.militarysurvivorstudy.org). Participants provided the following information: demographics, relationship to the deceased service member, circumstances of the death, and self-reported physical and psychological reactions, including

the ICG. The study was conducted in accordance with ethical standards as approved by the Human Research Protection Program in the Office of Research at the Uniformed Services University of the Health Sciences.

2.2.2 | Clinical research sample

Participants were enrolled in one of three studies (see earlier). Two of the studies were clinical trials to assess the efficacy of Complicated Grief Treatment. The third was a clinical trial to assess the efficacy of Citalopram with and without Complicated Grief Treatment. Data from the baseline assessments were used for the present analyses.

2.3 | Measures

The present analyses used demographic information and responses on the ICG (Prigerson et al., 1995) provided by all participants. The 19-item ICG has shown high internal consistency (Cronbach's α = 0.94), test–retest reliability (0.80) and strong concurrent validity with other measures of grief (Texas Revised Inventory of Grief [TRIG; Faschingbauer, Zisook, & DeVaul, 1987]: r = 0.87, p < 0.001; Grief Measurement Scale [GMS; Jacobs et al., 1987]: r = 0.70, p < 0.001) (Prigerson et al., 1995). Participants rated the frequency of their grief symptoms as occuring: 0 = never, 1 = rarely, 2 = sometimes, 3 = often, 4 = always (e.g. "Please mark the answer which best describes how you feel right now"). The mean and range of the ICG total scores for the military family and clinical research samples are provided in Table 1. In order to be consistent with prior work (Prigerson et al., 1999; Simon et al., 2011) and to ensure consistency with diagnostic classification systems (e.g. DSM), item responses on the ICG were dichotomized as present (often or always) or absent (not at all, rarely or sometimes).

2.4 | Statistical methods

Descriptive characteristics of the military family sample and clinical research sample are summarized in Table 1. Continuous variables were summarized using means and standard deviations. Categorical variables were summarized using frequencies and percent. To test for differences between the two samples, two-sample t-tests (for continuous variables) and chi-squared tests (for categorical variables) were used. To determine how the factor structure of the ICG in the military family compared to the structure in the clinical research sample, two analyses were conducted. First, a CFA was conducted to test whether the ICG structure proposed by Simon et al. (2011) provided a reasonable fit for the military family sample. Second, the factor structures between the military family sample and the clinical research sample were compared directly to each other using a test of measurement invariance.

2.4.1 | Confirmatory factor analyses

In order to determine whether the factor structure of the ICG in the military family sample was similar to the structure in Simon et al. (2011), a CFA was conducted in which each of the 19 ICG items was fixed to load on one of the six correlated symptom clusters defined in Simon et al. (2011). However, the six-factor model caused an empirical fitting problem whereby latent variable covariance matrix that was not positive definitive. The sixth factor was identified as the cause of this problem, and it was decided to drop this factor (and corresponding items) from the CFA. More specifically, a CFA was conducted in which items were fixed to load on one of five correlated factors corresponding to the five symptom clusters previously discussed in the Introduction. Items from the sixth factor (2, 5, and 12) were removed. Furthermore, the CFA model fit to the military family sample included four residual correlations between Q4 and Q9, Q7 and Q8, Q10 and Q19, Q13 and Q19; these were chosen based on statistically significant modification indices.

Estimation of the CFA models was conducted with robust weighted least squares appropriate for dichotomous items (Jöreskog & Moustaki, 2001; Wirth & Edwards, 2007). The magnitudes of the factor loadings were evaluated using the following rule of thumb: > 0.71 excellent, > 0.63 very good, > 0.55 good, > 0.45 fair, and >0.32 poor (Tabachnick & Fidell, 2007). Factor loadings less than 0.32 are negligible. Model fit was also assessed with multiple fit statistics including the chi-square goodness of fit test, the root-mean-square error of approximation (RMSEA) and 90% confidence interval (CI) for RMSEA, the comparative fit index (CFI), and the non-normed fit index also known as the Tucker–Lewis index (TLI). Models with lower RMSEA and higher CFI and TLI are thought to be relatively better fitting. Although there is no clear consensus on the most appropriate values to use as indications of adequate fit, the following guidelines were followed: RMSEA is 0.08 or lower (Browne & Cudeck, 1993), CFI and TLI are 0.90 or higher (Bentler, 1990; Kline, 2005).

2.4.2 | Test of measurement invariance of factor structure

In addition, measurement invariance of the factor structure between the military family sample and the clinical research sample was tested in order to demonstrate that the association between the items and the factors were the same in each sample. Three models were fit and compared. Model 1 was the unconstrained model where a separate CFA model was estimated for each of the samples. Model 2 constrained the factor loadings in the two samples to be the same, but allowed the thresholds (i.e. related to prevalence of each item) to vary between samples. Model 3 constrained both the factor loadings and the thresholds to be the same across the samples. Measurement invariance was evaluated by using the CFI difference (?CFI) test where a difference in CFI ≤ 0.01 supports measurement invariance, a difference between 0.01 and 0.02 indicates possible invariance, and a difference > 0.02 indicates non-invariance (Cheung & Rensvold, 2002). The CFI difference test has been suggested to be superior to the chi-square difference test in assessing invariance (Yuan & Bentler, 2004). All analyses were carried out using MPlus Version 7 (Muthen & Muthen, 1998–2013).

3 | RESULTS

Demographic characteristics of the military family sample and the clinical research sample are shown in Table 1. Of note, the military family sample was younger, had a higher proportion who were of Caucasian race, and contained more parents. The military family sample uniquely included participants bereaved due to combat, and had fewer bereavement experiences due to illness, was bereaved more recently and had a lower mean ICG score (Table 1).

TABLE 1 Demographic information of military family and clinical research samples

	Military family sample (n = 232)	Clinical research sample (n = 780)	p-value
Age mean in years (standard deviation, SD)	44.81 (11.91)	54.5 (14.4)	0.0000
Missing n	—	30	
Gender			0.0008
Female	205 (88.4%)	585 (78%)	
Male	27 (11.6%)	164 (22%)	
Missing n	—	31	
Race			(White vs. not White) 0.0000
Caucasian	211 (91.3%)	542 (74%)	
Hispanic or Latino	12 (5.2%)	58 (8%)	
African American	4 (1.7%)	112 (15%)	
American Indian/Alaska native	1 (0.4%)	6 (1%)	
Asian American	0 (0%)	11 (2%)	
Native Hawaiian/Pacific islander	0 (0%)	—	
Multi-racial	3 (1.3%)	—	
No answer/missing	1	47	
Other	—	4 (1%)	
Relationship of subject to deceased			0.0000
"I was his/her …"			
Spouse/partner/ex-spouse	70 (30.2%)	271 (36%)	
Parent/step-parent	121 (52.1%)	142 (19%)	
Child	3 (1.3%)	236 (31%)	
Sibling/step-sibling	38 (16.4%)	53 (7%)	
Other friends/family	—	48 (6%)	
Missing n	—	30	
Cause of death			(illness versus violent) 0.0000
Illness	8 (3.4%)	517 (71.2%)	
Combat-related death	103 (44.4%)	—	
Accident (unintentional injuries)	44 (19%)	54 (7.4%)	
Intentional self-harm (suicide)	25 (10.8%)	60 (8.3%)	
Homicide/terrorist attack (excluding combat-related death)	28 (12.1%)	12 (1.7%)	
Violent death (cause unknown)	—	61 (8.4%)	
Unknown/uncertain	22 (9.5%)	—	
Prefer not to answer	2 (0.9%)	—	
Other	—	22 (3.0%)	
Missing n	—	54	
Time since loss			0.0000
6–12 months	29 (12.5%)	201 (26%)	
1–2 years	42 (18.1%)	125 (16%)	
2–5 years	81 (34.9%)	220 (28%)	
5–10 years	78 (33.6%)	118 (15%)	
Greater than 10 years	2 (0.9%)	116 (15%)	
Mean in years (SD)	3.96 (2.59)	5.7 (8.1)	0.0000
ICG mean score (SD)	42.13 (9.65)	44.6 (9.3)	0.0005
[minimum–maximum]	[30–72]	[30–76]	

As previously described in the Methods section, fitting the six-factor confirmatory model corresponding to the six symptom clusters resulted in a latent variable covariance matrix that was not positive definite and the sixth factor, "Behavior change, including avoidance or proximity seeking", was identified as the cause of the poor fit. To address this issue, items 2, 5, and 12 were dropped and all remaining analyses were limited to the first five symptom clusters.

The five-factor CFA results for the military family sample are shown in Table 2 next to the results from the clinical research sample. In general, the factor loadings of all items on each of the factors were

in the "good" to "excellent" range (i.e. > 0.55) with only two exceptions: Q16 "I feel that is unfair that I should live when this person died" had a fair loading (0.523) on the first factor and Q18 "I feel envious of others who have not lost someone close" had a fair loading (0.330) on the fourth factor. The five-factor CFA model showed good fit to the military family sample with RMSEA = 0.052 (90% CI: 0.036–0.067), CFI = 0.950 and TLI = 0.934.

The investigation of invariance of the five-factor structure (i.e. loadings and thresholds) between the military family sample and the clinical research sample yielded a CFI = 0.943 for Model 1 (unconstrained model where a separate CFA model was estimated for each of the samples). Model 2 (constrained loadings) yielded a CFI = 0.953 and Model 3 (constrained loadings and thresholds) yielded a CFI = 0.937. Given that the CFI change between Models 1 and 2 was 0.01 (with the constrained model fitting the data better), factor loading invariance among the two samples can be concluded. Thus, in both samples, the strength of the association between each item and each factor can be considered equivalent. When comparing Model 3 with Model 1, the CFI change of 0.006 < 0.01 indicates the model with thresholds additionally constrained (Model 3) is no different than the unconstrained model (Model 1) indicating invariance of both the thresholds and the loadings. In combination, this series of analyses finds that the pattern and degree of endorsement for ICG items is similar in both the military family sample and the clinical research sample (see Table 3).

4 | DISCUSSION

The present study compared the factor structure of ICG items in a sample of bereaved military family members who had high ICG scores to a bereaved clinical research sample with similar ICG scores. Given that Simon et al. (2011) identified six clusters in a sample that was defined similarly, we hypothesized that ICG item responses in the military family sample would also cluster similarly. Though the six-factor

TABLE 2 Factor loadings and goodness-of-fit statistics for five-factor confirmatory factor analysis (CFA) model fit to military family sample (*n* = 232) compared to the five-factor CFA fit to the clinical research sample (*n* = 780).

	Military family sample (*n* = 232)	Clinical research sample (*n* = 780)
SYMPTOM CLUSTER 1: "yearning and preoccupation with the deceased"		
1. I think about this person so much that it's hard for me to do the things I normally do …	0.563[a]	0.597
4. I feel myself longing for the person who died …	0.705	0.727
13. I feel that life is empty without the person who died …	0.567	0.700
16. I feel that it is unfair that I should live when this person died …	0.523	0.745
19. I feel lonely a great deal of the time ever since he/she died …	0.564	0.592
SYMPTOM CLUSTER 2: "anger and bitterness"		
6. I can't help feeling angry about his/her death …	0.873	0.802
17. I feel bitter over this person's death …	0.854	0.966
SYMPTOM CLUSTER 3: "shock and disbelief"		
3. I feel I cannot accept the death of the person who died.	0.814	0.837
7. I feel disbelief over what happened …	0.870	0.676
8. I feel stunned or dazed over what happened …	0.834	0.731
SYMPTOM CLUSTER 4: "estrangement from others"		
9. Ever since he/she died it is hard for me to trust people …	0.553	0.692
10. Ever since he/she died I feel like I have lost the ability to care about other people or I feel distant from people I care about …	0.691	0.630
18. I feel envious of others who have not lost someone close*	0.330	0.434
SYMPTOM CLUSTER 5: "hallucinations of the deceased"		
11. I have pain in the same area of my body or have some of the same symptoms as the person who died …	0.608	0.450
14. I hear the voice of the person who died speak to me …	0.588	0.755
15. I see the person who died stand before me …	0.899	0.868
Goodness-of-fit statistics		
RMSEA	0.052	0.050
(90% CI for RMSEA)	(.036–.067)	(.043–.057)
CFI/TLI	0.95/0.93	0.94/0.93
Chi-square, df	146, 90	266, 90

[a]Values are estimated factor loadings measuring the strength of the relationship between specific items and respective latent factors (i.e. a separate factor is associated with each separate Symptom Cluster) in five-factor CFA model. Four correlated residual errors were allowed in the five-factor CFA: Q4 and Q9, Q7 and Q8, Q10 and Q19, Q13 and Q19 (estimated residual correlations not shown).

TABLE 3 Goodness-of-fit statistics

	Chi-square		Chi-square DIFFTEST	RMSEA	CFI	ΔCFI
Unconstrained model	409.2	df = 180		0.050	0.943	
Loadings equal versus unconstrained	378.9	df = 191	9.7 (df = 11) *p*-value = 0.5583	0.044	0.953	-0.01
Loadings and thresholds equal versus only loadings equal	453.5	df = 202	60.7 (df = 22) *p*-value = 0.0000	0.050	0.937	0.006

structure in Simon et al. (2011) was not replicated by the results of a CFA, the CFA did demonstrate equivalent five-factor structures in the military family sample compared to the clinical research sample.

These similarities in factor structure were present despite differences in demographic characteristics, sample origination (i.e. community sample versus clinical help seeking sample) and bereavement experiences between samples. As outlined in Table 1, the military family sample was younger, contained more individuals of Caucasian race, and contained more parents than the clinical research sample. The military family sample also experienced bereavement due to combat, had fewer bereavement experiences due to illness, was bereaved more recently and had a lower mean ICG score.

Prior research has suggested that circumstances of death, relationship to the deceased and demographics of the bereaved can affect severity of grief. However, these demographic factors and bereavement experiences did not influence the way in which grief symptoms, as measured by the ICG, were associated with each other. Thus, these results indicate that the ICG is an appropriate and useful instrument for measuring persistent and elevated grief in the military family sample population.

These results should be considered within the context of several study limitations. Neither the military nor the clinical samples were randomly selected, which could limit the generalizability of the findings. In addition, both samples provided self-report of grief (ICG) but with differing procedures; the military sample provided online responses and the clinical sample provided in-person responses. Given that there were no differences in factor structure across these populations, these potential methodological issues did not appear to influence the results.

Of note, our results failed to fit the original six-factor model proposed in Simon et al. (2011), although we did successfully confirm a structure based on the first five factors of their model. The issue caused by the sixth factor, "behavior change, including avoidance or proximity seeking", was not particularly surprising for a number of reasons. Most important among them is that in Simon et al. (2011), this factor was constructed based on clinical opinion rather than empirical evidence provided by their exploratory factor analysis. It is therefore quite plausible that the empirical evidence for this factor was also lacking in our sample. Despite the fact that the sixth factor was eliminated from these analyses, we still believe "avoidance and proximity seeking" is an important component of persistent and elevated grief and that lack of empirical evidence thus far is related to the measurement error of the three ICG items. These three items ("Memories of the person who died upset me"; "I feel drawn to places and things associated with the person who died" and "I go out of my way to avoid reminders of the person who died") make the assumption that the participant realizes that he or she is avoiding places or activities because they are reminders of the person who died. Based on our clinical experience, we have found that bereaved individuals do not always realize that they are "avoiding" things in response to the death. Thus, we believe that using a more thorough measure of avoidance/proximity seeking, such as the Grief Related Avoidance Questionnaire (Baker et al., 2016), would better capture these symptoms.

In conclusion, bereaved military family members who endorsed high levels of grief showed similar clusters of grief symptoms as non-military bereaved individuals who also had impairing grief. These findings suggest that the ICG reliably measures persistent and elevated grief in military family members, and that the ICG can be used in community as well as clinical samples. Information about the grief symptom profiles of military family members may allow providers to better address grief-related needs. For example, it is reasonable to expect that evidence-based interventions that have been used in populations similar to the clinical research sample (e.g. complicated grief treatment (CGT): Shear et al., 2001; Shear et al., 2005; Shear et al., 2016), would also be appropriate for military-bereaved family members with persistent and elevated grief. More research is needed to answer questions about optimal treatment approaches for bereaved military families.

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DECLARATION OF INTEREST STATEMENT

The authors declare that they have no conflict of interest. The authors' expressed opinions do not necessarily reflect those of the Uniformed Services University or the Department of Defense.

REFERENCES

American Psychiatric Association (APA) (2013). *Diagnostic and Statistical Manual of Mental Disorders (DSM-5®)*. Arlington, VA: American Psychiatric Publications.

Baker, A. W., Keshaviah, A., Horenstein, A., Goetter, E. M., Mauro, C., Reynolds, C. F., … Simon, N. M. (2016). The role of avoidance in complicated grief: A detailed examination of the grief-related avoidance questionnaire (GRAQ) in a large sample of individuals with complicated grief. *Journal of Loss and Trauma*, *21*, 1–15.

Barnes, J. B., Dickstein, B. D., Maguen, S., Neria, Y., & Litz, B. T. (2012). The distinctiveness of prolonged grief and posttraumatic stress disorder in adults bereaved by the attacks of September 11th. *Journal of Affective Disorders*, *136*, 366–369.

Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin*, *107*(2), 238.

Boelen, P. A., de Keijser, J., van den Hout, M. A., & van den Bout, J. (2007). Treatment of complicated grief: A comparison between cognitive-behavioral therapy and supportive counseling. *Journal of Consulting and Clinical Psychology*, *75*(2), 277.

Browne, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. *Sage Focus Editions*, *154*, 136–136.

Cheung, G. W., & Rensvold, R. B. (2002). Evaluating goodness-of-fit indexes measurement invariance. *Structural Equation Modeling*, *9*(2), 233–255.

Cozza, S. J., Fisher, J. E., Mauro, C., Zhou, J., Ortiz, C. D., Skritskaya, N., … Shear, M. K. (2016). Performance of DSM-5 persistent complex bereavement disorder criteria in a community sample of bereaved military family members. *American Journal of Psychiatry*, *173*, 919–929.

De Burgh, H. T., White, C. J., Fear, N. T., & Iversen, A. C. (2011). The impact of deployment to Iraq or Afghanistan on partners and wives of military personnel. *International Review of Psychiatry*, *23*, 192–2000.

Faschingbauer, T. R., Zisook, S., & DeVaul, R. (1987). The Texas revised inventory of grief. In S. Zisook (Ed.), *Biopsychosocial Aspects of Bereavement* (pp. 109–124). Washington, DC: American Psychiatric Press.

Green, B. L., Krupnick, J. L., Stockton, P., Goodman, L., Corcoran, C., & Petty, R. (2001). Psychological outcomes associated with traumatic loss in a sample of young women. *American Behavioral Scientist*, *44*, 817–837.

Horowitz, M. J., Siegel, B., Holen, A., Bonanno, G. A., Milbrath, C., & Stinson, C. H. (2003). Diagnostic criteria for complicated grief disorder. *Focus*, *1*(3), 290–298.

Jacobs, S., Kasl, S. V., Ostfeld, A. M., Berkman, L., Kosten, T. R., & Charpentier, P. (1987). The measurement of grief: Bereaved versus non-bereaved. *The Hospice Journal*, *2*, 21–36.

Jöreskog, K. G., & Moustaki, I. (2001). Factor analysis of ordinal variables: A comparison of three approaches. *Multivariate Behavioral Research*, *36*(3), 347–387.

Kaltman, S., & Bonanno, G. A. (2003). Trauma and bereavement: Examining the impact of sudden and violent deaths. *Journal of Anxiety Disorders*, *17*(2), 131–147.

Kersting, A., Brähler, E., Glaesmer, H., & Wagner, B. (2011). Prevalence of complicated grief in a representative population-based sample. *Journal of Affective Disorders*, *131*(1), 339–343.

Kline, R. B. (2005). *Principles and Practice of Structural Equation Modeling*. New York: The Guilford Press.

Kristensen, P., Weisæth, L., & Heir, T. (2010). Predictors of complicated grief after a natural disaster: A population study two years after the 2004 south-east Asian tsunami. *Death Studies*, *34*, 137–150.

Mansfield, A. J., Kaufman, J. S., Marshall, S. W., Gaynes, B. N., Morrissey, J. P., & Engel, C. C. (2010). Deployment and the use of mental health services among U.S. Army wives. *The New England Journal of Medicine*, *362*, 101–109.

Melhem, N. M., Day, N., Shear, M. K., Day, R., Reynolds, C. F., & Brent, D. (2004). Predictors of complicated grief among adolescents exposed to a peer's suicide. *Journal of Loss and Trauma*, *9*, 21–34.

Melhem, N. M., Moritz, G., Walker, M., Shear, M. K., & Brent, D. (2007). Phenomenology and correlates of complicated grief in children and adolescents. *Journal of American Academy of Child and Adolescent Psychiatry*, *46*, 493–499.

Mitchell, A. M., Kim, Y., Prigerson, H. G., & Mortimer, M. K. (2005). Complicated grief and suicidal ideation in adult survivors of suicide. *Suicide and Life-threatening Behavior*, *35*(5), 498–506.

Mitchell, A. M., Kim, Y., Prigerson, H. G., & Mortimer-Stephens, M. (2004). Complicated grief in survivors of suicide. *Crisis*, *25*(1), 12–18.

Morina, N., Rudari, V., Bleichhardt, G., & Prigerson, H. G. (2010). Prolonged grief disorder, depression, and posttraumatic stress disorder among bereaved Kosovar civilian war survivors: A preliminary investigation. *International Journal of Social Psychiatry*, *56*, 288–297.

Murphy, S. A., Johnson, L. C., Chung, I., & Beaton, R. D. (2003). The prevalence of PTSD following the violent death of a child and predictors of change 5 years later. *Journal of Traumatic Stress*, *16*, 17–25.

Muthen, L. K., & Muthen, B. O. (1998–2013). *Mplus User's Guide*. Los Angeles, CA: Muthen & Muthen.

Neria, Y., Gross, R., Litz, B., Maguen, S., Insel, B., Seirmarco, G., … Marshall, R. D. (2007). Prevalence and psychological correlates of complicated grief among bereaved adults 2.5–3.5 years after September 11th attacks. *Journal of Traumatic Stress*, *20*(3), 251–262.

Ott, C. H. (2003). The impact of complicated grief on mental and physical health at various points in the bereavement process. *Death Studies*, *27*, 249–272.

Prigerson, H. G., Horowitz, M. J., Jacobs, S. C., Parkes, C. M., Aslan, M., Goodkin, K., … Bonanno, G. (2009). Prolonged grief disorder: Psychometric validation of criteria proposed for DSM-V and ICD-11. *PLoS Medicine*, *6*(8), e1000121.

Prigerson, H. G., Maciejewski, P. K., Reynolds, C. F., Bierhals, A. J., Newsom, J. T., … Miller, M. (1995). Inventory of complicated grief: A scale to measure maladaptive symptoms of loss. *Psychiatry Research*, *59*, 65–79.

Prigerson, H. G., Shear, M. K., Jacobs, S. C., Reynolds, C., Maciejewski, P. K., Davidson, J. R., … Widiger, T. A. (1999). Consensus criteria for traumatic grief. A preliminary empirical test. *The British Journal of Psychiatry*, *174*(1), 67–73.

Shear, M. K. (2012). Getting straight about grief. *Depression and Anxiety*, *29*, 461–464.

Shear, M. K., Frank, E., Foa, E., Cherry, C., Reynolds, C. F. III, Vander Bilt, J., & Masters, S. (2001). Traumatic grief treatment: A pilot study. *American Journal of Psychiatry*, *158*(9), 1506–1508.

Shear, K., Frank, E., Houck, P. R., & Reynolds, C. F. (2005). Treatment of complicated grief: A randomized controlled trial. *JAMA*, *293*(21), 2601–2608.

Shear, M. K., Reynolds, C. F., Simon, N. M., Zisook, S., Wang, Y., Mauro, C., … Skritskaya, N. (2016). Optimizing treatment of complicated grief: A randomized clinical trial. *JAMA Psychiatry*, *73*, 685–694.

Shear, M. K., Simon, N., Wall, M., Zisook, S., Neimeyer, R., Duan, N., … Keshaviah, A. (2011). Complicated grief and related bereavement issues for DSM-5. *Depression and Anxiety*, *28*, 103–117.

Shear, M. K., Wang, Y., Skritskaya, N., Duan, N., Mauro, C., & Ghesquiere, A. (2014). Treatment of complicated grief in elderly persons: A randomized clinical trial. *JAMA Psychiatry*, *71*(11), 1287–1295.

Simon, N. M., Wall, M. M., Keshaviah, A., Dryman, T., LeBlanc, N. J., & Shear, M. K. (2011). Informing the symptom profile of complicated grief. *Depression and Anxiety*, *28*, 118–126.

Szanto, K., Shear, M. K., Houck, P. R., Reynolds, C. F., Frank, E., Caroff, K., & Silowash, R. (2006). Indirect self-destructive behavior and overt suicidality in patients with complicated grief. *Journal of Clinical Psychiatry*, *67*(2), 233–239.

Tabachnick, B. G., & Fidell, L. S. (2007). *Using Multivariate Statistics* (5th ed.). Needham Height, MA: Allyn & Bacon.

Wirth, R. J., & Edwards, M. C. (2007). Item factor analysis: Current approaches and future directions. *Psychological Methods*, *12*(1), 58.

Yuan, K. H., & Bentler, P. M. (2004). On chi-square difference and z tests in mean and covariance structure analysis when the base model is misspecified. *Educational and Psychological Measurement*, *64*(5), 737–757.

Zisook, S., & DeVaul, R. A. (1983). Grief, unresolved grief, and depression. *Psychosomatics*, *24*, 247–256.

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