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RESEARCH ARTICLE

Factor structure of Pre-Loss Grief-12 in caregivers of people living with dementia

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Abstract

Introduction: The objective was to develop and refine a version of the Prolonged-Loss Grief-12 (PG-12) specific to caregivers of people living with dementia. Confirmatory factor analysis (CFA) was performed to test the fit of the data from the caregivers and to assess the factor structure of the PG-12 in order to evaluate pre-loss grief accurately by identifying relevant items and eliminating items that are not appropriate for caregivers of persons with dementia.

Methods: A total of 699 eligible caregivers of persons living with dementia (PLWDs) were recruited through relevant dementia associations and organizations. The e-mail for recruitment provided potential participants with information about the study and detailed instructions on how to participate by following a link to the online survey. Secondary analysis was based on the survey data. CFA was conducted via the Full Information Maximum Likelihood estimation method to test the unidimensional model of PG-12 in the study population. Standard procedures were used to establish the parameters in the factor loading, factor variance-covariance, and uniqueness matrices.

Results: The initial model was modified to develop a better fitting model and to detect misfitting parameters in the PG-12 by deleting irrelevant items for the PLWD's caregiver. The adjusted dementia-specific 10-item version (PG-10-D) had significantly improved fit indices. An overall assessment of fit indicated that the model adequately approximated the data. Factor loadings ranged from 0.53 to 0.85.

Discussion: We found that the dementia-specific, unidimensional PG-10-D, modifying the original PG-12, may be useful and parsimonious in assessing and quantifying pre-loss grief in dementia caregivers. Future studies are needed to further test its validity and reliability.

KEYWORDS
caregivers, dementia, people living with dementia, PG-12, PG-10-D, pre-loss grief

Highlights

- First study to evaluate a dementia-specific 10-item version (PG-10-D) of the Prolonged-Loss Grief-12 (PG-12).

- PG-10-D is useful in assessing and quantifying pre-loss grief in caregivers.
- PG-10-D could be an early identifier of caregivers at risk for pre-loss grief.
- PG-10-D could be the standard measure for effective intervention for caregivers.

1 | BACKGROUND

Pre-loss grief, also called pre-death grief, is the emotional reaction by family caregivers as they grieve for psychologically, emotionally, and/or functionally absent patients with terminal conditions and anticipate their death.[1] This grief is frequently prevalent among caregivers of family members living with dementia.[2] Family members of persons living with dementia (PLWDs) experience multiple losses during the course of illness, including loss of PWLD's personhood, loss of companionship, loss at the time of nursing home admission, and loss at the time of death. The primary grief is experienced as the loss of the PLWD's personhood before the actual bodily death.[3] Pre-loss grief is generally associated with caregiver stress and burden,[4] caregiver depression,[5] and social isolation, all potentially leading to the caregiver's desire to admit the person with dementia to a long-term care facility.[6] Caregivers with higher levels of pre-loss grief also have a greater risk of health complications for themselves after the loss.[1,7] Caregivers with pre-loss grief show emotional and physical responses in reacting to the perceived psychological loss over the course of the disease prior to the death of the care recipient.[8]

The literature[9,10] indicates that early screening and assessment of caregivers with pre-loss grief and appropriate treatment may reduce the severity of burden and prevent long-term complicated grief. Although several studies on post-loss grief have been conducted, relatively little research has examined the assessment and treatment of caregivers with pre-loss grief.[8] In particular, there are few validated instruments to measure pre-loss grief in family caregivers of PLWDs.

Research on pre-loss grief in the context of dementia caregiving has thus far not been specifically operationalized. The current literature reports use of Prolonged Grief-12 (PG-12)[11] as a valid screening tool for measuring pre-loss grief.

1.1 | Theoretical framework

The Dementia Grief Model (DGM)[1] defines dementia grief as a normal grief process and experience with unique properties. The DGM can be used to understand how caregiver grief influences caregiver burden and stress. The DGM was built on the theory of ambiguous loss to present a framework for understanding how caregivers of PLWDs cope with loss across the spectrum of disease. In this model, grief has three states: (1) separation, (2) liminality, and (3) re-emergence. Each state is associated with a specific psychological symptom and has a dynamic mechanism through the grief process. In the separation state, acknowledging loss is the dynamic mechanism that moves one into the liminal state, in which one is confronted with ambiguity and difficult feelings. In the liminal state, the dynamic mechanism of tolerating negative emotions allows the caregiver's experience to clarify into a state of re-emergence in which the caregiver can make behavioral adaptions to a new environment. Re-emergence can be thus achieved through adapting to this new environment. The grief model provides opportunity for therapeutic interventions through the dynamic mechanisms of acknowledging loss in separation, tolerating difficult feelings in liminality, and in adapting in re-emergence. The DGM involves changing emotional states in response to losses as the disease progresses in the person with dementia. The DGM highlights the patterns that are particular to the unique experience of grief in caregivers of PLWDs. An improved ability of caregivers to cope with the stressors and burnout of caregiving by gaining competency in managing the grief process may lead to better health outcomes, both before and after the physical death of the PLWDs.[1]

1.2 | Purpose of the study

The purpose of the current study was to assess the ability of the PG-12[11] to be used with family caregivers of PLWDs to identify relevant items for the population, and to determine whether the PG-12 has a similar factor structure across caregivers of care recipients with specific types of dementia, including Alzheimer's disease (AD), dementia with Lewy bodies (DLB), Parkinson's disease dementia (PDD), and other types of dementia. The PG-12 was not designed specifically for pre-loss grief for caregivers of PLWDs. This study was completed through the investigation of the PG-12 factor structure based on scores from caregivers of PLWD. It was proposed that the PG-12 could be revised to a shorter version for ease of administration and accurate assessment of the caregivers. This modified version of the PG-12 was designed to target specific questions that best distinguish pre-loss grief of caregivers. A brief version of the PG-12 scale for caregivers was appropriate in this study to minimize response burden in caregivers who provide constant care for the PLWDs.

We examined the usefulness of the PG-12 in a sample of caregivers of PLWDs by evaluating and validating the factor structure of the PG-12 and determining which of the existing items might be eliminated from the 12-item version of the PG while improving or maintaining reliability and goodness of fit.

2 | METHODS

2.1 | Design

A cross-sectional online survey was conducted, followed by applied secondary analysis. The study was approved by the

New York University Institutional Review Board as an exempt protocol because data were collected without personal identifiers so that no informed consent was required.

2.2 | Sample size

A sample >200 is acceptable for most models.[12,13] In the current study, 699 caregivers completed the survey, which was deemed sufficient for factor analysis of the PG-12.

2.3 | Participants

The criterion for eligibility was a current caregiver of a PWLD diagnosed with AD, DLB, PDD, or other dementias. Eligible caregivers were recruited through the Lewy Body Dementia Association, the Alzheimer's Foundation of America, the National Family Caregiver Alliance, and other relevant organizations.

2.4 | Measures

2.4.1 | Sociodemographic variables

The sociodemographic variables were social and demographic characteristics of the caregivers and frequency and severity of dementia-related symptoms.

2.4.2 | The Prolonged Grief Disorder Questionnaire (PG-12)

The PG-12 is a 12-item self-report questionnaire assessing a caregiver's prolonged grief arising from the impending death of a care recipient. The PG-12 is a valid screening instrument applied to diagnose prolonged grief disorder. The PG-12 was adapted from the PG-13[14] and designed to assess grief experiences associated with the illness rather than the death of the care recipient. The PG-12 can be used for caregivers of terminal disease patients, including terminally ill cancer patients[15] and patients living with dementia.[16]

The PG-12 asks respondents (caregivers) how often they experienced distressing grief symptoms related to yearning, bitterness, or interpersonal disengagement. It assesses the risk of prolonged grief by scoring 11 symptoms that have occurred in the previous month.[3] The scale describes the presence and frequency of common grief symptoms. Respondents are asked to rate each on a 5-point Likert-type scale (1 = *almost never* to 5 = *always*). The scale includes the sum of the score for each of the 11 grief symptoms, ranging from 11 to 55, with higher scores indicating a greater level of pre-loss grief. The final question asks whether the caregiver has had a reduction in social, occupational, or other important areas of functioning.[3] The PG-12 has been found to have good internal consistency, with a Cronbach's alpha of 0.88.[17] The internal consistency in the current study was 0.89, showing moderate to high reliability.[17]

RESEARCH IN CONTEXT

1. **Systematic Review**: The authors reviewed the literature focusing on articles using electronic databases (e.g., Medline & Web of Science) that described caregivers of persons living with dementia (PLWDs) and pre-loss grief among the caregivers. Early screening and assessment of caregivers with pre-loss grief and appropriate treatment may reduce the severity of the burden and prevent long-term complicated grief. However, there are few reliable screening tools to measure pre-loss grief in family caregivers of PLWDs exclusively.
2. **Interpretation**: The study findings support that the dementia-specific, unidimensional dementia-specific 10-item version (PG-10-D), modifying the original Pre-Loss Grief-12 (PG-12), can be used to measure pre-loss grief specific to PLWD caregivers accurately.
3. **Future Directions**: The PG-10-D has the potential to be a useful measure in quantifying, characterizing, and understanding pre-loss grief in caregivers of PLWD. Further research is required to establish the psychometric properties, including factorial validity and reliability, particularly factorial invariance analysis and further factor analysis.

2.5 | Study procedure

The criterion for eligibility was a caregiver of a PLWD, including AD, DLB, PDD, or other dementia. The survey was available online for 3 months, using SurveyMonkey (www.surveymonkey.com, Palo Alto, CA). The study information was disseminated to persons on the caregiver e-mail lists of the selected organizations and listed on social media and selected webpages. The e-mail for recruitment provided potential participants with information about the study and detailed instructions on how to participate by following a link to the online survey. The current study used a secondary analysis based on the survey data. Personal health information was kept confidential, and the data were de-identified during data analyses.

2.6 | Data analysis

Descriptive statistics were calculated to describe the respondents' demographic characteristics using SPSS 28.0 (SPSS, Chicago, IL). The data were entered into SPSS and applied to the AMOS software (SPSS Inc., Chicago, IL) for confirmatory factor analysis (CFA). CFA was performed to test the fit of the data from the caregivers and to assess the factor structure of the PG-12 in order to eliminate items that were not appropriate to assess pre-loss grief accurately in caregivers of PLWDs.

CFA was conducted via the Full Information Maximum Likelihood estimation method to test the unidimensional model of the PG-12 in the study population. Standard procedures were used to establish the parameters in the factor loading, factor variance-covariance, and uniqueness matrices. The sample covariance matrix was used as input and a maximum likelihood solution was sought. CFA was utilized to estimate a measurement model in order to confirm that the observed variables linked to the underlying latent construct of the PG-12. Second, a full structural model was specified to test the hypothesis. The full model included both the latent factor and the observed variables, and all coefficients were estimated simultaneously.

Goodness of model fit was evaluated with the χ^2 test, the comparative fit index (CFI), the Tucker Lewis index (TLI), the root mean square error of approximation (RMSEA), the goodness-of-fit index (GFI), and the Root Mean Square Residual (RMR). Multiple fit indices were constructed to determine how well the model fit, following Kline's recommendation on cutoff scores. According to Kline,[13] model fit was assessed with the χ^2 test and *p*-value indicating a good fit, at $p \geq .005$. A significant χ^2 is sensitive to discrepancies in model fit in a large sample.[13] For the CFI and the TLI, a value of ≥0.90 indicates adequate fit; for the RMSEA, a value of ≤0.08 is considered to indicate good fit.[13,18]

3 | RESULTS

3.1 | Sample characteristics

A total of 699 caregivers of PLWDs (460 DLB, 80 AD, 76 PDD, 62 other dementias, and 21 not reporting a specific type of dementia) completed an online survey on pre-loss grief. Table 1 presents the characteristics of the respondent caregivers. The mean age of the family caregivers was 60.2 years (SD = 10.7), ranging from 23 to 89 years. Of the total of 699 caregivers, 620 were female (88.7%) and 76 were male (10.9%); three did not report gender. The majority of caregivers (95.3%, *n* = 666) were non-Hispanic White and married (74.1%, *n* = 557). Regarding the relationship to the care recipient, more than half reported that the care recipient was a spouse (56.5% *n* = 395) and 65.2% (*n* = 456) were currently living with the care recipient. More than half of the caregivers (54.4%, *n* = 380) rated physical health as good and 50% (*n* = 350) reported mental health as good. The psychometric sensitivity of the PG-12 was evaluated through the item-total correlation and Cronbach's alpha (Table 2). In addition, the assessment of normality of variables was conducted including minimum, maximum, mean (SD), skew, and kurtosis of the PG-12 (Table 3).

3.2 | Facture structure

A one-factor model of the PG-12 was tested. The 12 items of the PG-12 items showed a high internal consistency, with a Cronbach's alpha of 0.885. Among the observed variables, Item 5 and Item 11 were most positively correlated (*r* = 0.704). All constructs presented good internal

TABLE 1 Demographic characteristics of the participants

Characteristic and category		N	%
Caregiver demographic characteristics			
Age	Mean 60.2 years (SD = 10.749), range 23 to 89 years		
Gender	Female	620	88.7
	Male	76	10.9
Race	Non-Hispanic White	666	95.3
	African American	10	1.4
	Asian	4	0.6
	Native American	3	0.4
	Pacific Islander	2	0.3
Marital status	Married	557	79.7
	Divorced	46	6.6
	Widowed	18	2.6
	Single/never married	69	9.8
	Separated	5	0.7
Relationship to care recipients	Spouse	395	56.5
	Adult child	257	36.8
	Other family	20	2.9
	Non-family	23	3.3
Highest level of education	Post college	244	34.9
	College	233	31.9
	Partial college	159	22.7
	High school	63	9.0
	Partial high school	5	0.7
	Less than 7 years	2	0.3
Living with the care recipient	Yes	456	65.2
	No	236	33.8
Physical health	Excellent	114	16.3
	Good	380	54.4
	Fair	170	24.3
	Poor	19	2.7
Mental health	Excellent	87	12.4
	Good	350	50.1
	Fair	198	28.3
	Poor	45	6.4
Care recipients' demographic characteristics			
Age	Mean 75.2 years (SD = 9.393), range 47–97 years		
Type of dementia	Dementia with Lewy bodies	460	65.8
	Alzheimer's disease	80	11.4
	Parkinson's disease dementia	76	10.9
	Other dementias	62	8.9
	Missing	21	3.0
Stage of dementia	Mild	47	6.7
	Moderate	387	55.4
	Severe	242	34.6

TABLE 2 Reliability of the PG-12

Item	Item-total correlation	Cronbach's alpha if item deleted
1. In the past month, how often have you felt yourself longing or yearning for your loved one to be healthy again?	0.598	0.875
2. In the past month, how often have you had intense feelings of emotional pain, sorrow, or pangs of grief related to your loved one's illness?	0.681	0.870
3. In the past month, how often have you tried to avoid reminders that your loved one is ill?	0.607	0.875
4. In the past month, how often have you felt stunned, shocked or dazed by your loved one's illness	0.628	0.873
5. Confusion about your role in life or a diminished sense of self (feel that part of yourself died when your loved one became sick)?	0.734	0.867
6. Have you had trouble accepting your loved one's illness?	0.620	0.874
7. Has it been hard for you to trust others since your loved one's illness?	0.533	0.879
8. Do you feel bitter over your loved one's illness?	0.639	0.873
9. Do you feel that moving on (making new friends, pursuing new interests) would be difficult for you now?	0.506	0.881
10. Do you feel emotionally numb since your loved one's illness?	0.703	0.869
11. Do you feel that life is unfulfilling, empty, or meaningless since your loved one's illness?	0.726	0.867
12. Have you experienced a significant reduction in your social, occupational or other important areas of functioning?	-0.372	0.901

TABLE 3 Assessment of normality

Observed variable	Min	Max	Mean	SD	Skew	Kurtosis
PG 1	1.000	5.000	3.32	1.257	−0.240	−1.013
PG 2	1.000	5.000	3.19	1.280	−0.059	−1.135
PG 3	1.000	5.000	2.06	1.374	0.914	−0.629
PG 4	1.000	5.000	2.44	1.314	0.524	−0.853
PG 5	1.000	5.000	2.54	1.290	0.336	−1.001
PG 6	1.000	5.000	2.41	1.181	0.474	−0.753
PG 7	1.000	5.000	1.81	1.082	1.135	0.249
PG 8	1.000	5.000	2.29	1.283	0.692	−0.657
PG 9	1.000	5.000	2.94	1.385	−0.032	−1.247
PG 10	1.000	5.000	2.61	1.338	0.345	−1.073
PG 11	1.000	5.000	2.23	1.366	0.717	−0.810
PG 12	1.000	5.000	1.24	.428	1.214	−0.526

consistency. The results provided evidence for the instrument's validity and reliability; however, further investigation is recommended.

The model for the one-factor model of the PG-12 was a poor fit based on the following fit indices: RMSEA = 0.118, CFI = 0.863, TLI = 0.832, and GFI = 0.858 (χ^2 = 114.961 and *df* = 71). As depicted in Figure 1, the model was modified to develop a better fitting model and detect misfitting parameters in the PG-12 by correlating the pairing error in Items 1 and 2, 2 and 4, 1 and 4, and 4 and 11 and deleting Items 3 and 12 (Figure 2).

In the adjusted model (Figure 2), Item 3 (*In the past month, how often have you tried to avoid reminders that your loved one is ill?*) was deleted because there were high values in a standardized residual covariance matrix in Item 3 and other items (e.g., covariance Item 3 and Item 9 = 2.138). This covariance is not well reproduced by the estimated parameters, resulting in a model implied covariance of −2.138. The relationship between the two observed variables was underestimated in the original mode. Item 12 (*Do you feel that life is unfulfilling, empty or meaningless since your loved one's illness?*) was deleted because it showed negative low correlation, that is, not related to pre-loss grief.

This adjusted model (PG-10-D) was more specific for describing pre-loss grief in caregivers of PLWDs and had significantly improved fit indices. An overall assessment of fit indicated that the model

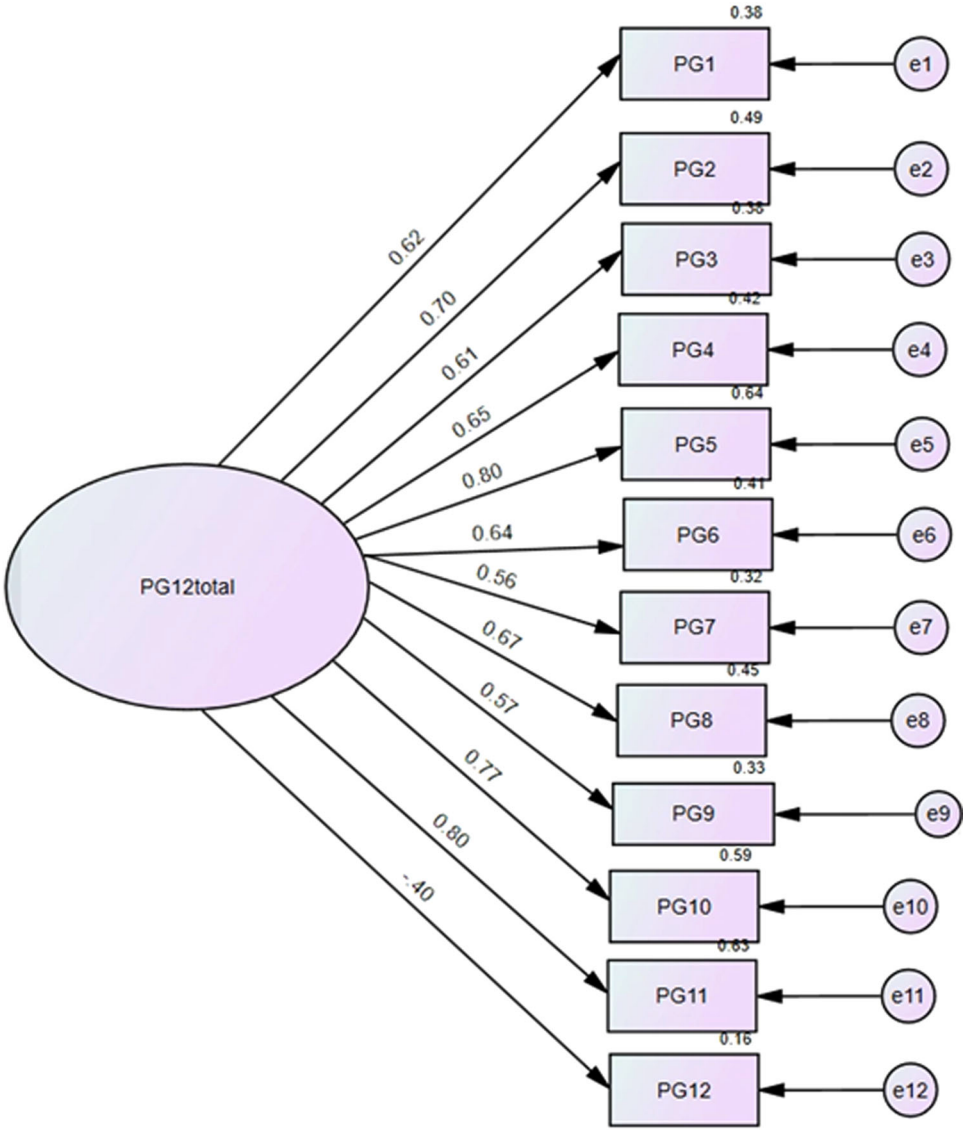

FIGURE 1 Confirmatory factor analysis of Prolonged Grief 12 (PG-12). A one-factor model of the PG-12 was tested. The 12 items of the PG-12 items showed a high internal consistency, with a Cronbach's alpha of 0.885. All constructs presented good internal consistency; however, the one-factor model of the PG-12 was a poor fit based on the following fit indices: RMSEA = 0.118, CFI = 0.863, TLI = 0.832, and GFI = 0.858 (χ^2 = 114.961 and *df* = 71). These findings led to the development and testing of an adjusted model for caregivers of persons living with dementia. Ovals represent latent variables, whereas boxes represent observed variables. (See text for additional details.)

adequately approximated the data. The specified model is presented in Figure 2 with factor loadings and factor correlations. The fit indices were within good ranges, χ^2 = 105.810, *df* = 31, $p < .0005$. Although there was a statistically significant *p*-value, significance is sensitive to discrepancies in model fit in a large sample size.[13] The following fit indices were reported, based on recommendations by Brown[18]: RMSEA = 0.064, CFI = 0.972, TLI = 0.960, and GFI = 0.963. The model was respecified based on the indices to identify the best fit model. The final sample size for the CFA was 582, after deleting 117 cases with missing values. Goodness of fit indicated poor fit of the original model for most indices. In the adjusted model, all observed variables on the PG-10-D ranged from 0.53 to 0.85. Item 1 was the weakest observed variable, followed by Item 7; the strongest observed variable was Item 11, followed by Item 10. The fit indices of the initial model and the adjusted model are reported in Table 4. The PG-10-D items showed a slightly higher internal consistency, with a Cronbach's alpha of 0.893, compared to the internal consistency of the PG-12 with Cronbach's α 0.885.

4 | DISCUSSION

This study examined the factor structure of the PG-12 to determine whether the PG-12 was appropriate for caregivers of PLWDs. The PG-12 demonstrated high internal consistency in this study sample of caregivers of persons with dementia. However, the initial model

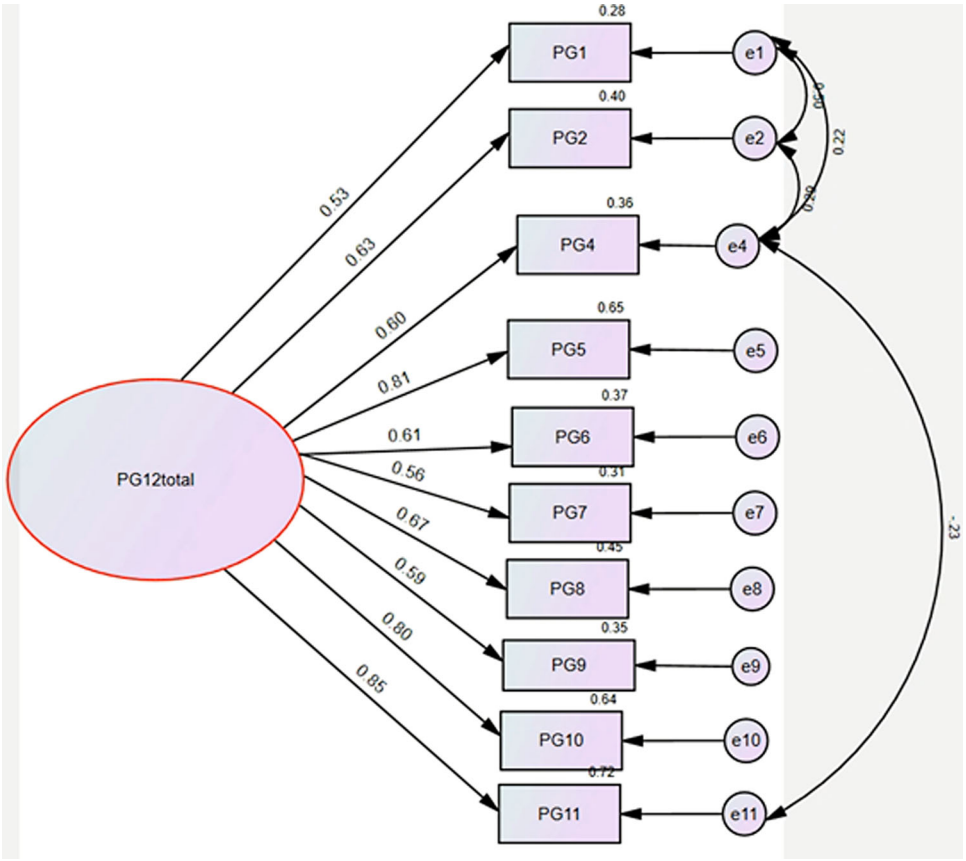

FIGURE 2 Adjusted confirmatory factor analysis model of modified Prolonged Grief 10-Dementia (PG-10-D). The original model was modified to develop a better fitting model and detect misfitting parameters in the PG-12 by correlating the pairing error in Items 1 and 2, 2 and 4, 1 and 4, and 4 and 11 and deleting Items 3 and 12. This adjusted model (PG-10-D) was more specific for describing pre-loss grief in caregivers of persons living with dementia and had significantly improved fit indices ($\chi^2 = 105.810$, $df = 31$, $p < .0005$, RMSEA = 0.064, CFI = 0.972, TLI = 0.960, and GFI = 0.963). The PG-10-D items showed a slightly higher internal consistency, with a Cronbach's alpha of 0.893, compared to the internal consistency of the PG-12 with a Cronbach's alpha of 0.885. The ovals represent latent variables, whereas boxes represent observed variables. (See text for additional details.)

TABLE 4 Fit indices of models

Indices	Initial model (PG-12)	Modified model (PG-10-D)
χ^2/df	9.03	3.41
CFI	0.863	0.972
TLI	0.832	0.960
RMSEA	0.118	0.064
GFI	0.858	0.963
MECVI	0.925	0.266

Sample size = 582.
Abbreviations: CFI, confirmatory factor analysis; GFI, goodness of fit index; MECVI, modified expected cross-variation analysis; RMSEA, root mean square error of approximation; TLI, Tucker Lewis index.

from CFA did not show satisfactory indices; thus, the initial model was modified to develop a better fitting model and to detect misfitting parameters in the PG-12 by deleting Items 3 and 12. The results of CFA indicated that the modified model for the PG-10-D had a good fit.

Item 1 was the weakest observed variable: *In the past month, how often have you felt yourself longing or yearning for your loved one to be healthy again?* Most of the PLWDs (90%, $n = 629$) had a moderate or severe stage of dementia that required the caregiver's substantial assistance and support. It appeared that the caregivers did not expect the PLWDs to become healthy again due to the degenerative nature of the disease. Dementia is a degenerative disease that cannot be cured with usual treatment techniques.[19] Thus, Item 1 was the least relevant to caregivers of PLWDs but could become more relevant in the advent of new disease-modifying medications. Item 7 was the second weakest variable: *Has it been hard for you to trust others since your loved one's illness?* This item does not seem to be associated with the caregiver's pre-loss grief. Because the caregivers of PLWDs may have been taking care of PLWDs during the long-term course of the disease, they developed long-lasting relationships and built trust with their health care providers, other caregivers' network, or social agencies.[20,21] The strongest variable was Item 11: *Do you feel that life is unfulfilling, empty, or meaningless since your loved one's illness?* The responses to this item showed that the caregivers were emotional and had negative

perspectives about their lives. The second strongest variable was I item 10: *Do you feel emotionally numb since your loved one's illness?* Many caregivers often feel emotionally numb from caregiving burden and stress.

Based on the factor loadings, pre-loss grief was related to the caregiver's emotional distress and lack of emotional support. The findings suggest that the dementia-specific, unidimensional PG-10-D, which modified the original PG-12 with the deletion of Items 3 and 12, is the best-fitting model and can be useful in capturing and quantifying pre-loss grief in caregivers of PLWD.

5 | LIMITATIONS AND IMPLICATIONS

It is important to measure pre-loss grief in caregivers of PLWDs accurately to provide the most effective interventions. The PG-10-D could be the standard measure for early identification of family caregivers who are at risk for pre-loss grief.

Several methodological limitations are acknowledged. First, the PG-12 is a unidimensional structure, although factor analyses provide stronger support for the model with two or three factors, as compared to a unidimensional model of prolonged grief.[22] A unidimensional measure may lead to a narrow construct focus and could be misleading, given that multidimensional constructs are the norm.[23] Second, the findings may not be generalizable to the population due to the convenience sampling method. The use of self-reported data derived from the online-based survey may lead to validity issues due to participants' eligibility, although the caregivers were recruited through dementia associations and relevant caregiver organizations. Further psychometric tests of the modified PG-10-D in other settings are recommended. Although this 10-item scale requires further validation, including tests of reliability and validity in future studies, health care providers may consider using the shorter version in health care settings to provide better assessment and treatment for caregivers of PLWDs who are experiencing pre-loss grief. This study addresses the gap in knowledge about pre-loss grief in caregivers of PLWDs. Results showed that the PG-10-D has the potential to be a useful measure in quantifying, characterizing, and understanding pre-loss grief in caregivers of PLWDs. Further research is required to establish psychometric properties, including factorial validity and reliability, particularly factorial invariance analysis and further factor analysis.

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CONFLICT OF INTEREST/DISCLOSURE STATEMENT

The authors have no conflict of interest to report.

REFERENCES

1. Blandin K, Pepin R. Dementia grief: a theoretical model of a unique grief experience. *Dementia*. 2017;16(1):67-78. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4853283/
2. Chan D, Livingston G, Jones L, Sampson EL. Grief reactions in dementia carers: a systematic review. *Int J Geriatr Psych*. 2013;28(1):1-17. https://pubmed.ncbi.nlm.nih.gov/22407743/
3. Kiely DK, Prigerson H, Mitchel, SL. Health care proxy grief symptoms before the death of nursing home residents with advanced dementia. *Am J Geriatr Psych*. 2008;16(8):664-673. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC2670475/
4. Holley CK, Mast BT. The impact of anticipatory grief on caregiver burden in dementia caregivers. *Gerontologist*. 2009;49:388-396. https://doi.org/10.1093/geront/gnp061
5. Sanders S, Adams KB. Grief reactions and depression in caregivers of individuals with Alzheimer's disease: results from a pilot study in an urban setting. *Health Soc Wk*. 2005;30(4):287-295. https://doi.org/10.1093/hsw/30.4.287
6. Walker RJ, Pomeroy EC, McNeil JS, Franklin C. Anticipatory grief and Alzheimer's disease: strategies for intervention. *J Gerontol Soc Wk*. 1995;22(3-4):21-40. https://doi.org/10.1300/J083V22N03_03
7. Givens JL, Prigerson HG, Kiely DK, Shaffer ML, Mitchel SL. Grief among family members of nursing home residents with advanced dementia. *Am J Geriatr Psychy*. 2011;19(6):543-550. https://pubmed.ncbi.nlm.nih.gov/21606897/
8. Lindauer A, Harvath TA. Pre-death grief in the context of dementia caregiving: a concept analysis. *J Adv Nurs*. 2014;70(10):2196-2207. https://pubmed.ncbi.nlm.nih.gov/24702153/
9. Hebert RS, Dang Q, Schulz R. Preparedness for the death of a loved one and mental health in bereaved caregivers of patients with dementia: findings from the REACH study. *J Palliat Med*. 2006;9(3):683-693. https://pubmed.ncbi.nlm.nih.gov/16752974/
10. Tomarken A, Holland J, Schachter S, et al. Factors of complicated grief pre-death in caregivers of cancer patients. *J Psychol Soc Behavl Dimen Cancer*. 2008;17(2):105-111. https://doi.org/10.1002/pon.1188
11. Prigerson HG, Vanderwerker LC, Maciejewski PK. Prolonged grief disorder: a case for inclusion in *DSM-V*. In Stroebe MS, Hansson RO, Schut H, Stroebe W, eds., *Handbook of bereavement research and practice: advances in theory and intervention*. American Psychological Association; 2008:165-186. https://psycnet.apa.org/doi/10.1037/14498-008
12. Harrington D. *Confirmatory factor analysis*. Oxford University Press; 2009.
13. Kline RB. *Principles and practice of structural equation modeling*. 2nd ed. Guilford; 2005.
14. Prigerson HG, Horowitz MJ, Jacobs SC, et al. Prolonged grief disorder: psychometric validation of criteria proposed for DSM-V and ICD-11. *PLoS Med*. 2009;6(8):1-12. https://pubmed.ncbi.nlm.nih.gov/19652695/
15. Treml J, Schmidt V, Nagl M, Kersting A. Pre-loss grief and preparedness for death among caregivers of terminally ill cancer patients: a systematic review. *Soc Sci Med*. 2021;284:1-19. https://doi.org/10.1016/j.socscimed.2021.114240
16. Park J, Galvin J. Pre-loss grief in caregivers of older adults with dementia with Lewy bodies. *J Alzheimers Dis*. 2021;82(4):1847-1859.https://doi.org/10.3233/JAD-210616
17. Chiambretto P, Moroni L, Guarnerio C, Bertolotti G, Prigerson HG. Prolonged grief and depression in caregivers of patients in vegetative state. *Brain Injury*. 2010;24(4):581-588. https://doi.org/10.3109/02699051003610490
18. Brown TA. *Confirmatory factor analysis for applied research*. Guilford; 2006.
19. Udjaja Y, Rumagit RY, Gazali W, Deni J. Healthy elder: brain stimulation game for the elderly to reduce the risk of dementia. *Procedia Comp Sci*. 2021;179:95-102. https://doi.org/10.1016/j.procs.2020.12.013

20. Brazil K, Carter G, Galway K, Watson M, van der Steen JT. General practitioners perceptions on advance care planning for patients living with dementia. *BMC Palliat Care*. 2015;14(1):1-6. https://doi.org/10.1186/s12904-015-0019-x
21. Schers H, van den Hoogen H, Bor H, Grol R, van den Bosch W. Familiarity with a GP and patients' evaluations of care. A cross-sectional study. *Fam Prac*. 2015;22(1):15-19. https://doi.org/10.1093/fampra/cmh721
22. Sveen J, Bondjers K, Heinsoo J, Arnberg FK. Psychometric evaluation of the Swedish version of the Prolonged Grief Disorder-13 (PG-13) in a bereaved mixed trauma sample. *Front Psych*. 2020;11:1-8. https://www.frontiersin.org/articles/541789
23. Gustafsson J-E, Aberg-Bengtsson L. Unidimensionality and interpretability of psychological instruments. In Embretson SE, ed., *Measuring psychological constructs: advances in model-based approaches*. American Psychological Association; 2010:97-121.

SUPPORTING INFORMATION

Additional supporting information can be found online in the Supporting Information section at the end of this article.

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