Research Article

COMPLICATED GRIEF ASSOCIATED WITH HURRICANE KATRINA

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Background: *Although losses are important consequences of disasters, few epidemiological studies of disasters have assessed complicated grief (CG) and none assessed CG associated with losses other than death of loved one.* **Methods:** *Data come from the baseline survey of the Hurricane Katrina Community Advisory Group, a representative sample of 3,088 residents of the areas directly affected by Hurricane Katrina. A brief screen for CG was included containing four items consistent with the proposed DSM-V criteria for a diagnosis of bereavement-related adjustment disorder.* **Results:** *Fifty-eight and half percent of respondents reported a significant hurricane-related loss: Most-severe losses were 29.0% tangible, 9.5% interpersonal, 8.1% intangible, 4.2% work/financial, and 3.7% death of loved one. Twenty-six point one percent respondents with significant loss had possible CG and 7.0% moderate-to-severe CG. Death of loved one was associated with the highest conditional probability of moderate-to-severe CG (18.5%, compared to 1.1–10.5% conditional probabilities for other losses), but accounted for only 16.5% of moderate-to-severe CG due to its comparatively low prevalence. Most moderate-to-severe CG was due to tangible (52.9%) or interpersonal (24.0%) losses. Significant predictors of CG were mostly unique to either bereavement (racial–ethnic minority status, social support) or other losses (prehurricane history of psychopathology, social competence.).* **Conclusions:** *Nonbereavement losses accounted for the vast majority of hurricane-related possible CG despite risk of CG being much higher in response to bereavement than to other losses. This result argues for expansion of research on CG beyond bereavement and alerts clinicians to the need to address postdisaster grief associated with a wide range of losses. Depression and Anxiety 28:648–657, 2011.*

Key words: *bereavement; complicated grief; disaster mental health; grief; loss; suicide*

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INTRODUCTION

Death of a loved one is one of the many types of loss caused by natural disasters.[1–16] Until very recently, though, loss was evaluated in epidemiological studies of the psychiatric consequences of disaster only as a stressor that might trigger PTSD or depression.[10,11] There is now growing awareness of the clinical significance of complicated grief (CG)[17] with recognition of its potential importance following disasters.[18–20] Uncomplicated acute grief is often intense and disruptive shortly after the occurrence of a loss,[21] but typically becomes more muted and less impairing over time.[22] For people with CG, though, this transformation does not occur and acute grief symptoms (e.g., strong feelings of longing/yearning, preoccupation with thoughts/memories of the deceased, withdrawal, loss of interest) persist longer. Research has documented that CG is impairing,[23–25] distinguishable from major depression and posttraumatic stress disorder,[23–27] and profits from psychotherapy that focuses on CG symptoms rather than on depression[28,29] or on general support.[30]

A DSM-V workgroup has proposed that CG be added to DSM-V as a new diagnosis of bereavement-related adjustment disorder, which is described as including intense yearning, difficulty accepting, and anger over the death of a loved one along with a feeling that life is empty or meaningless.[31] Although this proposal stipulates that these symptoms occur following the loss of a loved one, evidence exists that grief symptoms also often occur after nonbereavement losses, such as job loss,[32] loss of a home,[33] loss of the ability to function,[34,35] receiving a diagnosis of a fatal disease,[36–38] and caring for a loved one with dementia.[39,40] Grief symptoms associated with these nonbereavement losses appear to be similar to those associated with bereavement.[35] Yet, we are aware of no disaster research on CG associated with these nonbereavement losses.

This report presents preliminary data on this issue from a brief screening scale of CG collected in a survey with the Hurricane Katrina Community Advisory Group (CAG), a representative sample of prehurricane residents of the areas in Alabama, Louisiana, and Mississippi directly affected by Hurricane Katrina.[41–44] Hurricane Katrina was one of the most devastating natural disasters in U.S. history[45] and was associated with substantial losses of life, property, income, and community,[41,46] providing an excellent opportunity to examine the prevalence and correlates of CG associated with a range of disaster-related losses.

METHODS

SAMPLE

The CAG is a representative sample of 3,088 English-speaking adults (≥18 years old) recruited from random-digit-dial telephone calls of households in the FEMA-defined disaster area affected by Hurricane Katrina and from random selection of families applying for American Red Cross assistance. The baseline CAG interviews, the focus of this report, were carried out with separate samples of respondents in three waves: January–March 2006 (5–7 months posthurricane) $n = 1{,}043$; April–June 2006 (7–10 months posthurricane) $n = 723$; December 2006–April 2007 (15–19 months posthurricane) $n = 1{,}322$. Interviews were carried out in these three waves based on added funding that allowed baseline sample size to increase on two different occasions after the first wave. The 3,088 total respondents had a low (35.2%) cooperation rate (i.e., the survey completion rate among predesignated respondents who were successfully traced to their current residence at the time of interview) due to the requirement that respondents make a long-term commitment to remain in the CAG (and provide contact information for an informant who would know their whereabouts if they moved), as we aimed to use the CAG to track the progress of posthurricane recovery over time.

A nonresponse survey found that CAG nonrespondents were similar to respondents on sociodemographic variables, but had somewhat higher hurricane-related stress on a 0–10 scale (where 0 meant "no stress at all" and 10 meant "the most stress you can imagine") and more psychological distress (assessed with a short series of questions about common anxiety/mood symptoms scored on a 0–10 scale) than respondents. The median and interquartile range (IQR: 25th–75th percentiles) of hurricane-related stress were 8.0 (6.0–10.0) among nonrespondents and 7.0 (5.0–9.0) among respondents. The median and IQR of psychological distress were 2.9 (1.2–4.4) among nonrespondents and 1.7 (0.6–3.5) among respondents. A weight was applied to the baseline CAG data to adjust for these response biases. No data were collected from nonrespondents, though, on specific hurricane-related losses. A within-household probability of selection weight and poststratification weight were also used to adjust for residual discrepancies between the CAG and the 2000 Census population on a range of sociodemographic and prehurricane housing variables. The consolidated CAG sample weight was then trimmed to increase design efficiency.

MEASURES

Hurricane-related stressors. Respondents were asked 30 questions regarding exposure to hurricane-related stressors. Categories of stressors sufficiently common to be analyzed in subgroup analyses were serious risk of death, death of a family member or close friend, victimization due to lawlessness after the storm (e.g., robbery or physical assault), victimization of a loved one, physical illness or injury caused or exacerbated by the storm, extreme physical adversity (e.g., sleeping in a church basement, difficulty obtaining food or clothing), extreme psychological adversity (e.g., living in distressing circumstances, such as having to use the toilet or change clothes without adequate privacy), major property or income loss, and ongoing difficulties associated with housing (e.g., experiencing multiple moves or living in substantially worse posthurricane than prehurricane housing).[41]

Loss events. Respondents were asked to nominate and rate their one "most significant hurricane-related loss" on a 0–10 scale (where 0 meant "no loss" and 10 meant "the greatest loss you can imagine"). Only respondents who rated their loss 3+ were administered the grief questions described below. These losses were coded as death of loved one, work/financial losses, other tangible losses (e.g., home, possessions, memorabilia), intangible losses (e.g., quality of life, sense of well-being, control, security, way of life), and interpersonal losses (e.g., separations from family or friends, reduced quality of relationships with family or friends). A small proportion of respondents did not respond to this question (1.2%) or provided uncodeable responses (2.7%).

Grief. Respondents with losses rated 3+ were asked four questions about grief in the past 30 days associated with their most significant loss: (1) *How often have you found yourself longing or yearning for the people or things you lost*? (2) *How bitter do you feel over your loss*? (3) *How empty or meaningless do things seem since your loss*? and (4) *How difficult is it for you to accept your loss or to believe that it's real*? Response options were coded 0–4 (*almost all*, *most*, *some*, *a little*, and *none of the time* for the first question; and *not at all*, *a little*, *some*, *a lot*, and *extremely* for the other three questions). Principal axis factor analysis found one meaningful factor with an unrotated eigenvalue of 2.7 compared to 0.5 for the second factor and factor loadings of .77+ for all items. A composite measure of grief was created by reflecting responses to the first question and then summing the four responses to create a 0–16 scale. A preliminary categorical classification was made with the following categories: *severe CG* (15–16), *moderate CG* (13–14), *mild CG* (8–12), *subthreshold grief* (5–7), and *no–minimal grief* (0–4). These cut-points were based on an analysis of sensitivity–specificity of responses to a similar subset of questions in reproducing diagnoses of CG based on a widely utilized CG scale[47] in a large clinical dataset.[48] The fact that these interviews took place 5–19 months after the hurricane suggests that the majority of cases had symptoms for more than 6 months, which is the minimum duration typically specified for CG.[49,50]

Sociodemographics. We examined associations of CG symptoms with age, sex, race/ethnicity (Non-Hispanic White versus Other), education, marital status, family income in the year before the hurricane (low/low-to-middle versus high-to-middle/high), health insurance status, and prehurricane location of residence (New Orleans Metropolitan Area versus elsewhere). Low/low-to-middle family income was defined as less than or equal to the population median on the ratio of pretax income to a number of family members, whereas high/middle-to-high income was defined as greater than the median on this ratio.

Mental illness. Respondents completed short screening scales of prehurricane lifetime history of major depressive episode, anxiety disorders (panic disorder, generalized anxiety disorder, posttraumatic stress disorder), substance use disorders (alcohol or drug abuse with or without dependence), intermittent explosive disorder, and suicidality. These scales were adapted from the Family History Research Diagnostic Criteria interview[51] and its extensions.[52] The questions about suicidality were taken from the Self-Injurious Thoughts and Behaviors Interview.[53] The K6 scale of nonspecific psychological distress[54] was used to screen for DSM-IV Serious Mental Illness (SMI) in the 30 days before interview. Validation studies have found an area under the receiver operating characteristic curve of 0.86–0.89 of the K6 predicting clinical diagnoses of SMI.[54–56] K6 scores of 13–24 were classified probable SMI. A small K6 clinical reappraisal study ($n = 15$) in the CAG selected eight respondents with K6 scores in the clinical range and seven below that range, and blindly administered the Structured Clinical Interview for DSM-IV (SCID).[57] Sensitivity and specificity were perfect in predicting SMI. Suicidal ideation in the 12 months before interview was assessed with a question that asked respondents whether they had seriously thought about killing themselves in the past year.

Stress buffers. Functional social support[58] was assessed with one question that asked respondents about the number of people in their county/parish who they could speak to about their private feelings without embarrassment. Social competence was assessed with a 12-item scale[59] rating such abilities as staying calm in a crisis, getting along with people, being persuasive, staying out of trouble in dangerous situations, staying in control of emotions when necessary, and keeping a sense of humor in tense situations. The internal consistency reliability (Cronbach's α) of this scale was .87.

DATA ANALYSIS

Prevalence of grief symptoms associated with each type of loss and co-occurrence of CG with SMI suicidality were examined with cross-tabulations. Predictive associations of sociodemographics, hurricane-related stressors, and prehurricane history of psychopathology with CG were examined with logistic regression analysis. Logistic regression coefficients and their standard errors were exponentiated to create odds ratios (ORs) and 95% confidence intervals (CIs). The Taylor series linearization method was used to calculate design-based significance tests. Statistical significance was consistently evaluated using two-sided .05-level tests.

RESULTS

ESTIMATED PREVALENCE OF COMPLICATED GRIEF

The estimated prevalence of CG in the CAG was 15.3%, representing 26.1% of respondents with a significant loss (Table 1). The majority of CG (73%) was rated mild, compared to 14.5% moderate and 12.5% severe. Only 4.1% of respondents in the total sample (7.0% of those with a significant loss) were estimated to have moderate (2.2%) or severe (1.9%) CG.

DISTRIBUTION OF GRIEF BY TYPE OF LOSS

Only 3.7% of respondents reported that death of a loved one was their most significant hurricane-related loss. Other types of loss were more common, with 58.5% of respondents reporting some type of loss rated 3+ on the 0–10 loss severity scale (Table 2). The most commonly reported losses were tangible losses (29.0%), interpersonal losses (9.5%), intangible losses (8.1%), and work/financial losses (4.2%). The distribution across the five substantive loss categories did not differ significantly among respondents interviewed 5–6, 7–12, and 13–19 months after the hurricane ($\chi^2_8 = 4.2$, $P = .84$).

TABLE 1. Estimated prevalence of grief among adults exposed to Hurricane Katrina ($n = 3{,}088$)

	%	(se)
No loss[a]	41.5	(1.5)
No–minimal grief[b]	29.4	(1.3)
Subthreshold grief[b]	13.7	(1.0)
Complicated grief (CG)[b]		
Mild	11.1	(0.9)
Moderate[b]	2.2	(0.4)
Severe[b]	1.9	(0.5)
Total CG	15.3	(1.1)

[a]Scores in the range 0–2 on the 0–10 scale assessing severity of hurricane-related loss. Grief reactions were assessed only among respondents with scores in the range 3–10 on this scale.
[b]The grief scale was scored in the range 0–16. Scale ranges were defined as 0–4 *no–minimal grief*, 5–7 *subthreshold griefs*, 8–12 *mild CG*, 13–14 *moderate CG*, and 15–16 *severe CG*.

Bereavement had the highest conditional probability of grief symptoms (68.9%) and CG (18.9%) (Table 3; Part I). Grief symptoms were less prevalent among respondents whose main loss was interpersonal (52.5%) or tangible (50.5%). Moderate-to-severe CG was also lower in these subsamples (10.6% interpersonal, 7.6% tangible). Moderate-to-severe CG was least common among respondents whose main loss was intangible (1.3%) or work/financial (1.1%). Differences in prevalence of CG by type of most significant loss did not differ among respondents in the three survey waves (i.e., interviewed 5–6, 7–12, and 13–19 months post-hurricane; $\chi^2_8 = 10.3$, $P = .25$ total CG; $\chi^2_8 = 13.8$, $P = .09$ moderate-to-severe CG).

Despite the much higher risk of CG among respondents whose most significant loss was bereavement than other types of loss, only 16.5% of all moderate-to-severe CG was associated with bereavement (Table 3; Part II). This proportion did not vary markedly depending on whether respondents were interviewed 5–6 (15.8%), 7–12 (23.2%), or 13–19 (14.2%) months after the hurricane. The highest proportions of moderate-to-severe CG were associated with tangible (52.9%) and interpersonal (24.0%) losses.

TABLE 2. Distribution of self-reported most significant hurricane-related losses[a]

	%	*SE*	(*n*)
No loss	41.5	(1.5)	(1,021)
Tangible	29.0	(1.3)	(984)
Interpersonal	9.5	(0.8)	(388)
Intangible	8.1	(0.7)	(330)
Work or financial	4.2	(0.6)	(120)
Death of a loved one	3.7	(0.5)	(160)
No answer/unintelligible	2.7	(0.6)	(51)
Missing	1.2	(0.4)	(34)
Total			(3,088)

[a]Respondents who reported hurricane-related losses in the range 3–10 on the 0–10 severity-of-loss scale were asked to describe their most significant loss. Open-ended responses were coded into the categories reported in this table. Tangible losses include such things as loss of a home, possessions, or memorabilia. Interpersonal losses (other than death of a loved one) include separations from family or friends as well as decreases in quality of relationships with family or friends. Intangible losses include such things as loss of quality of life, sense of well being, control, security, or way of life. Work/financial losses include any mention of job, money, finance, income, or business losses.

CO-OCCURRENCE OF COMPLICATED GRIEF WITH SERIOUS MENTAL ILLNESS AND SUICIDAL IDEATION

The vast majority of respondents with severe CG (83.9%) met criteria for either the 30-day SMI or the 12-month suicidal ideation (Table 4). ORs between severe CG (compared to no hurricane-related loss) and these outcomes are in the range of 24.0–97.5. Prevalence of SMI or suicidal ideation were considerably lower among respondents with moderate (41.7%) or mild (38.3%) CG (ORs = 7.8–13.3). Prevalence of SMI or suicidal ideation were lower still among respondents with no–minimal or subthreshold grief symptoms (21.4%), but with elevated ORs (5.1–6.9) compared to people who had no hurricane-related

TABLE 3. Estimated prevalence and severity of complicated grief (CG) according to type of loss[a]

	No–minimal grief (0–4)		Subthreshold grief (5–7)		Mild CG (8–12)		Moderate CG (13–14)		Severe CG (15–16)		Moderate/Severe CG (13–16)		
I. Percentage by rows	%	*SE*	%	*SE*	%	*SE*	%	*SE*	%	*SE*	%	*SE*	(*n*)
I. Percentage by rows													
Tangible losses	49.5	(2.7)	20.8	(2.2)	22.0	(2.4)	4.9	(1.1)	2.7	(1.1)	7.6	(1.5)	(984)
Interpersonal losses	47.5	(4.6)	28.4	(4.2)	13.5	(2.8)	2.8	(1.2)	7.7	(3.2)	10.6	(3.3)	(388)
Intangible losses	57.4	(4.4)	26.9	(4.3)	14.4	(2.7)	0.9	(0.6)	0.4	(0.3)	1.3	(0.6)	(330)
Work/financial losses	64.4	(7.0)	15.3	(4.7)	19.2	(6.0)	1.1	(0.8)	0.0	(0.0)	1.1	(0.8)	(120)
Death of a loved one	31.1	(6.4)	22.0	(5.3)	28.0	(5.7)	11.4	(4.9)	7.5	(2.9)	18.9	(5.4)	(160)
Unintelligible	60.3	(10.9)	31.5	(10.9)	4.3	(2.2)	0.3	(0.3)	3.6	(3.2)	4.0	(3.2)	(51)
Missing	31.7	(13.0)	40.4	(13.7)	26.7	(15.2)	0.0	(0.0)	1.2	(1.2)	1.2	(1.2)	(34)
II. Percentage by columns													
Tangible losses	48.8	(2.6)	44.0	(4.0)	57.4	(4.2)	63.9	(8.6)	40.2	(12.6)	52.9	(7.5)	
Interpersonal losses	15.4	(1.9)	19.7	(3.1)	11.6	(2.5)	11.9	(5.1)	38.0	(12.5)	24.0	(6.9)	
Intangible losses	15.8	(1.7)	15.8	(2.8)	10.5	(2.0)	3.2	(2.1)	1.8	(1.4)	2.5	(1.3)	
Work/financial losses	9.2	(1.7)	4.7	(1.5)	7.3	(2.4)	2.1	(1.6)	0.0	(0.0)	1.1	(0.8)	
Death of a loved one	3.9	(1.0)	5.9	(1.5)	9.2	(2.1)	18.6	(7.7)	14.1	(5.9)	16.5	(5.0)	
Unintelligible	5.6	(1.5)	6.3	(2.6)	1.1	(0.5)	0.4	(0.4)	5.1	(4.5)	2.6	(2.1)	
Missing	1.3	(0.6)	3.6	(1.4)	3.0	(2.0)	0.0	(0.0)	0.8	(0.8)	0.4	(0.4)	
(*n*)	(1,132)		(461)		(358)		(77)		(39)		(116)		

[a]The 2,183 respondents in this table consist of all those who reported hurricane-related losses in the range 3–10 on the 0–10 severity-of-loss scale. The subsample *n*'s do not correspond to the proportions in Tables 1 and 2 due to the fact that those proportions are based on weighted data, whereas the *n*'s reported in the current table are unweighted.

TABLE 4. Co-occurrence of complicated grief (CG) with 30-day serious mental illness (SMI) and 12-month suicidal ideation ($n = 3,088$)[a]

	30-day SMI[a]				12-month suicidal ideation				SMI or suicidal ideation			
	%	*SE*	OR	(95% CI)	%	*SE*	OR	(95% CI)	%	*SE*	OR	(95% CI)
No hurricane-related loss	4.2	(0.7)	1.0	–	1.0	(0.4)	1.0	–	5.1	(0.8)	1.0	–
No–minimal/subthreshold grief	18.7	(3.1)	5.3*	(3.0–9.1)	6.5	(2.2)	6.9*	(2.4–19.9)	21.4	(3.3)	5.1*	(3.0–8.5)
Mild CG	35.6	(4.2)	12.6*	(7.5–21.1)	7.3	(2.4)	7.8*	(2.8–22.1)	38.3	(4.3)	11.6*	(7.1–18.9)
Moderate CG	39.8	(8.3)	15.1*	(7.0–32.5)	9.5	(4.7)	10.4*	(2.8–38.8)	41.7	(8.5)	13.3*	(6.2–28.4)
Severe CG	79.3	(9.4)	87.2*	(27.3–278.9)	19.5	(10.2)	24.0*	(5.5–105.6)	83.9	(8.7)	97.5*	(26.7–356.3)
Any CG	41.7	(3.8)	16.4*	(10.2–26.3)	9.2	(2.3)	10.0*	(3.9–25.9)	44.6	(3.8)	15.0*	(9.5–23.6)
Moderate-to-severe CG	58.1	(7.5)	31.6*	(15.7–63.7)	14.1	(5.4)	16.3*	(5.1–52.6)	61.3	(7.4)	29.5*	(14.7–59.3)

[a]χ^2_4 tests for the association between level of grief (no loss, no–minimal/subthreshold grief, mild CG, moderate CG, severe CG) and each dichotomous outcome are: SMI $\chi^2_4 = 135.7$, $P<.001$, suicidal ideation $\chi^2_4 = 26.3$, $P<.001$, SMI or suicidal ideation $\chi^2_4 = 135.7$, $P<.001$.

loss. Prevalence of SMI or suicidal ideation among respondents who had no hurricane-related loss, finally, was 5.1%.

PREDICTORS OF COMPLICATED GRIEF

We examined associations of sociodemographics, hurricane-related stressors, prehurricane history of psychopathology, and posthurricane resiliency factors with moderate-to-severe CG among respondents who experienced hurricane-related loss. None of the sociodemographic variables was a significant predictor after controlling type of loss. This is striking given that sociodemographics typically are associated with more general measures of anxiety and mood disorders in community epidemiological surveys.[60,61] Access to health insurance, an indirect indicator of socioeconomic status, was also unrelated to moderate-to-severe CG, as was residential location before the hurricane (the New Orleans Metropolitan Area versus the remainder of the areas affected by the hurricane).

Two presumed stress buffers, social support and social competence, were also insignificant predictors of moderate-to-severe CG. However, the remaining two predictors, number of hurricane-related stressors reported by respondents and prehurricane history of psychopathology, were both significant. Number of hurricane-related stressors were coded in the range 1–10 (with 1 being the lowest score rather than 0, because all respondents in the loss subsample reported exposure to at least one hurricane-related stressor), where a score of 10 represents reporting exposure to 10 or more of the 30 stressors assessed in the survey. (Scores were truncated at 10, because only a very small number of respondents reported exposure to more than 10 of the 30 stressors.) The 1.7 OR associated with hurricane-related stressors consequently represents the relative odds of moderate-to-severe CG associated with an increase of one stressor. More detailed analyses (results available on request) showed that the implicit assumption of a linear association between number of stressors and log odds of moderate-to-severe CG is consistent with the data; that is, the OR of having been exposed to 3 stressors versus 1 is roughly equal to $1.7^2 = 2.9$; of having been exposed to 4 stressors versus 1 equal to 0 $1.7^3 = 4.9$, etc. Further analysis also supported the model assumption that types of stressors could be considered equivalent for purposes of predicting this outcome (Table 5).

Prehurricane history of psychopathology was coded as a 0–7 count of number of prior lifetime mental disorders assessed in the survey. The OR of 1.2 associated with this predictor consequently represents the association of an increase in one point on this scale. More detailed analyses (results available on request) showed that the implicit assumption of a linear association between number of disorders and log odds of CG is consistent with the data; that is, the OR history of two prior mental disorders versus 0 is roughly $1.2^2 = 1.4$, of having three prior disorders versus 0 is roughly $1.2^3 = 1.7$, etc. Further analysis also supported the model assumption that types of disorders are not significant predictors of CG once number of disorders is controlled. This means that the vulnerability associated with history of psychopathology is relatively general rather than linked to any particular subset of disorders.

Decomposition showed that the ORs of the predictors taken as a set are significantly different across subsamples defined by type of loss ($\chi^2_{28} = 47.9$, $P = .011$). However, the only individual predictor for which the ORs are significantly different across subsamples is social competence ($\chi^2_2 = 6.4$, $P = .041$). Social competence (standardized to a mean of 0 and variance of 1) has a statistically significant 0.3 OR predicting moderate-to-severe CG associated with interpersonal loss, but is not significant in predicting moderate-to-severe CG associated with other types of loss (0.8–0.9). Most other significant specifications involved predictors only of CG associated with bereavement, including elevated ORs associated with non-White race (6.9), low education (8.6), and social support (2.3). However, caution is needed in interpreting these specifications, as none of the ORs differs

TABLE 5. Multivariate associations of sociodemographics, hurricane-related stressors, prehurricane history of psychopathology, and posthurricane resiliency factors with moderate-to-severe complicated grief (CG) among respondents with any hurricane-related loss and separately among respondents with the hurricane-related losses most strongly associated with CG[a]

	Any loss		Death of a loved one		Tangible losses		Interpersonal losses	
	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)	OR	(95% CI)
Age								
18–39	0.5	(0.2–1.5)	3.2	(0.5–21.2)	0.3	(0.1–1.1)	0.2	(0.0–2.6)
40–59	0.8	(0.3–2.5)	2.5	(0.4–16.6)	0.9	(0.3–2.9)	0.1	(0.0–1.5)
60+	1.0	–	1.0	–	1.0	–	1.0	–
χ^2_2	2.5		1.5		4.5		2.8	
Sex								
Male	0.7	(0.3–1.3)	0.4	(0.1–1.4)	0.6	(0.2–1.5)	1.5	(0.4–5.3)
Female	1.0	–	1.0	–	1.0	–	1.0	–
χ^2_1	1.4		2.3		1.3		0.3	
Race/ethnicity								
Non-white	1.8	(0.9–3.5)	6.9*	(1.9–25.0)	1.7	(0.7–4.3)	1.4	(0.3–6.6)
White	1.0	–	1.0	–	1.0	–	1.0	–
χ^2_1	2.8		8.7*		1.2		0.2	
Income								
Low/low-to-middle	1.9	(0.9–4.0)	1.5	(0.4–6.0)	2.1	(0.6–7.1)	3.6	(0.6–23.2)
Middle-to-high	1.0	–	1.0	–	1.0	–	1.0	–
χ^2_1	3.2		0.4		1.5		1.9	
Health insurance								
None	0.9	(0.5–1.9)	0.4	(0.1–1.3)	0.8	(0.2–2.7)	0.6	(0.1–2.9)
Any	1.0	–	1.0	–	1.0	–	1.0	–
χ^2_1	0.0		2.6		0.1		0.4	
Education (in years)								
0–12	1.5	(0.8–2.9)	6.6*	(1.4–31.2)	1.3	(0.5–3.9)	2.1	(0.6–7.8)
13+	1.0	–	1.0	–	1.0	–	1.0	–
χ^2_1	1.4		5.7*		0.3		1.3	
Prehurricane residence								
New Orleans metro	1.6	(0.8–3.1)	4.8	(0.6–36.2)	1.3	(0.4–3.6)	1.0	(0.3–3.9)
All others	1.0	–	1.0	–	1.0	–	1.0	–
χ^2_1	2.0		2.4		0.2		0.0	
Marriage status								
Married	0.7	(0.3–1.6)	0.5	(0.1–2.6)	0.6	(0.2–2.2)	1.5	(0.2–10.4)
Previously married	0.6	(0.2–1.4)	2.5	(0.5–12.4)	0.4	(0.1–1.3)	0.5	(0.0–7.6)
Never married	1.0	–	1.0	–	1.0	–	1.0	–
χ^2_2	1.5		3.6		2.7		0.8	
Hurricane-related stressors[b]								
	1.7*	(1.5–2.1)	1.4*	(1.0–1.8)	1.9*	(1.4–2.5)	1.9*	(1.2–2.9)
χ^2_1	45.5*		4.3*		20.0*		7.3*	
Social support[c]								
	1.2	(0.9–1.7)	2.3*	(1.1–4.8)	1.2	(0.8–2.0)	1.1	(0.4–3.1)
χ^2_1	1.7		5.0*		0.9		0.0	
Social competence[c]								
	0.7	(0.6–1.0)	0.8	(0.5–1.3)	0.9	(0.6–1.4)	0.3*	(0.2–0.6)
χ^2_1	3.7		1.1		0.2		11.8*	
Prehurricane history of psychopathology[d]								
	1.2*	(1.0–1.4)	1.2	(0.8–1.7)	1.2*	(1.0–1.5)	1.5*	(1.1–2.1)
χ^2_1	6.0*		1.1		4.5*		6.2*	
(*n*)	(2,183)		(160)		(984)		(388)	

*Significant at the .05 level, two-sided test.

[a]Multivariate logistic regression models predicting moderate-to-severe complicated grief among respondents who reported hurricane-related losses in the range 3–10 on the 0–10 severity-of-loss scale.

[b]The hurricane-related stressors scale is a count of number of hurricane-related stressors out of the 30 assessed. The scale is scored in the range 1–10 in this subsample. The lowest score is 1 because all respondents with significant loss reported at least one hurricane-related stressor. The highest score is 10 because the small number of respondents who reported more than 10 hurricane-related stressors were coded 10 due to the rarity of higher exposures.

[c]The social support and social competence scales are standardized to have a mean of 0.0 and a variance of 1.0 in the total sample.

[d]Prehurricane history of psychopathology is coded in the range 0–7 and represents the number of lifetime disorders the respondent reported having before the hurricane. These seven include major depressive episode, panic disorder, generalized anxiety disorder, posttraumatic stress disorder, intermittent explosive disorder, substance abuse with or without dependence, and suicide ideation.

significantly from the nonsignificant ORs for these predictors in the total sample ($\chi^2_2 = 2.2–3.5$, $P = .17–.34$), raising the possibility that significant subsample associations might be due to chance fluctuations in the large number of subsample replications. The only other noteworthy specification is that history of psychopathology does not predict CG associated with bereavement, whereas it does predict CG associated with other types of loss.

DISCUSSION

The CAG is one of the largest disaster-related surveys that screened CG and the first to investigate CG associated with nonbereavement disaster-related losses. More than half of respondents reported a disaster-related loss, with types similar to those described after other disasters.[15,62] More than one-fourth of respondents with a significant loss reported at least some grief symptoms, with moderate-to-severe CG reported by 3.9% of respondents. Although CG was significantly associated with SMI and suicidal ideation, the majority of respondents with mild or moderate CG did not have SMI.

CG was most prevalent following bereavement (conditional prevalence of moderate-to-severe CG of 18.9% compared to 1.1–10.6% for other losses). These differences were quite consistent across subsamples of respondents that differed in length of time between the hurricane and the time of baseline interview.

Prevalence estimates of CG in other postdisaster studies that assessed CG related to bereavement[18–20] and other studies of death of a loved one due to a variety of causes[49,63] vary widely (10–76%). The 18.9% CAG estimate is at the lower end of this range. Caution is needed in interpreting this comparison, though, as each study so far has used a different rating instrument and the CAG estimate was based on a very short screening measure. No other study asked respondents to rate a range of losses and to identify which was most severe.

We are unaware of any previous disaster study that estimated CG associated with nonbereavement loss. Interestingly, because of the comparatively low prevalence of bereavement, other types of loss accounted for the vast majority of CG (83.5%). Property loss was the most common cause of CG (accounting for 52.9% of all CG cases), with interpersonal losses other than death accounting for an additional 24.0%. However, as a result of the high conditional risk of CG among respondents with bereavement, the proportion of CG due to bereavement (16.5%) was a considerably higher proportion than one would expect by chance given that only 6.4% of all respondents who reported a loss said that bereavement was their most significant loss.

The finding of high co-occurrence of CG with both mood/anxiety disorders[27,64,65] and suicidal ideation[66–69] is consistent with previous research, and was particularly common (more than 80%) among individuals with severe CG. In addition, we found that exposure to hurricane-related stressors was strongly related to CG. This, too, is consistent with previous research.[18,64] However, our finding that CG from nonbereavement loss was largely unrelated to sociodemographics is inconsistent with evidence from previous studies that bereavement-related CG is generally more common among women, minorities, the unmarried, and people with socioeconomic disadvantage.[18,25,64] This failure to find strong sociodemographic correlates of CG is part of a larger pattern in the CAG for sociodemographics to be much less strongly related either to trauma exposure or to psychopathology (PTSD or SMI) than in other natural disaster samples.[41,43] We suggested in a previous report that these weak associations are due to the enormity of the devastation caused by Katrina, which overwhelmed the protective effects typically provided by sociodemographic advantage, leading to a wider distribution of psychopathological reactions than in more typical natural disasters.[42]

Another CAG finding consistent with previous research is that prehurricane history of psychopathology strongly predicted clinically significant CG.[27,64,70] The finding that *number* of rather than *type* of prior disorders predicted CG is consistent with accumulating evidence that CG is a unique syndrome, not best described as a form of depression or PTSD as many have done,[1–16] although it is important to be clear that this finding is certainly not definitive in arguing that CG is a unique syndrome. Indeed, one of the weakest aspects of this sample is that it did not include a comprehensive assessment of other disorders with which CG might be confounded.

A series of specifications showed that low education, minority race/ethnic status and social support predicted bereavement-related CG but not other CG, whereas prehurricane history of psychopathology and social competence predicted only nonbereavement-related CG. The stability of these specifications is uncertain and requires replication in independent datasets. The possibility of specificity, paired with the high prevalence of grief symptoms among those with nonbereavement losses, points to the importance of future studies examining patterns and predictors of grief among individuals who experienced losses other than death of a loved one.

Several observations can be made about these specificities. The finding that markers of disadvantaged social status (minority race/ethnic status, low education) predicted only bereavement-related CG might be taken to suggest that social ties are especially important for people in socially disadvantaged than advantaged positions. Evidence consistent with such a specification exists in the social networks literature.[71,72] The finding that social support predicts *increased* risk of CG, but only when the CG is related to bereavement, might indicate that social support is a marker of the magnitude of loss rather than a true vulnerability

factor. Studies of social support in older bereaved samples indicate an association between greater emotional loneliness and instrumental social support.[73,74] However, it is unclear how this relates to CG. We are unaware of previous studies that examined effects of social competence on CG. Our finding that social competence does not protect against CG due to nonbereavement loss raises the possibility that protective effects of social competence might be specific to interpersonal losses. All these specifications need to be replicated in other datasets, though, before they are considered reliable.

A number of study limitations are important to note. First, the CAG excluded people who we could not trace as well as those not reachable by telephone, which likely resulted in the underrepresentation of individuals with the greatest exposure to hurricane-related stressors and, potentially, the highest rates of CG. Second, CG was assessed using a brief symptom scale that included only a subset of the symptoms now recommended for assessment of CG. In addition, symptoms were assessed 5–19 months after the hurricane even though the DSM-V workgroup suggested a minimum duration of at least 12 months for a diagnosis of bereavement-related adjustment disorder.[31] Prevalence estimates of CG and results regarding associations should be considered only provisional. It is noteworthy, though, that results regarding correlates of CG did not vary significantly as a function of time between the hurricane and the survey, which means that the patterns reported here are broadly consistent whether CG is defined with durations as short as 4–5 months (i.e., symptoms in the past month among respondents interviewed 5–6 months after the hurricane, 6–11 months, or 12+ months). Third, although the screening scales of co-occurring mental disorders used here have been validated,[54,56] screening scales are inherently less precise than comprehensive diagnostic interviews, which undoubtedly led to at least some misclassification of respondents. Fourth, it would have been valuable if the survey had included a comprehensive assessment of other disorders that might be comorbid with CG, allowing us to investigate whether or not unique associations could be found with CG after controlling those other disorders. Fifth, it is difficult to interpret results for the 8.1% of respondents who said that they had a most significant hurricane-related loss that was intangible (e.g., quality of life, sense of well-being, control, security, way of life), as the kinds of experiences included in the description of intangible losses overlap considerably with the symptoms of CG. It is noteworthy, though, that prevalence of clinically significant CG was quite low in this subsample (1.3%), minimizing the impact of this problem. These limitations need to be corrected in future studies.

Despite these limitations, the results reported here suggest that CG is associated with losses other than death, that nondeath grief might make up a large proportion of CG after a natural disaster and that the predictors of CG might differ depending on type of loss, although replication of these results in a study that assesses a wide range of other DSM disorders is needed to determine the extent to which these patterns hold up after controlling for all other relevant disorders. A practical implication of the results for disaster response involves the fact that postdisaster interventions for grief have been developed, although not systematically tested,[75] and could be applied if clinicians increased their recognition of potentially problematic postdisaster grief reactions. Previous studies indicate that grief-focused therapies out-perform more conventional therapies in ameliorating CG symptoms,[28–30] but this work has not targeted disaster-bereaved individuals and has not included losses other than death. Data reported here suggest that the magnitude and heterogeneity of the problem of postdisaster CG are large enough to warrant systematic investigation of these possibilities.

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