



A person-centered analysis of posttraumatic stress disorder symptoms following a natural disaster: Predictors of latent class membership[☆]



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ABSTRACT

The present study applied latent class analysis to a sample of 810 participants residing in southern Mississippi at the time of Hurricane Katrina to determine if people would report distinct, meaningful PTSD symptom classes following a natural disaster. We found a four-class solution that distinguished persons on the basis of PTSD symptom severity/pervasiveness (Severe, Moderate, Mild, and Negligible Classes). Multinomial logistic regression models demonstrated that membership in the Severe and Moderate Classes was associated with potentially traumatic hurricane-specific experiences (e.g., being physically injured, seeing dead bodies), pre-hurricane traumatic events, co-occurring depression symptom severity and suicidal ideation, certain religious beliefs, and post-hurricane stressors (e.g., social support). Collectively, the findings suggest that more severe/pervasive typologies of natural disaster PTSD may be predicted by the frequency and severity of exposure to stressful/traumatic experiences (before, during, and after the disaster), co-occurring psychopathology, and specific internal beliefs.

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1. Introduction

1.1. Posttraumatic stress disorder following natural disasters

As many as one in five individuals are exposed to at least one natural disaster over their lifetime (Briere & Elliott, 2000; Norris, 1992). The population prevalence of posttraumatic stress disorder (PTSD) has been found to range between 4% (Canino, Bravo, Rubio-Stipec, & Woodbury, 1990) and 60% (Madakasira & O'Brien, 1987) within two years of a natural disaster, with the highest rates typically occurring in areas that are most heavily affected by the disaster (e.g., Najarian, Goenjian, Pelcovitz, Mandel, & Najarian, 2001). Over the past several years, multiple studies have documented PTSD in the general population following Hurricane Katrina; for example, the past-month prevalence of PTSD was as high as 30.3% (within nine months of Hurricane Katrina) among persons who were living in the New Orleans metropolitan area at the time of the storm

(Galea et al., 2007). Consistent with other natural disaster studies (for a review see Neria, Nandi, & Galea, 2008), being female, less educated, unemployed, living in an area with greater disaster exposure (e.g., New Orleans, Mississippi gulf coast), and experiencing a greater number of hurricane-related stressors (e.g., hurricane-specific traumatic events, post-hurricane crime victimization) have all been associated with greater odds of having probable PTSD after Hurricane Katrina (Galea et al., 2007; Galea, Tracy, Norris, & Coffey, 2008; Kessler et al., 2008). Galea and colleagues (2008) also identified economic and social factors that were significantly associated with having probable *Diagnostic and Statistical Manual of Mental Disorders* (4th edition, *DSM-IV*, American Psychiatric Association, APA, 1994) PTSD subsequent to Hurricane Katrina, including experiencing financial loss as a result of the storm, having fewer social supports, and experiencing a greater number of pre- and post-disaster PTSD Criterion A traumas. More recent studies have also replicated and expanded on these early findings by examining correlates of PTSD following Hurricane Katrina in more circumscribed samples (e.g., veterans, Davis et al., 2012; Vietnamese Americans, Norris, VanLandingham, & Vu, 2009; children, Pina et al., 2008).

1.2. Latent classes of posttraumatic stress disorder symptoms

Although research has helped establish the foundational epidemiology of PTSD after disasters (see Galea, Nandi, & Vlahov, 2005;

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Neria et al., 2008), this literature has been limited in its evaluation of the heterogeneous nature of PTSD symptoms. For example, theory has underscored the possibility that individuals may experience varying presentations (i.e., typologies) and severities of PTSD symptoms (i.e., Bonanno, 2004; Layne, Warren, Watson, & Shalev, 2007). Consistent with heterogeneous conceptualizations is the polythetic criteria approach utilized by DSM in making a diagnosis of PTSD. That is, some people may experience all 17 DSM-IV-TR symptoms of PTSD while others may present only with the six symptoms that are required to make a diagnosis (i.e., one re-experiencing, three avoidance/numbing, two hyperarousal). Additionally, attending solely to the dichotomous diagnostic outcome of PTSD (as has been done in most natural disaster studies) fails to account for a group of people that fall one or two symptoms short of receiving a diagnosis (e.g., subsyndromal PTSD following a terrorist disaster, Galea et al., 2003). This group of individuals is of particular relevance given research in non-disaster samples suggesting that subthreshold PTSD results in high levels of interference/distress (Stein, Walker, Hazen, & Forde, 1997; Zlotnick, Franklin, & Zimmerman, 2002).

In an effort to address these limitations, person-centered statistical approaches (i.e., mixture modeling) have emerged that can be used to identify unobserved groups who share similar PTSD symptom presentations. In particular, PTSD symptoms have been examined in samples of persons exposed to Criterion A traumas using latent class analysis (LCA, e.g., Ayer et al., 2011; Maguen et al., 2013; Steenkamp et al., 2012). LCA offers improvements over older person-centered analytic techniques such as cluster analysis by being less restrictive (e.g., not requiring equal indicator variances across classes) and estimating multiple indices of model fit (Nylund, Asparouhov, & Muthén, 2007). LCA also permits the regression of classes onto various covariates in order to evaluate differential predictors of class membership in a single step, as opposed to evaluating predictors of *most likely* class/cluster membership, which does not account for classification uncertainty (see Clark & Muthén, 2009).

Although studies have started to use LCA to examine the heterogeneity of PTSD symptoms and predictors of class membership, extant studies have heavily relied on veteran samples exposed to combat and community samples exposed to interpersonal violence (e.g., assault). Among veterans, two-class (Naifeh, Richardson, Del Ben, & Elhai, 2010), three-class (Steenkamp et al., 2012), or four-class (Maguen et al., 2013) solutions characterized by varying levels of PTSD symptom severity and pervasiveness have been identified (e.g., classes with low/negligible symptoms, intermediate symptoms, and severe/pervasive symptoms). When evaluating combat-specific predictors of class-membership, these studies have also found that veterans exposed to a greater number of wartime stressors (e.g., killing others, witnessing death) are at increased odds of belonging to a severe/pervasive symptom class (Maguen et al., 2013; Steenkamp et al., 2012). Although LCA studies conducted in community samples have typically derived similar three-class solutions (Ayer et al., 2011; Breslau, Reboussin, Anthony, & Storr, 2005; Elhai, Naifeh, Forbes, Ractliffe, & Tamburrino, 2011), these studies have been unable to provide insight into classes of PTSD following natural disasters because of low rates of natural disaster exposure relative to other traumatic events (e.g., sexual and physical assaults, sudden death of loved ones). It is plausible that natural disasters, which are collectively experienced and can involve multiple traumatic events (e.g., disaster exposure, physical injury, and witnessing death), may result in different classes of PTSD symptoms compared to traumatic events that are more idiographic in nature.

To date, no studies of which we are aware have used LCA to evaluate if people can be classified on the basis of shared PTSD symptoms presentations following a natural disaster. Likewise,

the literature has yet to evaluate what factors may be relevant in predicting membership in a particular class of PTSD following a natural disaster. Understanding the presence and predictors of different PTSD classes may be particularly important in identifying factors that are associated with experiencing PTSD symptoms at varying levels of pervasiveness and severity (i.e., identifying who is most likely to experience more PTSD symptoms or more severe PTSD following a natural disaster).

1.3. Present study

Accordingly, the present study aimed to use a person-centered statistical approach to examine the presence of distinct subgroups of natural disaster-related PTSD symptom presentations after Hurricane Katrina. Consistent with prior studies (with similar aims) conducted in veteran and community samples, PTSD symptoms were evaluated using LCA. It was predicted that either a three- or four-class solution would provide acceptable model fit and be the most conceptually interpretable. Specifically, we expected LCA to identify multiple groups characterized by experiencing PTSD symptoms at various levels of severity and pervasiveness (e.g., a “Severe” class characterized by a high probability of nearly all PTSD symptoms, “Moderate” class characterized by high probability of a few PTSD symptoms, “Negligible” class characterized by low probability of nearly all PTSD symptoms).

After identifying the optimal LCA solution, the present study also aimed to evaluate predictors of class membership. In particular, we aimed to extend the findings of studies looking at predictors of a PTSD diagnosis after natural disasters by examining the relevance of demographic information, hurricane-specific experiences, depression, pre-hurricane traumatic events, post-hurricane stress, social support, and religious behaviors/beliefs in predicting class membership. Based on the prior natural disaster PTSD literature (e.g., Ali, Farooq, Bhatti, & Kuroiwa, 2012; Arnberg, Hultman, Michel, & Lundin, 2012; Neria et al., 2008), we predicted that potentially traumatic hurricane specific experiences and pre-hurricane trauma would be associated with increased odds of membership in more severe/pervasive PTSD symptom classes, whereas greater social support and stronger religious beliefs were hypothesized to predict membership in mild/unaffected symptom classes.

2. Method

2.1. Participants

The sample consisted of 810 adults from 23 counties in southern Mississippi affected by Hurricane Katrina. All participants were living in these counties at the time of the storm. An area probability sampling frame was used to select potential participants from counties with the greatest extent of hurricane damage. More specifically, trained listers were used to enumerate pre-hurricane addresses based on aggregations of 2000 Census blocks, and worked diligently to locate individuals who had lived at the selected addresses prior to Hurricane Katrina (e.g., internet, telephone, archival, and in-person searches). In contrast, potential participants residing in counties with less extensive damage were contacted using a random digit dialing sampling frame. Additional details of the sampling strategy are described in Galea et al. (2008).

2.2. Measures

Trained interviewers used a computer-assisted system to gather the data for the present study. Interviews were conducted over several months in 2007, within two years of Hurricane Katrina. Administration of the interview took, on average, 37 min. This study

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