Increased alcohol use after Hurricane Ike: The roles of perceived social cohesion and social control

Chenyi Ma [a, *], Tony E. Smith [b]

[a] School of Social Policy and Practice, University of Pennsylvania, 3815 Walnut Street, Philadelphia, PA 19104, United States
[b] Department of Electrical and Systems Engineering, University of Pennsylvania, 220 South 33rd Street, Philadelphia, PA 19104, United States

ARTICLE INFO

ABSTRACT

Hurricane Ike, the third costliest hurricane in US history, made landfall in the Galveston Bay Area in September, 2008. Existing literature postulates that maladaptive behavior such as increased alcohol use is often exhibited by disaster survivors in coping with both disaster-related traumatic events and post-disaster stressful events. In addition, it has also been postulated that survivors' perceptions of social cohesion and social control can potentially serve to moderate such behavior. The purpose of this paper is to study such hypotheses for Hurricane Ike. In particular, we investigate the following four hypotheses: (H1) There is an increase of alcohol use by survivors of Hurricane Ike in the Galveston Bay Area; (H2) There are positive associations between both Ike-related trauma and post-Ike stress events and the increase in alcohol use; (H3) There are negative associations between both perceived social cohesion and social control and the increase in alcohol use following Ike; and finally that (H4) perceived social cohesion and social control serve to moderate the associations between both Ike-related trauma and post-Ike stress events and increased alcohol use after Ike. Using public use survey-weighted data from the Galveston Bay Recovery Study (GBRS) of Ike survivors (N = 658), we tested these hypotheses using logistic regressions controlling for other key socioeconomic variables. Our results confirm H1 and H2. Hypotheses H3 and H4 are partially confirmed with respect to social control, but show that (i) there is a positive association between perceived social cohesion and the increase in alcohol use following Ike, and that (ii) while perceived social cohesion and social control do moderate the association between post-Ike stress events and increased alcohol use, they have no effect on the association between Ike-related trauma and increased alcohol use.

1. Introduction

In September of 2008, Hurricane Ike made landfall in the Galveston Bay Area of Texas. It was the third costliest hurricane in US history, killing 195 persons and causing property damage of about $30 billion (Pietrzak et al., 2013). In addition to this loss of life and property, Ike also had devastating psychological effects on its survivors, including well documented increases in the prevalence of posttraumatic stress disorder (PTSD) and depression (Norris et al., 2010; Pietrzak et al., 2013). Studies of other disasters have also found an increase in alcohol use among survivors [including Hurricane Katrina in New Orleans (Beaudoin, 2011; Cerdá et al., 2011),

the Murray Federal Building bombing in Oklahoma City (Dw et al., 1999), and the World Trade Center attack in Manhattan (Vlahov et al., 2002; Bonanno et al., 2007)]. These findings suggest that the traumatic effects of disasters may be related to increased alcohol use. In this setting, the main objectives of the present study are to analyze such relations for Hurricane Ike in the Galveston Bay Area, and more generally, to explore the behavioral mechanisms underlying this increase in alcohol use.

Our work is most closely related to the Hurricane Katrina study by Cerdá et al. (2011), who found that increased alcohol use was associated both with increased numbers of Katrina-related traumatic events and post-disaster stress events. They noted that even those post-disaster stressors not directly related to the hurricane itself may serve to magnify the distress induced by this disaster, [also found among survivors of the World Trade Center attack in Manhattan (Bonanno et al., 2007)]. One objective of our present study is to determine whether similar relations hold for Hurricane

* Corresponding author.
  E-mail addresses: machenyi@upenn.edu (C. Ma), tesmith@seas.upenn.edu (T.E. Smith).

Ike. One additional finding of this Katrina study was that increased alcohol use was associated with lower levels of "social support" received by survivors. Our present study of Hurricane Ike also focuses on certain relations between survivors and their surrounding communities. But in a manner similar to the study of Hurricane Sandy by Heid et al., 2017, our focus is directed more toward survivors' perceptions of those community resources typically designated as *collective efficacy*, which are described in broad terms by Bandura (1986) as "judgments about group capabilities to make decisions, to enlist supporters and resources, to devise and carry out appropriate strategies, and to withstand failures and reprisals". (Alternative definitions are summarized in Benight, 2004.).

Such perceptions of community resources are postulated to have a moderating effect on forms of maladaptive behavior including alcohol consumption (Benight, 2004). Specifically, following Sampson et al. (1997), we focus on the influence of perceived "social cohesion" and "social control" on increased alcohol use by survivors: where *perceived social cohesion* is here taken to reflect an individual's perceptions of trust and connection among community members, and *perceived social control* is taken to reflect perceptions of "the capacity of a group to regulate its members according to desired principles" (Sampson et al., 1997). [While alternative definitions of these concepts are given by others (such as in the detailed development by Kawachi and Berkman, 2014), the survey data for our study (discussed below) is based directly on the operational definitions of Sampson et al. (1997).]

More recent literature suggests that the concepts of "social cohesion" and "social control" be de-coupled, and treated as distinct variables (Gau, 2014; Heid et al., 2017 Cagney et al., 2016). On the one hand, social control tends to suppress antisocial behavior by community members, such as underage drinking (Kawachi and Berkman, 2014; Duncan et al., 2002). On the other hand, social cohesion tends to be more supportive in nature. For example, social cohesion can help to maintain community resources in hard times, contributing to the overall health of its members (Kawachi et al., 1999).

In light of this previous work, we are interested not only in the separate effects of these two social dimensions on increased alcohol use, but also the degree to which they may serve to moderate the associations between increased alcohol use and both the numbers of Ike-related traumatic events and post-Ike stressful events suffered by survivors. For example, neighbors helping each other to rebuild after hurricane disasters may create a social environment in which maladaptive responses to such stressful situations are less likely. In terms of substance abuse in particular, the social stress model of Rhodes and Jason (1990) postulates that the likelihood of such behavior by adolescents is a function of both the stress levels they experience and the extent to which they are offset by "stress moderators, social competencies, and resources".

To explore these questions, our prior hypotheses were that: (H1) There is an increase of alcohol use by survivors of Hurricane Ike in the Galveston Bay area; (H2) There are positive associations between both Ike-related trauma and post-Ike stress events and the increase in alcohol use; (H3) There are negative associations between both perceived social cohesion and social control and the increase in alcohol use following Ike; and finally that (H4) perceived social cohesion and social control serve to moderate the associations between both Ike-related trauma and post-Ike stress events and increased alcohol use after Ike.

2. Data and methods

The data used for this study was taken from the Galveston Bay Recovery Study (GBRS) public use file (PUF), accessed online at the Inter-University Consortium for Political and Social Research (ICPSR) (National Center for Disaster Mental Health Research, Galea and Norris, 2016). GBRS is an epidemiological and mental health study of ($N = 658$) disaster survivors randomly drawn from the adult population residing Galveston or Chamber counties at least one month before Hurricane Ike made landfall on September 13, 2008.

2.1. Sampling

Stratified sampling was employed to ensure the inclusion of residents in those areas most affected by Hurricane Ike, and who were most likely to have experienced hurricane-related traumatic events. Within both Galveston and Chambers counties, 80 clusters of Census blocks were selected from five separate regions (strata), ranging from areas that suffered direct storm-surge damage to non-flooded and non-poverty areas. Telephone and face to face interviews were conducted in either Spanish or English, in three waves at approximately 2—6, 6—9, and 14—18 months after the hurricane, respectively. Given that our study focuses on the immediate impact of Hurricane Ike on alcohol drinking (and in particular on post-Ike stressors that are most likely to magnify the stress induced by this disaster), we have used only the first wave of interview data. With respect to this first wave, information was obtained on alcohol use before and after Ike, lifetime traumatic events and stress before Ike, and perception of social cohesion and social control after Ike. Demographic variables include race/ethnicity, age, education, marital status, household income, whether household income declined after Ike, employment status, and whether jobs were lost because of Ike.

Finally, it should be noted that the sample used involves only survivors who were still living in the Galveston Bay Area at the time of the interviews. Any survivors who left and did not return during this six-month period were implicitly excluded from the sample. However, unlike Hurricane Katrina (Fussell et al., 2010), there is no evidence of substantial population exodus following Hurricane Ike. Moreover, since our study is particularly concerned with *place-based* stressors occurring after Ike, this exclusion should have no effect on our results.

2.2. Measurement

Information about GBRS respondents' behavior before and after Hurricane Ike was obtained by asking each respondent a series of questions. Our key variables were constructed from these questions as outlined below. [A full listing of all questions can be found in Galea and Norris (2016).]

Our binary measure for *Increased alcohol use* was constructed with value "1" if the difference between the respondent's number of drinks in the *post-Ike* period (i.e., during the 30 days before the interview) and the *pre-Ike* period (i.e., in the 30 days before Ike) was positive, and with value "0" otherwise. Those respondents with increased alcohol use who did not drink during the pre-Ike period are designated as *new drinkers*. In addition, following Sheehan et al. (1997), the dichotomous variable, *Alcohol abuse before Ike*, was constructed as a "yes" answer to any of a series of symptoms with onset before Ike, such as "being intoxicated more than once while ignoring other family responsibilities".

Our stress variables were constructed from a list of twelve stressful events, modified by Boardman et al. (2001, 2004), including questions about "serious financial problems" and "problems getting access to adequate healthcare". For respondents who had experienced any of these events before Ike, the indicator variable, *Any stressful events before Ike*, was defined to be one and zero otherwise. In addition, the number of these twelve event type types experienced by a respondent after Ike was taken was taken to