The impact of Hurricane Katrina on socioeconomic disparities in alcohol use

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Abstract

Hurricane Katrina was, in terms of death toll and economic impact, the most important natural disaster to hit the United States in the past 75 years. We investigated (1) the relation between exposure to Katrina and alcohol use and dependence; (2) socioeconomic differences in the association between exposures to Katrina and use and dependence. We used data from the Panel Study of Income Dynamics collected in 2005 and 2007 in Mississippi, Louisiana and Alabama on adults aged 18-85 (n=491). Exposure to more post-event stressors was associated with a 3.2-unit increase in the level of alcohol use between 2005 and 2007, while exposure to more peri-event traumatic events was associated with 5.1 times higher risk of alcohol dependence (95% CI 2.9, 8.9). The highest risk was found among the lower education groups: those with less than a high school education who had experienced a traumatic event during the Hurricane had 21.01 times higher odds of alcohol dependence (95% CI: 5.3, 84.0) than respondents who had experienced a comparable event but had more than a high school education. Disaster exposure is associated with more alcohol misuse and the differential impact of disasters on lower socioeconomic status groups can widen preexisting health disparities.

Background

Hurricane Katrina was, in terms of death toll and economic impact, the single most important natural disaster to hit the United States in the past 75 years. Abundant research has suggested that the extent of exposure to disaster-related events is an important determinant of mental health problems after a disaster, including post-traumatic stress disorder, depression, anxiety, and substance use and misuse [1-5]. The extent of damage resulting from Hurricane Katrina, including the death of more than 1000 people, the displacement of 500,000 others and more than $100 billion in damage costs, suggests that there might be a high prevalence of mental health problems among those exposed to Katrina [6].

Available research on the consequences of Katrina provides evidence of an association between exposure to the hurricane and an increase in mental health problems [7, 8]. Current studies on the health impact of Katrina, however, are limited in several ways. First, they focus on select populations [9-12], such as those recruited from shelters and evacuation centers [9, 11, 12], or professionals involved in the rescue effort, such as police and firefighters [10]. Second, due to the difficulties involved in tracing people exposed to Katrina, studies often include very small samples [13]. Finally, a crucial shortcoming of current studies is the use of a cross-sectional study design, without pre-event measures of mental health status [7, 8].

Although degree of disaster-related exposure is clearly central to the determination of post-disaster behavioral pathology, some evidence indicates that individual social and economic resources before a disaster may modify the relation between disaster-related experiences and their consequences [14-17]. There are three ways in which individual social and economic resources may influence the disaster experience-consequence relation. First, persons who are more advantaged may be more likely to avoid experiencing disaster-related events, by heeding advance warnings or by being located in safer housing. Second, persons with more social and economic resources may be more likely to retain some resources after an event which may be critical in facilitating post-disaster recovery. Third, cumulative exposure to economic advantage over the lifecourse may help persons develop the personal and social resources that buffer the impact of disasters. This is consistent with Hobfoll's Conservation of

Resources Theory [18], which states that those with greater initial reserves of resources are less vulnerable to resource loss and more capable of mobilizing resources to "bounce back" in the event of a source of traumatic stress such as a disaster.

As was widely recorded in the news and popular media, many of the persons most affected by Hurricane Katrina in the short term were minorities and persons with lower socioeconomic status (SES) [12]. These groups likely already had worse health than other, more advantaged groups before Hurricane Katrina hit [11, 12, 19]. If Hurricane Katrina did indeed affect disadvantaged groups more than advantaged groups it is likely that Hurricane Katrina contributed to a further worsening of health indicators among these persons, further widening health disparities between persons of high and low socioeconomic status in the Gulf Coast region. These widening racial/ethnic and socioeconomic disparities in specific health indicators may have important long-term implications for population health in the Gulf Coast regions for years to come.

It is recognized that there is a socioeconomic gradient in alcohol consumption, whereby individuals of lower socioeconomic status are at higher risk for very heavy alcohol consumption, such as bingeing and alcohol dependence [20, 21]. In this paper, we investigate (1) the relation between exposure to Katrina and its aftermath to alcohol consumption levels and alcohol dependence after Katrina; (2) socioeconomic differences in the association between exposures to Katrina and alcohol consumption; as well as (3) socioeconomic differences in the association between exposures to Katrina and alcohol dependence.

Methods

Sample

The PSID is a nationally representative sample of what were originally 5000 families first interviewed in 1968 [22]. It consisted of two sub-samples: a national sample of 3000 families taken from all areas, and a national sample of 2000 families living in low-income counties. Taken together, the two original samples, with appropriate weights, constituted a national sample of the US population with an over-sample of poor families. Interviews were conducted with each of these families each year from 1968-1997 and every other year in odd-numbered years since 1997. In 2007, persons living in Louisiana, Mississippi, and Alabama before the hurricane and who

responded to the 2005 PSID survey were recontacted and received a 20 minute survey designed to assess exposure to the Hurricane and mental health, in addition to the PSID standard survey, (n=555). Persons who had moved to other areas as a result of the Hurricane were tracked to their new addresses by using contact persons supplied by the recipients, the US Postal Service National Change of Address Service, and Red Cross and similar websites set up to identify relocated disaster victims. In 2007, the PSID had a 97% wave-to-wave reinterview rate, and the Katrina module had a 96% response rate.

The PSID questions are asked to a "respondent" in the household, who answers on behalf of the head of the household and his/her partner, and may or may not be the head or partner. From the surveyed sample of 555 respondents, our analytic sample included those household heads and partners who had actually been the household PSID survey respondent both in 2005 and 2007 (n=491): we removed those participants who had responded in either year through a proxy, as we thought proxy reports of alcohol use could suffer from recall bias. Also, the 2007 questions about Katrina were addressed directly to the respondent, rather than to the household head and his/her partner, so we needed to focus our analysis on subjects who had actually responded themselves to the survey in 2007.

We used two types of data for this study: 1) data from the PSID from 2005 to measure socioeconomic status and alcohol consumption levels before the Hurricane, and 2) data from the 2007 supplemental module to measure exposure to the Hurricane and post-event alcohol consumption levels and dependence.

Measures

Alcohol consumption: Level of alcohol consumption was measured in 2005 and 2007 as the number of drinks consumed per day times the frequency of consumption in past year (6-category response option, ranging from "less than once a month" to "every day"). We also constructed a dichotomous measure of alcohol dependence, operationalized as having a mean endorsement above 1 (scale ranges from 1="never" to 5="daily") on a scale of five items asking about dependence symptoms (e.g. "How often during the last year have you: needed a first drink in the morning to get yourself going after a heavy drinking session; had a feeling of guilt or remorse after drinking; been

unable to remember what happened the night before because of your drinking."). Alcohol dependence was only measured in 2007.

Socioeconomic status: We operationalized socioeconomic status as total household income and years of education in 2005. We used quartiles of income and three categories of education (less than high school, high school, more than high school) as the variables of interest for the analyses.

***Exposure to the Hurricane*:** The PSID Katrina supplement has a series of questions on level of exposure to the event itself. We measured exposure as the sum of 1) having been present when hurricane force winds/floods occurred; 2) having been moderately or extremely afraid that they might be killed/seriously injured from the Hurricane; 3) having been unsure about the safety/whereabouts of family members/close friends during the storm; and 4) being involved in the rescue/recovery efforts. We used a measure of "high exposure" in the analyses, operationalized as having been exposed to three or more of the abovementioned events.

Traumatic events during the Hurricane: We developed an index of the total number of traumatic events the subject reported, including 1) personal experiences of injury; 2) injury to others proximate the respondent; 3) death/injury to friends, relatives, acquaintances; and 4) exposure to dead bodies during or after the Hurricane. Given the small number of subjects exposed to any of these traumatic events, we used a measure of exposure to any of the abovementioned events as the variable of interest in our analyses.

Post-Hurricane stressors: We developed a measure based on exposure to the following stressors in the first month after the Hurricane: 1) damage to property/possessions; 2) loss of sentimental possessions; 3) displacement from home; 4) shortage of food; 5) shortage of water; 6) feeling of isolation; 7) experience of unsanitary conditions; 8) fear of crime; 9) loss of electricity. A measure of "high exposure to post-Hurricane stressors", defined as exposure to more than three of these stressors, was used in the analyses.

Sociodemographic characteristics: We included controls for pre-Hurricane home ownership, gender, age, race/ethnicity (white vs. nonwhite), marital status (never married, widowed, separated/divorced, married, other marital status), and family size. Race/ethnicity was classified as white/nonwhite due to the low number of subjects who

were of a race/ethnicity other than black or white: only six subjects were other race/ethnicities, so they were grouped with blacks into a "nonwhite" category.

Post-Hurricane social support: We also included a measure of the level of social support available in the time between Katrina/Rita and Halloween. We used a scale of mean values of responses to a series of six questions, with response categories ranging from 1 ("never") to 7 ("always"). Questions included: "Between Katrina and Halloween, how often was someone willing to listen to you when you needed to talk?" ; "How often did you have contact with people who were in a similar situation to you?"; "How often were you able to talk about your thoughts and feelings with others?"; "How often did you receive sympathy and support from others?"; and "How often did you receive practical help from others?"

Analyses

We first described the characteristics of the overall sample, using weighted estimates, in order to provide an overview of the sample. We also presented level of exposure to the Hurricane itself, to traumatic events during the Hurricane, and to post-Hurricane stressors by education levels, in order to examine the variation of exposure by socioeconomic status. We fit a series of logistic models to estimate the odds of alcohol dependence in 2007, controlling for the level of alcohol consumption in 2005, as well as a series of linear regression models to estimate the magnitude of change in level of consumption between 2005 and 2007. The change models included further adjustment for baseline alcohol consumption, in order to avoid predicting change that was just determined by the baseline level (e.g. that everyone with high baseline goes down, and everyone with low baseline has a positive change), given that change in alcohol consumption was highly associated with baseline consumption levels. We estimated the following models for both outcomes: 1) including basic sociodemographic covariates and level of post-Hurricane social support; 2) adding a measure of high exposure to the Hurricane, since it was the first exposure the subjects would have experienced; 3) adding potential mediators of the impact of exposure to the Hurricane, that is, measures of experience of traumatic events during the Hurricane and post-Hurricane stressors; and 4) assessing interactions between high exposure to hurricane-related events and household income as well as education. All analyses were conducted using SAS [23]. Analyses were

weighted to account for unequal selection probabilities and differential attrition in 1968 and future waves, as well as to adjust for the reduction in the size of the PSID core families and the introduction of a supplemental sample of post-1968 immigrant families [24].

Results

Table 1 presents the characteristics of the PSID sample in the areas affected by Hurricanes Katrina/Rita. The sample consisted of adults aged 18 to 80 (average age 46 years), with a lower representation of males (39.4% of sample) than females, and an equal proportion of white and nonwhite subjects (50.3% white, 49.4% nonwhite). The mean income of the sample was $56,166.8, and the subjects had a fairly even distribution across income strata, from low (<$15,000: 25.1% of sample), to high ($50,354-280,600: 25.1% of sample). The level of alcohol consumption decreased slightly between 2005 and 2007, from 4.9 to 4.2, and only 6% of the sample reported being alcohol dependent in 2007.

Table 2 presents the level of exposure to specific aspects of the Hurricane itself, experience of traumatic events during the Hurricane and exposure to post-event stressors, for the total sample and by education group. Approximately 15% of the total sample was exposed to three or more aspects of the Hurricane, and the highest levels of exposure were experienced by those in the lowest education group. A comparable number of the overall sample was also exposed to at least one Hurricane-related traumatic event: exposure increased by education group, so that those with less than a high school education reported being exposed to the lowest extent (13.9% of participants), and those with more than a high school education had the highest proportion of subjects exposed (16.1%). A higher proportion of subjects (17.6%) were exposed to more than three post-Hurricane stressors, and those in the lowest education groups had the highest proportion of exposed persons (22.2%).

We first estimated the association between individual characteristics in 2005 and change in alcohol consumption levels between 2005 and 2007. Table 3 indicates that controlling for pre-Hurricane sociodemographic characteristics, as well as for the availability of post-Hurricane social support, exposure to the Hurricane event had a marginal association with change in consumption levels: having been exposed to three or

more experiences related to the Hurricane was associated with a 1.5-unit increase in alcohol consumption (Model 2). In addition, a high level of exposure to post-Hurricane stressors was associated with change in alcohol consumption (Model 3): exposure to more than three post-Hurricane stressors was associated with a 3.2-unit increase in the level of alcohol consumption. The association between exposure to the Hurricane and alcohol consumption disappeared once we controlled for exposure to post-Hurricane stressors. We found a significant interaction between prior levels of alcohol consumption and post-Hurricane stressors (data not shown), such that post-Hurricane stressors were more strongly related to change in alcohol consumption among those who had higher levels of consumption in 2005, before the Hurricane. We also estimated the interaction between income and exposure to post-Hurricane stressors (not shown), as well as between education and exposure to post-event stressors, but the associations were not significant.

We also investigated the association between exposures related to the Hurricane and alcohol dependence. As seen in Table 4, income and education had opposite associations with alcohol dependence: participants in lower income categories had lower odds of alcohol dependence than subjects in the highest income category, while participants with a high school or lower education had higher odds of dependence than those who had more than a high school education (Model 1). High exposure to the Hurricane was associated with higher odds of dependence: having been exposed to three or more experiences related to the event was associated with a 3.4 times higher odds of dependence (95% CI: 2.3, 5.1) (Model 2). Finally, experience of any Hurricane-related traumatic events was independently associated with dependence, so that those exposed to any traumatic event were 5.1 times more likely to experience alcohol dependence (95% CI: 2.9, 8.9) (Model 3). The association between exposure to the event and dependence was non-significant once we controlled for traumatic events. High exposure to post-Hurricane stressors was marginally associated with higher odds of dependence, so that those exposed to more than three stressors were 1.5 times less likely to be alcohol dependent (95% CI: 0.9, 2.6) (Model 3). We found a significant interaction between past alcohol use levels and exposure to traumatic events during the Hurricane (data not shown), so that those who were exposed to any such trauma and also had higher prior

levels of alcohol use had a higher odds of being alcohol dependent than those who had been exposed to comparable traumatic events but had lower prior levels of alcohol use.

We also examined the variation in the association between exposure to Hurricane-related experiences and alcohol dependence, by income and education levels. The interaction with income and either peri-event traumatic experiences or post-event stressors depended highly on the way income was specified: while we found a significant interaction with continuous income (the z-score of the log of income), the standard errors tended toward infinity once we estimated the interactions with categories of income. It was not possible to estimate income as a continuous measure, as it was vulnerable to the influence of outliers. Given the instability of the interaction estimates with income categories, these data are not shown. We thus only present interactions of peri- and post-event stressors/traumatic experiences with education. We present separate models for each interaction term, as the small sample size and the low frequency of the outcome limit the power to estimate more interactions in one model. The first interaction model (Model 4, Table 4) indicates that among those who had experienced at least one Hurricane-related traumatic event, those who had less than a high school education had 21.01 times higher odds of alcohol dependence (95% CI: 5.3, 84.0) than those with more than high school education, while those with a high school education had 20.1 times higher odds of reporting dependence (95% CI: 5.9, 68.6) than those who had more than high school. The second model (Model 5) indicates that the association between exposure to post-even stressors and alcohol dependence also depends on years of education: those with less than a high school education and exposed to a high number of post-Hurricane stressors, had 8.11 times higher odds of being dependent on alcohol (95% CI: 3.7, 17.6) than respondents with a comparable exposure to stressors, but with more than high school education.

Discussion

In one of the first studies to use a prospective population-based sample to document the mental health impact of a large-scale disaster such as Hurricanes Katrina/Rita we examined the impact of disaster-related stressors and trauma on the full range of alcohol consumption, from level of use to the likelihood of alcohol dependence. Exposure to Hurricane-related experiences, such as having been present during the

Hurricane force winds or floods, contributed to both alcohol consumption and alcohol dependence. This finding is consistent with prior cross-sectional studies of other disasters [2, 25-27], as well a retrospective study of Katrina [7], all of which showed an association between exposure to disasters and mental illness, particularly post-traumatic stress disorder. We also examined the specific impact of exposure to traumatic events surrounding the Hurricane, as well as to stressors resulting from the Hurricane, on alcohol, and we found that experience of Hurricane-related traumatic events and post-event stressors partly mediated the impact of Hurricane exposure on alcohol use and misuse.

Experience of any traumatic event during the Hurricane was associated with greater risk of alcohol dependence, but not level of alcohol consumption. Prior research has found an association between exposure to traumatic circumstances surrounding a disaster, such as injuries, and later psychiatric function [28-31]. It seems therefore plausible and consistent with previous work that Hurricane-related traumatic events, including personal experiences of injury as well as those of close relatives/friends, may manifest in a defined psychiatric problem such as alcohol dependence, rather than in changes in patterns of use.

We also found that post-Hurricane stressors, such as loss of property and belongings, and food shortage, contributed to both change in level of alcohol use and alcohol dependence, and they also acted as a mediator of the association between exposure to the Hurricane and alcohol use/dependence. This finding is consistent with theories suggesting that post-disaster resource loss, as well as the availability of post-disaster sources of social support, makes an important contribution to the development of stress and the capacity to recover after mass trauma [3, 18, 28, 32]. Selected post-disaster studies have found that loss of resources such as income or property, as well as loss of employment, contributed to the development of post-traumatic stress disorder [28, 32, 33]. This is one of the only studies, to our knowledge, that uses a prospective design to assess the relation between post-event stressors on alcohol use and misuse.

The consistent association between post-event loss of resources and alcohol use and misuse is particularly worthy of note as this highlights an opportunity for policy intervention. Investment in housing reconstruction and infrastructure replacement, as well

as social welfare programs that will act as buffers against temporary losses of income can play an important role in reducing the mental health burden after a disaster and can, in effect, be considered health interventions.

Respondents with lower education levels (either high school or below) were at the highest risk of reporting substance dependence after being exposed to traumatic experiences during the Hurricane, or to post-event stressors. Prior studies investigating health function after a disaster have found individual heterogeneity in response to disasters, and have particularly found low education, as a measure of socioeconomic status, to contribute to worse mental health outcomes [28, 32-34]. However, we are not aware of other studies that have examined the relation among socioeconomic status, exposure to particular consequences of the disaster, and mental health outcomes. Our findings highlight that respondents of lower socioeconomic status are at higher risk for worse health outcomes and also are particularly vulnerable to the trauma and loss of resources that results from a disaster. Part of this increased vulnerability could be due to the fact that respondents of lower education were more exposed to the Hurricane itself, and suffered more from loss of resources due to the Hurricane. Failure to target mental health services and reconstruction efforts to this particularly vulnerable population may serve to widen existing socioeconomic disparities in mental health.

This study has several limitations. First, the measures of exposure to the Hurricane and circumstances following this event were obtained two years after the event, which could have contributed to selective recall bias, particularly reported by respondents who consumed heavy amounts of alcohol. However, the central presence of events such as losing one's property or being displaced by the Hurricane on people's lives mitigates this concern. Second, the absence of a measure of alcohol dependence prior to the Hurricane may have led us to establish an association between exposure to the disaster and dependence that actually reflected pre-event dependent status. The availability of pre-Hurricane measures of level of consumption partly addresses this concern. Finally, the small sample size limited our ability to estimate interactions, and may have influenced the statistical significance of our estimates.

Despite its limitations, this study constitutes one of the first prospective, population-based examinations of the role that exposure to a massive disaster has on both

substance use and misuse [35, 36]. We found exposure to peri-event traumatic experiences and post-event stressors to act as key mechanisms explaining the association between exposure to the Hurricane and both alcohol use and dependence. Low-education respondents were at particular risk of reporting alcohol dependence after having experienced hurricane-related personal and economic adversities. This study serves to highlight the key role that post-disaster investment in reconstruction and recovery may have, not only in decreasing the population-wide substance abuse burden from a disaster, but also in preventing the post-disaster amplification of pre-existing socioeconomic disparities in substance abuse.

Table 1. Descriptive characteristics of PSID study sample, Katrina-affected area (Mississippi, Louisiana and Alabama), 2005-2007 (n=491) (weighted estimates)

Variables	Mean/ %	(SD)	Min	Max
Age	46.0	51.3	18.0	85.0
Male sex	39.4	-	0	1
Race/ethnicity				
Nonwhite	49.4	-	0	1
White	50.3	-	0	1
Income	56,166.8	168,130.3	0	280,600
0-15,000	25.1	-	0	1
15,100-29,500	24.9	-	0	1
29,880-50,330	25.1	-	0	1
50,354-280,600	25.1	-	0	1
Family size	2.4	4.2	1	10
Home ownership	65.0	-	0	1
Years of education	12.9	8.9	0	17
Less than HS	23.9	-	0	1
HS	31.7	-	0	1
More than HS	44.4	-	0	1
Marital status				
Married	48.8	-	0	1
Never married	21.3	-	0	1
Separated/divorced	13.9	-	0	1
Other	15.9	-	0	1
Social support	4.7	1.8	1	7
Alcohol use				
Amount drank last year, 2005	4.9	31.4	0	120
Number of times (1=never; 6=daily)	1.8	6.8	0	6
Number of drinks per time	1.4	6.7	0	24
Amount drank last year, 2007	4.2	28. 7	0	125
Number of times (1=never; 6=daily)	1.5	6.2	0	6
Number of drinks per time	1.2	6.3	0	25
Alcohol dependence	6.0	-	0	1

Table 2. Proportion exposed to Hurricane-related stressors and traumatic events, for total PSID sample in Katrina-affected areas (Mississippi, Alabama, Louisiana) and by education group (weighted estimates)

Variables	Total sample	Low education (less than high school)	Middle education (high school)	High education (more than high school)
Exposure to Hurricane				
Present when hurricane force winds or floods	45.5	43.7	56.8	38.4
Moderately or extremely afraid that might be killed or seriously injured	29.8	32.1	34.7	25.0
Unsure about safety/whereabouts of family members/close friends during storm	31.2	35.6	31.7	28.4
Involved in rescue/recovery efforts	8.2	7.7	10.8	6.6
High exposure to Hurricane (three or more exposures)	15.0	18.7	16.0	12.3
Experience of traumatic events during the hurricane				
You or anyone in family physically injured	0.4	0.3	0.7	0.2
Others physically injured	9.4	5.3	10.5	11.6
Anyone killed	9.8	7.9	9.3	10.3
Saw dead bodies during or after Katrina/Rita	2.1	5.7	0.8	1.1
Experience of any Hurricane-related traumatic events	15.0	14.0	14.2	16.1
Post-Hurricane stressors				
Damage to property or possessions as result of Katrina/Rita	54.2	48.9	53.7	57.3
Loss of sentimental possessions	6.1	10.2	4.2	5.1
Displaced from home	19.3	20.7	15.2	21.6
Experienced shortage of food	13.5	13.4	10.8	15.5
Experienced shortage of water	11.6	13.1	6.7	14.4
Felt isolated	14.0	15.7	14.5	12.7
Experienced unsanitary conditions	8.2	11.8	7.0	7.1
Experienced fear of crime	12.0	17.5	4.7	14.3
Experienced loss of electricity	53.3	64.0	58.6	43.8
High exposure to post-Hurricane stressors (more than 3 stressors)	17.6	22.2	11.5	19.6

Table 3. Estimated change in level of alcohol consumption by pre-hurricane sociodemographic characteristics and exposure to Hurricane-related stressors, traumatic events, and post-hurricane social support, PSID study sample, Katrina-affected area (Mississippi, Louisiana and Alabama), 2005-2007 (n=491) (weighted estimates)

	Model 1			Model 2			Model 3		
Variables	Beta	Std Error		Beta	Std Error		Beta	Std Error	
Intercept	1.8	(2.0)		1.3	(2.0)		1.3	(1.9)	
Amount consumed 2005	-0.2	(0.0)	***	-0.2	(0.0)	***	-0.3	(0.0)	***
Age	0.0	(0.0)		0.0	(0.0)		0.0	(0.0)	
Male sex	-1.7	(0.6)	**	-1.6	(0.6)	*	-1.7	(0.6)	**
Race/ethnicity									
Nonwhite	-0.4	(0.6)		-0.4	(0.6)		-0.5	(0.6)	
Income (reference category: $50,354-280,600)									
0-15,000	-0.6	(1.1)		-0.8	(1.1)		-1.1	(1.1)	
15,100-29,500	-1.0	(1.0)		-1.0	(1.0)		-1.2	(1.0)	
29,880-50,330	0.7	(0.8)		0.7	(0.8)		0.3	(0.7)	
Family size	-0.4	(0.3)		-0.4	(0.3)		-0.4	(0.3)	
Home ownership	-0.2	(0.7)		-0.1	(0.7)		0.1	(0.7)	
Years of education (reference category: more than HS)									
Less than HS	-0.2	(0.8)		-0.2	(0.7)		-0.2	(0.7)	
HS	0.4	(0.7)		0.4	(0.7)		0.9	(0.7)	
Marital status (reference: marrried)									
Never married	1.1	(1.0)		1.4	(1.0)		1.6	(1.0)	~
Separated/divorced	0.4	(0.9)		0.5	(0.9)		0.9	(0.9)	
Other	-1.1	(0.9)		-0.9	(0.9)		-0.8	(0.9)	
Post-Hurricane social support	0.0	(0.2)		0.0	(0.2)		-0.2	(0.2)	
High exposure to Hurricane				1.5	(0.8)	~	0.9	(0.8)	

Experience of any traumatic event during the Hurricane	-0.9	(0.8)	
High exposure to post-Hurricane stressors (more than 3 stressors)	3.2	(0.8)	***

~p<0.10;*p<0.05; **p<0.01;***p<0.001

Table 4. Estimated odds of alcohol dependence by pre-hurricane sociodemographic characteristics, exposure to Hurricane-related stressors and traumatic events, and post-hurricane social support, PSID study sample, Katrina-affected area (Mississippi, Louisiana and Alabama), 2005-2007 (n=491) (weighted estimates)

	Model 1			Model 2			Model 3			Model 4			Model 5		
Variables	OR	(95%	CI)	OR	(95%	CI)	OR	(95%	CI)	OR	(95%	CI)	OR	(95%	CI)
Amount consumed 2005	1.1	(1.1	1.2)	1.2	(1.1	1.2)	1.2	(1.1	1.2)	1.2	(1.1	1.2)	1.2	(1.1	1.2)
Age	0.9	(0.9	0.9)	0.9	(0.9	1.0)	0.9	(0.9	1.0)	0.9	(0.9	1.0)	0.9	(0.9	1.0)
Male sex	0.1	(0.1	0.2)	0.1	(0.1	0.2)	0.1	(0.1	0.2)	0.1	(0.1	0.1)	0.1	(0.0	0.1)
Race/ethnicity															
Nonwhite	0.2	(0.1	0.3)	0.2	(0.1	0.4)	0.2	(0.2	0.4)	0.2	(0.1	0.3)	0.2	(0.1	0.3)
Income (reference category: $50,354-280,600)															
0-15,000	0.2	(0.1	0.5)	0.3	(0.1	0.5)	0.4	(0.2	0.7)	0.4	(0.2	0.7)	0.5	(0.3	1.0)
15,100-29,500	0.4	(0.2	0.7)	0.5	(0.3	0.9)	0.7	(0.4	1.1)	0.6	(0.3	1.0)	0.7	(0.4	1.3)
29,880-50,330	0.1	(0.1	0.2)	0.1	(0.1	0.2)	0.1	(0.0	0.2)	0.1	(0.0	0.1)	0.1	(0.0	0.1)
Family size	0.9	(0.7	1.0)	0.9	(0.8	1.1)	0.9	(0.8	1.1)	1.0	(0.9	1.2)	1.0	(0.9	1.2)
Home ownership	0.1	(0.1	0.2)	0.2	(0.1	0.2)	0.2	(0.1	0.3)	0.1	(0.1	0.2)	0.1	(0.1	0.2)
Years of education (reference category: more than HS)															
Less than HS	5.6	(3.5	8.9)	4.6	(2.9	7.5)	3.7	(2.3	6.1)	1.8	(1.0	3.4)	1.3	(0.0	48407.4)
HS	5.3	(3.5	7.9)	4.7	(3.1	7.2)	5.0	(3.2	7.8)	3.0	(1.9	4.8)	1.2	(0.0	9.56 x 10^{21})
Marital status															
Never married	0.6	(0.4	0.9)	0.8	(0.5	1.3)	0.7	(0.4	1.2)	0.6	(0.4	1.1)	1.0	(0.9	1.2)
Separated/divorced	0.1	(0.1	0.4)	0.2	(0.1	0.5)	0.2	(0.1	0.5)	0.2	(0.1	0.4)	0.1	(0.1	0.2)

Other	1.4	(0.9	2.3)	2.0	(1.2	3.4)	1.8	(1.1	3.0)	1.8	(1.1	3.0)	1.9	(1.2	3.2)
Post-Hurricane social support	0.7	(0.7	0.8)	0.7	(0.6	0.8)	0.6	(0.6	0.7)	0.7	(0.6	0.8)	0.7	(0.6	0.8)
<u>Hurricane stressors and traumatic events</u>															
High exposure to Hurricane (three or more exposures)				3.4	(2.3	5.1)	1.1	(0.6	2.0)						
Experience of any traumatic events during Hurricane							5.1	(2.9	8.9)	0.4	(0.1	1.3)	5.2	(3.3	8.1)
Interaction with education															
x less than HS										21.0	(5.3	84.0)			
x HS										20.0	(5.9	68.6)			
High exposure to post-Hurricane stressors (more than 3 stressors)							1.5	(0.9	2.6)	2.2	(1.3	3.7)	1.3	(0.7	2.4)
Interaction with education															
x less than HS													8.1	(3.7	17.6)
x HS													1.0	(0.5	2.5)

~p<0.10;*p<0.05; **p<0.01;***p<0.001

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