INTRODUCTION

First responders represent a unique class of individuals affected by disaster. The nature of this work can often be dangerous, and situations are likely exacerbated by the environmental hazards and

These negative effects are frequently compounded for first responders as they are assigned atypical work activities during disasters that they may not have been adequately trained for and experience additional personal stressors, such as extended work hours, sleep deprivation, home destruction, and separation from family (Bernard, Driscoll, Kitt, West, & Tak, 2006). Osofsky and colleagues found that first responders continued to experience depression and PTSD symptoms eighteen months after Hurricane Katrina (Osofsky et al., 2011). In addition, our previous work has found that negative effects of disasters impact responders who work with, but did not directly respond to, a disaster; there was a significant increase in alcohol use among firefighters who were linked to responders but did not respond themselves to the crash of a commercial airplane (Homish, Frazer, & Carey, 2012).

An increase in alcohol consumption in the post-disaster period is an additional negative consequence of disaster exposure. For example, survivors of the Oklahoma City bombing had greater alcohol consumption in the time after the attack (Pfefferbaum & Doughty, 2001). Also, exposure to additional hurricane-related stressors was associated with greater alcohol consumption as well as greater odds of binge drinking in the post-disaster period (Cerda, Tracy, & Galea, 2011). In addition, the research by Flory, Hankin, Kloos, Cheely, and Turecki (2009) indicates that Hurricane Katrina survivors experienced increased hazardous alcohol use.

There is a dose-response relationship with trauma or disaster exposure and alcohol consumption. Greater exposure to the World Trade Center disaster was associated with greater alcohol consumption at one and two years after the attacks; in addition, binge drinking one year after the disaster was also associated with greater exposure to the attacks (Boscarino, Adams, & Galea, 2006). In some cases, there appears to be a threshold effect, as those with low or moderate levels of lifetime trauma did not have significant changes in alcohol use, but those with high levels of lifetime trauma did have increased alcohol use after hurricane related stressors (Cerda et al., 2011).

First responders have higher levels of hazardous alcohol use than is expected in a typical community population (Boxer & Wild, 1993). Nearly two-thirds (64%) of a police sample exceeded the recommended daily alcohol consumption, with 17.2% engaging in hazardous drinking, as defined by the authors as consuming six or more drinks on one occasion, on a weekly or daily basis (Violanti et al., 2011). This is nearly double the percent of hazardous drinkers in a U.S. national workplace sample that had a rate of 8.8% (Larson,

Police officers from a Police Department in the New Orleans area (n=122, 49.2% of department) participated in this cross-sectional survey administration. Of these officers, 81% indicated their level of involvement during Hurricane Katrina (n=99) and were included in the current analyses.

Police officers completed pencil-and-paper survey packets that included informed consent documentation, demographic information, and survey questionnaires. Surveys were used to assess demographics, quality of life (perceived stress, recent life changes, global life satisfaction), mental health (posttraumatic stress disorder, depression), alcohol use, physical health (health conditions, current medications), resiliency, social and organizational support, posttraumatic growth, and gratitude. For this report, alcohol use, involvement level in Hurricane Katrina, marital status, military service, and demographic factors were included in the models.

Alcohol use was measured using the Alcohol Use Disorders Identification Test (AUDIT; Babor, Higgins-Biddle, Saunders, & Monteiro, 2001). The AUDIT is a ten item questionnaire that assesses the frequency of drinking behaviors, quantity of alcohol consumption, and social factors of drinking, such as whether someone has expressed concern regarding drinking habits. Each response ranges from 0 to 4, and all responses are summed for a total score. Higher scores on the AUDIT indicate greater likelihood of hazardous drinking. The alpha level for this sample is 0.79, indicating generally strong internal consistency.

The police officers' involvement level during Hurricane Katrina was assessed among those officers who indicated that they did work as a sworn officer during the Hurricane Katrina storm. Officers were asked to what degree s/he were involved with the storm and were given three response choices, heavy involvement, moderate involvement, or light involvement. Heavy involvement was defined as "I participated in almost all rescue and recovery operations and was constantly in close proximity to all police activities related to the storm;" moderate involvement was defined as "I participated in rescue and recovery operations to some extent, but not constantly. I had other duties to consider away from the storm;" and light involvement was defined as "I participated in some rescue and recovery operations to a little extent, but I had other duties to consider away from the storm."

Marital status was assessed with one question asking for the participant's current marital status. Response options included never married, married, widowed, divorced/separated, divorced and remarried, and living with someone. For these analyses, marital status was recoded to a binary variable, married or living as if married and not married. Those who were married or living with someone as if married, included respondents who indicated they were currently married, divorced and remarried, or living with someone as if married. Those who were classified as not married included those who indicated they were never married, widowed, or divorced/separated.

Military service was assessed by asking respondents if they were ever in the military (yes/no). Participants were also asked to identify which branch of the military s/he belonged, as well as length of service in years, and rank upon discharge.

Age and gender were examined as potential covariates in the models.

Descriptive statistics were used to characterize police officers who worked as sworn officers during Hurricane Katrina. The primary method of statistical analysis was negative binomial regression. Due to the nature of an outcome variable (a count), either Poisson or negative binomial regression was chosen as appropriate methods. Negative binomial regression was chosen as the assumptions are less restrictive than Poisson and is more appropriate for over-dispersed count data (Gardner, Mulvey, & Shaw, 1995).

First, unadjusted associations between involvement level during Hurricane Katrina and AUDIT score were explored. Second, these models were adjusted for age and gender. Finally, the third model examined resilience factors (marital status and prior military service) as potential moderators to the association between exposure and AUDIT score. All statistical analyses were performed using Stata (Version 13.1).

Within the sample, 99 participants (81% of the full 122 person sample) worked as sworn officers during Hurricane Katrina and indicated their level of exposure. Of these officers, 78.4% (n=76) were male, and the mean age was 45.1 years (SD =7.8; Table 1). The majority of respondents were European American (54.1%, n=53) or African American (41.8%, n=41). The mean number of years of police service for these officers was 19.2 years (SD =8.0, Range: 6 – 35). Police officers represented a wide range of officer ranks, including sergeant (30.9%, n=30), lieutenant (15.5%, n=15), captain (1%, n=1), and detective (13.4%, n=13).The majority were married or living as if married (62.2%, n=61); only 22.5% (n=22) had prior military service. Nearly half (45.5%, n=10) of those with prior military service had served in the Army, 22.7% (n=5) had served in the Navy, and the remaining individuals served in the Marine Corp, Air Force, or National Guard (31.8%, n=7). These individuals had 6.8 years of military service, on average (SD = 6.3, Range: 1 – 27).

Nearly half (48%, n=46) of the officers experienced heavy involvement, 31% (n=29) indicated moderate involvement, and 21% (n=20) experienced light involvement during the response to Hurricane Katrina (4 were missing involvement level and dropped from further analyses). In addition, average AUDIT score for participants was 4.42 (SD: 4.83), with scores ranging from 0 to 22. Greater AUDIT scores are indicative of greater levels of hazardous drinking.

The main effects model was adjusted for age and gender, but did not include interactions for involvement level with marital status or prior military service. Involvement level during Hurricane Katrina was associated with higher AUDIT scores for those with heavy involvement. Of those with heavy involvement during Hurricane Katrina, their AUDIT scores were, on average, 1.8 times greater than those with low involvement (exp( )[EB] = 1.81; CI: 1.03, 3.17; p<0.05; Table 2), controlling for age and gender. AUDIT scores for those with moderate involvement were not significantly different from those with low involvement (p>0.05). For those with heavy involvement, the average AUDIT score is 6.05 (SE= 0.96). The mean AUDIT scores for those with low involvement is 3.34 (SE=0.84) and for those with moderate involvement the mean AUDIT score is 3.47 (SE=0.65).

AUDIT scores for those with heavy involvement were not significantly greater than those with lower involvement (p>0.05). Older age was significantly associated with lower AUDIT score, on average (EB = 0.95, 95% CI: 0.92 – 0.97, p < 0.001). In addition, within this model, female gender was protective against greater AUDIT scores, on average (EB=0.51, 95%CI: 0.27 – 0.97, p<0.05). Marital status was not significantly associated with AUDIT score.

The primary purpose of this model was to explore interaction

Additional variables included in this model were marital status, military service history, age, and gender. AUDIT scores for those with a history of military service were not significantly associated with a history of military service (p>0.05). Further, there were not significant differences in AUDIT score between those who were married/living as if married and those who were single, dating, divorced, or widowed (p>0.05). Age was considered as a covariate, and older age was protective against greater AUDIT scores (EB=0.95, 95% CI: 0.92 – 0.97, p<0.001). Gender did not have significant effects within this model (p>0.05).

The second set of models examined resilience factors, marital status and prior military service, as potential moderators to the association between exposure level and AUDIT score. The primary difference between model 1 and model 2 is the inclusion of exposure by resilience factor interactions. Thus, the first moderation model (2a) examines interaction of marital status and involvement level, and the second moderation model (2b) examines the interaction of military service history and involvement level. Neither moderation model included both interactions to preserve model parsimony, but control variables (age and gender) were included.

Model 2a: Marital Status & Involvement Level

This first moderation model (2a) examined marital status, involvement level, AUDIT scores, and interaction of marital status and involvement level, controlling for age and gender. This model included military service but not the military service by exposure level interaction to preserve model parsimony. In this model there was not a significant association between involvement level during Hurricane Katrina and AUDIT score (p>0.05; full results in Table 2). In addition, gender, marital status, and history of military service were not significantly associated with AUDIT score (all p>0.05). However, older age was significantly associated with lower AUDIT score (EB=0.95, 95% CI: 0.93 – 0.98, p<0.001).

Model 2b: Military Service & Involvement Level

The second moderation model (2b) examined military service history, involvement level, AUDIT scores, and interaction of military service history and involvement level, controlling for age and gender. This model included marital status but not marital status by exposure level interaction to preserve model parsimony.

Taken together, these findings suggest that those with greatest exposure to disasters are most at-risk for hazardous drinking, compared to those with low or moderate levels of exposure. Thus, when considering prevention, intervention, and treatment programs, targeting those most involved in disasters may provide the best use of scarce resources. Such a targeted approach could include screening for those police officers with greatest involvement level and then providing specific, focused interventions on those high-risk individuals. General training programs could target all police force members prior to disaster exposure and present coping techniques to support adaptive rather than maladaptive behaviors, prevention education sessions, and resources for all individuals. A more focused, tailored approach like this one would result in the most cost-effective interventions.

The second aim of the present work was to examine whether marital status and military history might act as buffers against hazardous alcohol use for police officers with heavy exposure to Hurricane Katrina. These results indicate that marital status did not provide a protective effect for the police officers under study. For the present study, marital status was assessed by asking officers to indicate their current relationship status, and the results did not indicate a significant protective effect between exposure level and alcohol use. It may be that marital status did not serve as a protective factor because in other work, we have found that marital satisfaction, rather than simply whether the individual is or is not married, was the influential factor in buffering hazardous alcohol use. For example, Homish and Leonard (2008) found that greater marital satisfaction was associated with reduced risk of alcohol problems over time for both men and women. Additionally, marital dissatisfaction is associated with subsequent alcohol use disorder diagnosis (Whisman, Uebelacker, & Bruce, 2006) as well as findings that greater marital satisfaction was associated with better treatment outcomes in a clinical sample (Maisto, McKay, & O'Farrell, 1998). Thus, it seems plausible that marital status did not capture the complex influences marriage exerts and as such, a more comprehensive measure, such as satisfaction, may better account for the important effects marriage plays in reducing hazardous alcohol use. As such, future studies would benefit from including marital satisfaction, rather than simply marital status, as a way to examine what protective effects may be afforded.

Military status also did not provide a protective effect against hazardous alcohol use. These findings are contrary to our previous work, which found that police officers without previous military experience had greater stress levels after critical incidents than those with previous military service (Hartley et al., 2013). Given that military training affords additional proficiencies, including leadership skills, unit cohesion, and even self-confidence (Andrisani & Daymont, 1991), it is understandable that those with previous military service would have more personal resources with which to cope with traumatic events.

In contrast, other scholars have found that military service history b,

and have established valid and reliable results. However, these limitations do not diminish the strengths of this study, particularly the police officer sample, an important population who experience traumatic incidents at much greater rates than the general population. Further, this work builds on current knowledge of hazardous alcohol use by police officers and indicates that there may be a threshold effect with traumatic exposure and hazardous alcohol use.

In conclusion, the current report examines whether heavy exposure to Hurricane Katrina is associated with hazardous alcohol use, and whether marital status or military service history has a protective effect. The results do illustrate that heavy disaster exposure was associated with hazardous alcohol use among police officers, although neither marital status nor military service history buffered this relationship. Further work is needed to clarify these associations and determine whether there is a temporal order to traumatic stressors and hazardous alcohol use among police officers. In addition, the noted threshold effect needs further consideration. Our results suggest that those with low or moderate disaster exposure do not have an association with hazardous alcohol use, while those with heavy exposure do. This is critically important for prevention, intervention, and treatment efforts, as targeting those with greatest exposure may provide the most efficient and cost-effective means for reducing the poor health outcomes associated with disaster response.