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Alcohol use disorders and drinking among survivors of the 9/11 attacks on the World Trade Center in New York City

Carol S. North[a,b,*], Bryon Adinoff[a,c], David E. Pollio[d], Sagar Kinge[e], Dana L. Downs[c], Betty Pfefferbaum[f]

[a]*The VA North Texas Health Care System, Dallas, TX, USA*

[b]*The University of Texas Southwestern Medical Center, Departments of Psychiatry and Surgery/Division of Emergency Medicine, Dallas, TX, USA*

[c]*The University of Texas Southwestern Medical Center, Department of Psychiatry, Dallas, TX, USA*

[d]*The University of Alabama School of Social Work, Tuscaloosa, AL, USA*

[e]*The University of Texas School of Public Health, Dallas, TX, USA*

[f]*The University of Oklahoma Health Sciences Center, Department of Psychiatry and Behavioral Sciences, College of Medicine, Oklahoma City, OK, USA*

Abstract

Research on the relationship of alcohol and disasters has yielded mixed conclusions. Some studies investigate alcohol consumption but others examine alcohol use disorders in relation to disaster. Alcohol consumption and alcohol use disorders have not be studied concurrently in relation to specific disaster trauma exposures. A volunteer sample of 379 individuals from New York City agencies affected by the September 11, 2001 (9/11) attacks on World Trade Center were assessed approximately 3 years postdisaster for alcohol consumption and alcohol use disorders relative to specific disaster exposures. Increases in alcohol consumption were relatively small, eventually returning to pre-9/11 levels, with few cases of new alcohol use disorders or alcohol relapse. The findings suggest that postdisaster alcohol use has negligible clinical relevance for most of the population. Scarce disaster resources should be focused on those at identified risk of excessive alcohol use, that is, those with pre-existing alcohol or other psychiatric disorders.
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1. Introduction

The link between trauma exposure and alcohol use disorders has been a long-standing focus of scientific inquiry. Alcohol use disorders are well-established risk factors for trauma exposure and injuries [1–4]. Alcohol use disorders are also assumed to arise after trauma exposure through alcohol use by survivors to manage their posttraumatic symptoms [5]. Because alcohol use disorders may represent both risk factors for and outcomes of trauma exposure, alcohol use disorders and trauma exposure are inextricably confounded. Large-scale collective disasters do not generally discriminate based on individual personal characteristics of their targets [6,7]. Therefore, disasters provide unique opportunities to study associations between trauma and alcohol, circumventing such confounders.

Research evidence on the relationship of alcohol use and disasters has been mixed. Some disaster studies investigate alcohol *consumption* but others examine alcohol use *disorders*. Studies of alcohol consumption patterns have described increased alcohol use after disasters [8–10]. A high prevalence of alcohol use disorders has been observed in some disaster-exposed populations [11–13]. A study of 10 methodologically consistent disaster studies, however, demonstrated the development of new (incident) alcohol use disorders after disaster to be uncommon [14].

Much of the existing alcohol-related disaster research has been conducted with populations affected by the September 11, 2001 (9/11) attacks, most of which have focused on alcohol consumption, not disorders. Post-9/11 telephone surveys in

* Corresponding author. The Nancy and Ray L. Hunt Chair in Crisis Psychiatry, Department of Psychiatry, UT Southwestern Medical Center at Dallas, Dallas, TX 75390-8828, USA. Tel.: +1 214 648 5375; fax: +1 214 648 5376.

E-mail addresses: carol.north@utsouthwestern.edu (C.S. North), bryon.adinoff@utsouthwestern.edu (B. Adinoff), depollio@sw.ua.edu (D.E. Pollio), sagar.kinge@utsouthwestern.edu (S. Kinge), dana.downs@utsouthwestern.edu (D.L. Downs), betty-pfefferbaum@ouhsc.edu (B. Pfefferbaum).

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New York City (NYC) [6,15–18] found that alcohol use increased, over up to 2 years [15–18]. The actual increases in alcohol use in these studies were clinically small (one-half drink/day) [16]; pathological alcohol use did not increase [17,18]. Overall alcohol use in the first two years post-9/11 was within established safe ranges [18]. Vlahov et al. [16] (p. 254) concluded, "It remains to be determined whether increased substance use is associated with substance abuse and dependence in post-September 11 New York City."

Even less is known about associations of alcohol use and abuse with individual disaster-related trauma exposure and posttraumatic stress disorder (PTSD). One study [16] found no association between alcohol consumption and 9/11 exposure, but two others [6,17] reported alcohol consumption to be significantly associated with 9/11 exposure. Vlahov et al. [16] found the increase in alcohol consumption of NYC residents after the 9/11 attacks unassociated with posttraumatic symptoms, but Boscarino et al. [18] reported increased alcohol consumption in association with posttraumatic symptoms in adult NYC residents.

Because disaster studies to date have not concurrently examined alcohol use and disorders in temporal relation to specific disaster trauma exposures, questions remain about the clinical significance of increased alcohol use after disasters: (1) Does increased postdisaster alcohol use occur globally across populations, or are specific subgroups (e.g., those with alcohol use disorders or direct trauma exposures) more likely to increase alcohol consumption? (2) To what extent does increased alcohol consumption following disaster exposure lead to new alcohol use disorders? and (3) To what extent does increased alcohol consumption reflect relapse of established alcohol use disorders in remission at the time of the disaster? The current study examined these questions in a sample recruited from agencies affected by the 9/11 attacks on the World Trade Center (WTC).

2. Methods

Further details of the methods for this study, the sample, and their 9/11 trauma exposures are provided elsewhere [19]. Three years (median = 35 months) after the 9/11 attacks, a volunteer sample (with 17% participation) of 379 study participants (176 from three agencies located in the WTC towers on 9/11 and 203 from four agencies not in the towers) were recruited from eight agencies substantially affected by the attacks through information distributed at their workplace. The participants provided informed consent and completed structured interviews assessing their disaster exposures and psychiatric/substance-use histories. Human studies approval for the study was obtained at the cooperating academic institutions.

The Diagnostic Interview Schedule for *DSM-IV* (DIS-IV) [20] and Disaster Supplement [21] were administered by mental health professionals formally trained on these interviews. The PTSD section of the DIS provided information related to trauma exposure in the 9/11 attacks. The Disaster Supplement provided further detail of disaster-related experiences and inquiries about coping with the 9/11 experience by drinking alcohol.

Data were obtained on timing of onset, recency, and recurrence of symptoms relative to the 9/11 date, permitting assessment of lifetime disorder (e.g., alcohol use disorder at any time in their lives), pre-9/11 lifetime disorder (e.g., alcohol use disorder at any time before the disaster), post-9/11 disorder (i.e., at any time since the 9/11 attacks), and incident post-9/11 disorder (i.e., development of a new alcohol use disorder at any time after 9/11), as well as current disorder (i.e., disorder present in the last year). Remission from alcohol use disorder during the month before the 9/11 attacks among those with a lifetime pre-9/11 alcohol use disorder was defined as having no alcohol abuse/dependence symptoms during the pre-9/11 month. Post-9/11 relapse was defined as endorsement of clinically significant alcohol abuse/dependence symptoms after 9/11 among those in remission from alcohol use disorder in the pre-9/11 month.

Alcohol consumed (mean number of drinks/day) in the pre-9/11 year, the post-9/11 month, and the past year was calculated from responses to questions about the frequency and amount of drinking, similar to methods used by previous research on pre- and post-9/11 alcohol consumption among NYC residents [18]. A standard drink was defined; for each time frame, participants were asked: "How often did you drink alcohol (how many days a week/month/year?)" and "On a typical day when you consumed alcohol, how many drinks would you have on that day?" For example, a participant who reported one drinking day per week and seven drinks on that drinking day during the post-9/11 month on average was calculated to have consumed a mean of one drink per day (DPD) and seven drinks per drinking day (DDD) during that time frame. Reported alcohol consumption variables (DPD and DDD) were thus calculated for three specified periods of time: the pre-9/11 year, post-9/11 month, and last year.

Statistical analysis used SAS version 9.2 (SAS Institute, Cary, NC). Categorical variables were compared using two-sided chi-squared tests, substituting Fisher's exact texts for expected cell sizes <5. Categorial and numerical variables were compared using *t*-tests, substituting Satterthwaite analyses in instances of unequal variance (Table 1). Separate multiple regression models (PROC REG in SAS) were used to predict amount of alcohol consumption (dependent variable) for each time frame, controlling for sex, post-9/11 alcohol use disorder, and employment at a WTC agency entered simultaneously (independent covariates) into the models.

Generalized linear mixed models (GLMM) were used to compare alcohol consumption across different time frames controlling for repeated measures within individuals. GLMM incorporates random effects, permitting both individual-specific (conditional) and population-averaged