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# Psychiatric symptoms in Ground Zero ironworkers in the aftermath of 9/11: prevalence and predictors

**AIMS AND METHOD**
To establish the prevalence of, and risk factors for, psychiatric symptoms in Ground Zero ironworkers. Questionnaires commonly used to screen for psychiatric symptoms were completed by 124 workers.

**RESULTS**
We have established the prevalence of screening positive for symptoms of post-traumatic stress disorder, panic attacks, generalised anxiety, depression and alcohol misuse. Among the risk factors were alcohol misuse, injury to or death of a family member, friend or co-worker at Ground Zero and one or more adverse life events since 9/11.

**CLINICAL IMPLICATIONS**
Ironworkers at Ground Zero tend to have significant psychiatric symptoms likely to be associated with the traumatic experience of working there during the clean-up operation. Risk factors for psychiatric symptoms were established.

In the aftermath of the attacks on the World Trade Centre on 11 September 2001, many individuals working at the Ground Zero site during the clean-up operation had psychiatric symptoms (Lagnado, 2001). Among these individuals is the group of ironworkers, who were exposed to extreme and extended distressing experiences because of their 'front-line' work (Kilgannon, 2002) and were therefore at risk for post-trauma psychiatric morbidity (Marshall, 2002). This study establishes the prevalence of, and risk factors for, psychiatric symptoms in this group.

## Method

Ironworkers were recruited into the study from their work union, based on their perceived need or desire to attend the World Trade Centre Mental Health Screening Program at Mount Sinai Medical Center in New York City. In all, 124 ironworkers attended the medical centre in the period between 14 and 17 months after 9/11. They completed a written self-reporting structured screening questionnaire which they had not seen before, that had been devised for use in the screening programme. The questionnaire contained the following individual screening instruments: the Post-Traumatic Stress Disorder Checklist (PCL; Blanchard *et al*, 1996; Cook *et al*, 2005); the CAGE questionnaire (Ewing, 1984) for symptoms of alcohol misuse; and the Patient Health Questionnaire (PHQ; Spitzer *et al*, 1999) which was divided into three sub-sections to screen for symptoms of panic attack (PHQ–1), generalised anxiety disorder (PHQ–2) and depression (PHQ–3). Screening positive for psychiatric symptoms was defined as screening positive in one or more of the individual screening instruments of the questionnaire. Those who did not screen positive in any of the instruments were considered having screened negative in the screening questionnaire. They were used as a comparison group for statistical analysis to assess for relative risk factors for psychiatric symptoms.

Apart from the individual screening instruments, the screening questionnaire also asked about the participant's gender, age, marital status, alcohol use since 9/11, injury to and/or death of family members, friends or co-workers on 9/11 and about 14 predetermined negative life events in the 12 months after 9/11. The events the participants could choose from were: the loss of job or income, house move, divorce from spouse, end of relationship with partner or best friend, domestic violence, mechanical car trouble, personal theft, a victim of mugging/violent attack, debt, serious illness and/or injury, criminal record, family illness, family death and serious family illness or death in the 6 months after 9/11. Threshold scores were used for each of the individual screening instruments (Mayfield *et al*, 1974; Ewing, 1984; Bush *et al*, 1987; Goldberg & Williams, 1988; Liscow *et al*, 1995; Spitzer *et al*, 1999): 43 out of 85 established scores for the PCL, 1 out of 4 for the CAGE questionnaire, 8 out of 15 for the PHQ–1, 4 out of 7 in the PHQ–2 and 5 out of 9 on the PHQ–3.

We used an internet-based statistical analysis package (Cantrell, 2003) for Fisher's exact test to establish statistical significance when risk factors for psychiatric symptoms were compared between the participants and the comparison group. To calculate *P*-values more accurately, we used Yates' continuity correction and two-tailed *P*-values.

## Results

The screening questionnaire was completed by 124 ironworkers; no questionnaires were spoiled. More than half of ironworkers (*n*=73, 58.9%) screened positive for psychiatric symptoms and those who screened negative became the comparison group (*n*=51, 41.1%).

### Demographic characteristics

All but one ironworker who attended the medical centre were male (*n*=123, 99.2%). Their mean age was 38 years

(range 20–62, median 43) and the majority (*n*=87, 70.2%) were in a relationship at the time of attendance.

## PCL and PHQ

Less than a fifth of the participants (*n*=23, 18.5%) screened positive on the PCL: 3.2% (*n*=4) screened positive for panic attack symptoms (PHQ–1), 6.5% (*n*=8) for generalised anxiety disorder symptoms (PHQ–2) and 5.7% (*n*=7) for depressive symptoms (PHQ–3).

## CAGE questionnaire and alcohol use

About two-thirds of the participants (*n*= 84, 67.7%) drank alcohol; 44% (*n*=37) have had a period since 9/11 when they have been drinking 'more than usual', 36.2% (*n*=17) while working at Ground Zero and 63.8% (*n*=30) after leaving their work at the site. Of the participants who drank alcohol, 39.3% (*n*=33) screened positive on the CAGE questionnaire.

## Risk factors for psychiatric symptoms in individual screening instruments

### Marital status
Relationship status was not a risk factor for screening positive on any individual screening instrument.

### Alcohol use and misuse
A period of excessive alcohol use at any time since 9/11 was a significant risk factor for screening positive on the PCL (*P*=0.0082) and CAGE questionnaire (*P*=0.0001).

### Injury to or death of a family member, friend or co-worker on 9/11
None of the participants suffered personal injury on 9/11. Injury to a family member, friend or co-worker on 9/11 was a risk factor for screening positive on the PCL (*P*=0.0318). Forty-seven participants (37.9%) lost a family member, friend or co-worker on 9/11, which was also a risk factor for screening positive on the PCL (*P*=0.0168) and CAGE questionnaire (*P*=0.0011).

### Life events in the 12 months after 9/11
Comparing those who had not experienced any of the 14 life events as stated in the questionnaire in the 12 months after 9/11 with those who had experienced one or more events, experiencing one or more life events was a risk factor for screening positive on the PCL (*P*=0.0125).

We also compared those who had experienced zero or one life event since 9/11 and those who had experienced two or more and found that the latter was a risk factor for screening positive on the PCL (*P*=0.0028) and PHQ–3 (*P*=0.0065).

When comparing those who had experienced less than four life events since 9/11 and those who had experienced four or more, the latter was found to be a risk factor for screening positive on the PCL (*P*=0.0259), CAGE (*P*=0.0064) and PHQ–3 (*P*=0.0513).

## Discussion

Ironworkers who worked on the clean-up operation at Ground Zero in the aftermath of the World Trade Centre terrorist attacks have had psychiatric symptoms 14–17 months after 9/11. Symptoms of post-traumatic stress disorder were found in 18.5% of workers, 3.2% had panic attacks, 6.5% had symptoms of generalised anxiety disorder, 5.7% had symptoms of depression and 39.3% screened positive on the CAGE questionnaire suggesting harmful or dependent use of alcohol.

When compared with the 12-month prevalence rates of psychiatric symptoms in the general population of adult Americans, all but the depression rates are higher in the ironworkers. The rates in the general population are: 3.5% for post-traumatic stress disorder, 2.7% for panic disorder, 3.1% for generalised anxiety disorder, 6.7% for major depressive disorder, 3.1% for alcohol misuse and 1.3% for alcohol dependence (Kessler *et al*, 2005). This implicates that there is a causal relationship between psychiatric symptoms and the traumatic experience of working at Ground Zero during the clean-up operation, although the current study establishes only the prevalence of significant symptoms of these disorders, using the threshold scores of screening instruments, as opposed to the DSM–IV diagnosed prevalence of these disorders in the general population.

Excessive alcohol use since 9/11, injury to and/or death of a friend, family member or co-worker on 9/11 and at least one life event in the 6 months after 9/11 were statistically significant risk factors for psychiatric symptoms – those participants consistently screened positive in the individual screening instruments, primarily in the PCL and CAGE questionnaire. In the ironworker group, the prevalence of the death of a friend, family member or coworker on 9/11 was 37.9% compared with 20% in the general population. Participants of the World Trade Centre Mental Health Screening Program suggested that this was because many of their colleagues working in Manhattan and Brooklyn on 9/11 flocked to the Ground Zero site when the first of the two towers had collapsed to assist in rescuing survivors. However, they were killed when the second of the two towers collapsed. It is possible that this high prevalence of death or injury to friends, family members and co-workers has increased the risk of subsequent psychiatric illness in participants.

## Comparing the results with other studies

Although some studies have found lower rates of post-traumatic stress disorder symptoms in exposed members of the general population after disasters (Streimer *et al*, 1985; Corneil *et al*, 1999; Trout *et al*, 2002) others have found those rates to be greater (Kessler *et al*, 1995; Wagner *et al*, 1998; North *et al*, 2002*a*; Schlenger *et al*, 2002; Silver *et al*, 2002). This variation is likely caused by a number of variables, including the degree and duration of exposure, diagnostic stringency, the duration between locus event and the study, selection criteria, past psychiatric history, comorbidity and a number of other confounding variables.

Considerably more problems with alcohol misuse were identified in the current study than in the one comparable study of 181 firefighters involved in the

clean-up operation after the Oklahoma City Bombing in 1995 (North *et al*, 2002*a*). This may be attributed to the low threshold score for screening positive in the current study, but may also be caused by differences between ironworkers and the firefighters studied. Ironworkers taking part in the study anecdotally reported the industry as having a culture of socialisation involving excessive alcohol use outside work. They have also admitted to be generally disinclined to focus on or communicate their emotions, potentially placing them at increased risk of harmful alcohol use or developing alcohol dependence.

### Risk factors in comparable studies

Some of the risk factors identified in the current study have also been observed in previous studies: 'loss of a loved one' and 'unemployment' after the traumatic event in Bryant & Harvey (1995); 'significant loss' and 'injury' in McFarlane (1988); 'subsequent traumatic events' in Carlier *et al* (1997) and Galea *et al* (2002); 'alcohol use and functional impairment' in North *et al* (2002*b*); and 'chronic pain' or 'injury' in Asmundson *et al* (1998).

## Can the psychiatric symptoms be prevented?

Results of this study may help in planning preventive measures for future disaster scenarios. For example, observation and intervention could be focused on those ironworkers who use alcohol excessively, those whose family member, friend or co-worker was injured or killed in the disaster, or those who experience in the 12 months after the disaster one or more life events as specified in the screening questionnaire.

## Limitations

Ironworkers who attended the World Trade Center Mental Health Screening Program were either selected by their union or volunteered. As this was based on perceived need or desire for mental healthcare, it caused a selection bias. The ironworkers' alleged disinclination to focus on or communicate their emotions may have prevented some of them from attending the programme, thus missing those who potentially could have screened positive for psychiatric symptoms. The over-representation of White males in the group does not reflect the New York demographics and therefore the results cannot be generalised to the US population. However, these proportions do represent the predominance of males in the wider ironworker population.

The individual screening instruments used in the screening questionnaire, although useful for screening for psychiatric symptoms, do not provide a psychiatric diagnosis. Therefore, it has not been possible in our study to establish the prevalence of mental illness among ironworkers as a result of working at Ground Zero.

Using those who screened negative for psychiatric symptoms as the comparison group may have introduced a number of confounding factors not corrected for such as past or family psychiatric history.

The significant delay between 9/11 and attendance at the screening programme could introduce the confounding variable of psychiatric symptoms arising which are unrelated to the experience of working at Ground Zero. By the same token, the delay allowed to assess whether life events experienced in the 12 months since 9/11 were one of the causes of psychiatric illness.

Risk factors for psychiatric morbidity were established by showing a statistically significant correlation between two variables that are likely, but not proven, to be related. Statistical analyses with adjustments for confounding variables were not undertaken.

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# Dementia screening in acute medical and geriatric hospital admissions

**AIMS AND METHOD**
We studied a representative cohort of 161 patients over 65 years of age, admitted non-electively to medical and geriatric wards of a large teaching hospital. Assessment for dementia was made using DSM–IV criteria. Psychiatric records were then examined, masked, to determine the involvement of psychogeriatric services.

**RESULTS**
There were 111 possible cases of dementia (69%), of which 30 (27%) had prior local psychogeriatric case notes; in 22 cases (20%) the patient had a prior psychiatric diagnosis of dementia. Of 161 patients, 19 (12%) were seen by psychogeriatric services during their admission, of whom 12 (7%) were already known to psychiatric services. Dementia was diagnosed in 17 (complicated by delirium in 2), depression in 1 and hypomania in 1. Many patients with a possible diagnosis of dementia had no psychiatric assessment.

**CLINICAL IMPLICATIONS**
Psychogeriatric assessment was performed on a minority of older people admitted to medical care. This population may include older people with undiagnosed dementia and unmet psychiatric care needs.

Dementia is a relatively common diagnosis among the elderly population. The frequency is thought to be higher in hospitalised patients than in community dwellers (Royal College of Psychiatrists, 2005), and is often unrecognised in the former group (Jorm & Jolley, 1998; Laurila *et al*, 2004). Providing hospital care for the older person with dementia has implications for individual patient outcomes and broader financial costs.

Psychiatric assessment of older people in hospital may be an individual's first contact with mental health services, or may occur because specific review is required of a known patient. The aim of this study was to determine the proportion of elderly patients admitted to medical or geriatric wards thought to have a diagnosis of dementia, and their contact with local psychiatric services.

## Method

An observational study of patients aged 65 years and over admitted to an acute medical unit or geriatric assessment unit generated 161 sets of patient details (80 acute medical admissions and 81 geriatric medical admissions). The patients were examined by the Department of Medicine for the Elderly (DoME) to determine potential diagnoses of dementia (using the DSM–IV checklist; see Appendix) (American Psychiatric Association, 1994) and delirium (using the Confusion Assessment Method; H. Hu, personal communication, 2006).

The demographic details of the 161 patients were then used by an assessor masked to patient diagnosis to enable a search of a computerised database, the Patient Information Management System, to determine those known to the local psychiatric services. Overall, 45 such