Hazardous or harmful alcohol use in Royal Australian Navy veterans of the 1991 Gulf War: Identification of high risk subgroups

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Abstract

Elevated alcohol use disorders have been observed in 1991 Gulf War veterans from a variety of countries. This study used a self-report instrument, the Alcohol Use Disorders Identification Test (AUDIT), to ascertain whether any subgroups of 1232 male Royal Australian Navy (RAN) Gulf War veterans were at higher risk of hazardous or harmful alcohol use. Recursive partitioning/classification and regression tree (CART) analysis, followed by logistic regression, found five subgroups among the veterans, with differing risks of AUDIT caseness. The highest risk subgroup comprised current smokers. The other two high risk groups both consisted of former or never smokers of lower rank who were (1) not married, or (2) married, with a current diagnosis of major depression. The above subgroups were over three times as likely to exhibit AUDIT caseness than those who were former or never smokers of higher rank. The findings have important implications for effective development of public health initiatives designed to encourage safe alcohol use among veterans.

Keywords: Alcohol; Hazardous drinking; Major depression; Posttraumatic stress disorder; Veterans; Classification and regression trees

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1. Introduction

As discussed in a recent review (Hotopf & Wessely, 2005), 1991 Gulf War veterans from a variety of countries have demonstrably lower levels of psychological and physical health than those in military control or comparison groups that did not deploy to the Gulf. Several studies have observed higher levels of alcohol abuse or dependence in Gulf War veterans, measured using both diagnostic (Black et al., 2004; Ikin et al., 2004) and self-report (The Iowa Persian Gulf Study Group, 1997) instruments, compared with military comparison groups. Alcohol abuse or dependence is also commonly found among Gulf War veterans seeking medical treatment (Engel et al., 1999).

In order to ascertain which veterans may most benefit from additional care and treatment facilities, those at highest risk of exhibiting hazardous or harmful alcohol use must be identified. Previous studies have performed only limited subgroup analyses. For example, disabled Gulf War veterans have been shown to be more likely to exhibit alcohol-related disorders than non-disabled veterans (Ismail et al., 2002).

Our group recently conducted the Australian Gulf War Veterans’ Health Study, comparing the health of Australian Gulf War veterans with that of an age and service matched military comparison group that had not deployed to the Gulf (Forbes et al., 2004; Glass et al., in press; Ikin et al., 2004; Kelsall et al., 2004; McKenzie et al., 2004). Using a structured clinical interview, we found significantly higher levels of alcohol abuse and dependence among the Gulf veterans, in the period since their deployment (Ikin et al., 2004). While structured and validated clinical interviews provide a high degree of clinical accuracy in making a diagnosis, they require administration by trained personnel and are time-consuming when employed with large groups. Brief self-report instruments such as the Alcohol Use Disorders Identification Test (AUDIT) (Babor, Fuente, Saunders, & Grant, 1989) can, therefore, be useful in screening for elevated alcohol use disorders.

Having identified high rates of substance use problems in deployed veterans 10 years after the Gulf War, we sought in the present study to explore those factors that increased the risk of being identified as a “case” on the AUDIT. In addition to employing logistic regression we applied an exploratory statistical technique known as classification and regression trees (CART) (Breiman, Friedman, Olshen, & Stone, 1984). The former procedure is generally used to find global or overall relationships between potential risk factors and outcomes, whereas CART and other tree-building or recursive partitioning methods are used to examine local (subgroup) relationships (Zhang & Singer, 1999). Although not previously employed in Gulf War analyses, CART and similar techniques have been applied in studies of alcohol (Bailey, 1999; Barnes, Welte, & Dintcheff, 1991; Schwan et al., 2004) and other addictive behaviours (Welte, Barnes, Wieczorek, & Tidwell, 2004), as well as in general applications (Barton, McKenzie, Walters, Abramson, & Victorian Asthma Mortality Study Group, 2005; Craig, Siegel, Hopper, Lin, & Sartorius, 1997; McKenzie et al., 1993; Schmitz, Kugler, & Rollnik, 2003). For example, Barnes et al. (1991) used CART to find subgroups typified by heavier (such as young male students) or lighter (such as married or widowed females on lower incomes) alcohol consumption.

Although few studies have actually done so, it is important to include diagnoses such as posttraumatic stress disorder (PTSD) and depression when analysing post-combat alcohol disorders (Rundell & Ursano, 1996). Such diagnoses, as well as other anxiety disorders, have been associated with alcohol disorders in veteran (McLeod et al., 2001; Tomlinson, Tate, Anderson, McCarthy, & Brown, in press) as well as general (Libby, Orton, Stover, & Riggs, 2005; McFarlane, 1998) populations. Rundell and Ursano (1996) have also proposed that pre-deployment alcohol use be examined, because alcohol problems may be present before conflict is encountered.
The aim of this paper, therefore, was to extend the overall findings of Ikin et al. (2004) regarding elevated levels of alcohol abuse or dependence in Australian Gulf War veterans by ascertaining which patterns of psychiatric co-morbidity and demographic variables are associated with higher risk of hazardous or harmful alcohol use. The latter was assessed using the AUDIT, intended for the early identification of such behaviour (Babor et al., 1989).

2. Method

2.1. Participants

The participating Gulf War veteran study group consisted of 1456 veterans (80.5% of those eligible) of whom 1249 (85.8%) were Royal Australian Navy (RAN), 95 (6.5%) were Australian Army and 112 (7.7%) were Royal Australian Air Force personnel. As the numbers of females (only 2%), and participants from the Army and Air Force were comparatively small, the current analysis was restricted to the 1232 male RAN Gulf War veterans. The mean age at time of study (2000 to 2002) for the above group was 37.36 years (S.D. = 6.08).

2.2. Measures and procedure

The AUDIT core questionnaire was developed by the World Health Organization (WHO) to identify persons whose drinking of alcohol has become hazardous or harmful to their health (Babor et al., 1989). The instrument consists of ten questions pertaining to alcohol consumption, alcohol dependence, and alcohol-related problems during the past 12 months. The AUDIT performs similarly to, or better than, other self-report alcohol screening tests (Rumpf, Hapke, Meyer, & John, 2002), and has previously been applied in Gulf War research (e.g., Haley et al., 1997).

The AUDIT is generally employed with the recommended WHO cut-off score of eight (Babor et al., 1989). Several optimal cut-off scores, as large as 16 (Pal, Jena, & Yadav, 2004), have since been reported. We empirically determined the optimal cut-off for the AUDIT.

In our study, the ‘standard drink’ referred to in the AUDIT was defined as being one containing 10 g or 12.5 ml (0.44 fluid ounces) of pure alcohol (National Health & Medical Research Council, 2001).

A trained psychologist conducted an interview at which the presence of DSM-IV (American Psychiatric Association, 1994) psychiatric diagnoses was evaluated using the computer-assisted version of the Composite International Diagnostic Interview (CIDI-Auto) (Robins et al., 1988; World Health Organization Collaborating Centre for Mental Health & Substance Abuse, 1997). Data collection also involved a comprehensive postal questionnaire comprising a range of demographic and service history information, as well as the AUDIT. Details of the data collection process can be found in Ikin et al. (2004).

2.3. Statistical analyses

2.3.1. Receiver Operating Characteristic analysis

Receiver Operating Characteristic (ROC) (Kraemer, 1992) analysis was used to establish the optimal AUDIT cut-off score for the RAN Gulf War veterans. The criterion diagnosis was defined
as the presence of current (past 12 months prior to interview) DSM-IV alcohol abuse or dependence. ROC analysis was undertaken using SPSS 12 (SPSS Inc., 2003). Confidence intervals (CI) for classification accuracy or diagnostic efficiency, sensitivity and specificity (Kraemer, 1992) were obtained using a Fortran 90 programme (McKenzie, Vida, Mackinnon, Onghena, & Clarke, 1997).

2.3.2. Risk factors for AUDIT caseness

Logistic regression was employed to perform an overall analysis of risk factors of AUDIT caseness, defined in Section 3.1 below. Current DSM-IV (past 12 month) diagnoses of PTSD, any other anxiety disorder, major depression, and pre-1991 Gulf War (prior to invasion of Kuwait on 2 August 1990) diagnosis of alcohol abuse or dependence were included as possible risk factors.

Other possible risk factors included in the analyses were age at 2 August 1990, highest education level (≤ 10 years of schooling, 11–12 years, certificate or diploma, university or college degree), marital status (married/de facto, separated/divorced/widowed, single/never married), smoking status (never, former, current smoker), and military rank as at 2 August, 1990. Rank was categorised as officer, other rank—supervisory (at or above the rank of Leading Seaman) and other rank—non-supervisory. These categories are comparable to those of officer, non-commissioned officer and enlisted employed in other Gulf War research.

Unless otherwise specified, all statistical analyses were performed using Stata 8 (StataCorp, 2004).

2.3.3. CART subgroup analysis

We used the CART 4 binary tree-building procedure (Breiman et al., 1984; Salford Systems, 2001) to identify possible subgroups of Gulf War veterans at high risk of hazardous or harmful alcohol use, as determined using AUDIT caseness. All of the variables employed in the logistic regression analysis were available for selection by CART. Unlike early recursive partitioning algorithms (Morgan, 2005), CART explicitly validates the generality of its tree structures, using by default 10-fold cross-validation (Breiman et al., 1984). The dataset is randomly divided into 10 subsets, each subset in turn being used to test the performance of the tree created with the other nine subsets.

Contemporary recursive partitioning techniques have been found to give satisfactory performance when applied to different sub-samples of a given dataset (James, White, & Kraemer, 2005). The performance of CART is comparable to that of other recursive partitioning techniques (Lim, Loh, & Shih, 2000; McKenzie et al., 1993). We further tested the generality of CART using a separate ‘hold-out’ or validation subset (Bleeker et al., 2003). SPSS randomly divided those Gulf War veterans with non-missing AUDIT information into a learning subset of approximately 75% and a validation subset of approximately 25% of the observations, with similar levels of AUDIT caseness. The classification tree obtained for the learning subset was then applied to the validation subset (James et al., 2005). The classification accuracy obtained for each subset was compared using a two (learning and validation subsets) by four (true positives, true negatives, false positives, false negatives) Chi-squared test. If the results of this test did not approach statistical significance, the subsets were combined. Finally, the final subgroups or ‘terminal nodes’ of the CART tree structure were themselves entered into a logistic regression analysis (Zhang & Singer, 1999), adjusting for the effects of possible risk factors available to, but not chosen by, CART.
3. Results

3.1. AUDIT cut-off

A total of 1201 (97.5%) of the Gulf War veterans in the study group completed the AUDIT questionnaire and the CIDI. In determining the optimal cut-off score for the AUDIT, the prevalence of the criterion diagnosis of current DSM-IV alcohol use or dependence was 4.5%. ROC analysis found the optimal cut-off to be 10 or greater, therefore this score was chosen to determine AUDIT caseness. The area under the ROC curve was 0.88 (chance performance=0.50), with a 95% confidence interval (CI) of 0.84 to 0.92. Sensitivity using the above cut-off score was 0.85 (95% CI=0.73 to 0.93), specificity was 0.77 (95% CI=0.75 to 0.79), and overall classification accuracy was 0.77 (95% CI=0.75 to 0.80).

3.2. Overall risk factors for AUDIT caseness

Of the 1201 RAN Gulf War veterans analysed, 25.7% (309) exhibited AUDIT caseness as defined in Section 3.1 above. Table 1 shows the results of the logistic regression analysis of possible risk factors for AUDIT caseness. The results for age (p=0.31), number of active deployments (p=0.21) and current (past year) DSM-IV diagnosis of other anxiety disorder (p=0.73) are clearly not statistically significant.

Table 1
Relationships of DSM-IV diagnoses and other possible risk factors to hazardous or harmful alcohol use (AUDIT caseness) in male Royal Australian Navy Gulf War veterans

<table>
<thead>
<tr>
<th>Education</th>
<th>AUDIT caseness (%)</th>
<th>OR</th>
<th>Adjusted ORa</th>
<th>p value</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>≤ 10 years</td>
<td>34.6</td>
<td>1.0</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>11–12 years</td>
<td>25.7</td>
<td>0.7</td>
<td>0.8</td>
<td>0.32</td>
<td>0.5, 1.2</td>
</tr>
<tr>
<td>Certificate/diploma</td>
<td>25.4</td>
<td>0.6</td>
<td>0.8</td>
<td>0.34</td>
<td>0.6, 1.2</td>
</tr>
<tr>
<td>University/college</td>
<td>11.0</td>
<td>0.2</td>
<td>0.5</td>
<td>0.02</td>
<td>0.2, 0.9</td>
</tr>
<tr>
<td>Rank</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Officer</td>
<td>12.8</td>
<td>1.0</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other rank—supervisory</td>
<td>25.3</td>
<td>2.3</td>
<td>1.4</td>
<td>0.25</td>
<td>0.8, 2.5</td>
</tr>
<tr>
<td>Other rank—non-supervisory</td>
<td>31.3</td>
<td>3.1</td>
<td>2.2</td>
<td>0.03</td>
<td>1.1, 4.3</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Married/de facto</td>
<td>21.9</td>
<td>1.0</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Separated/divorced/widowed</td>
<td>39.0</td>
<td>2.3</td>
<td>1.9</td>
<td>0.002</td>
<td>1.3, 2.8</td>
</tr>
<tr>
<td>Single/never married</td>
<td>36.1</td>
<td>2.0</td>
<td>1.9</td>
<td>0.001</td>
<td>1.3, 2.9</td>
</tr>
<tr>
<td>Smoking status</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Never</td>
<td>17.4</td>
<td>1.0</td>
<td>1.0</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Former</td>
<td>24.7</td>
<td>1.6</td>
<td>1.4</td>
<td>0.042</td>
<td>1.01, 2.0</td>
</tr>
<tr>
<td>Current</td>
<td>39.6</td>
<td>3.1</td>
<td>2.4</td>
<td>&lt;0.001</td>
<td>1.7, 3.3</td>
</tr>
<tr>
<td>PTSD</td>
<td>47.5</td>
<td>2.8</td>
<td>1.8</td>
<td>0.052</td>
<td>0.99, 3.3</td>
</tr>
<tr>
<td>Major depression</td>
<td>44.9</td>
<td>2.6</td>
<td>1.7</td>
<td>0.03</td>
<td>1.1, 2.7</td>
</tr>
<tr>
<td>Pre-August 2, 1990, alcohol abuse or dependence</td>
<td>34.0</td>
<td>1.7</td>
<td>1.6</td>
<td>0.004</td>
<td>1.2, 2.2</td>
</tr>
</tbody>
</table>

a Odds ratios were obtained using logistic regression, adjusting for the other variables in the model.

b Omnibus test of statistical significance for overall difference between variable categories, adjusted for the other variables in the model.

c Dose-response slope is the expected proportionate increase in the odds ratio per decrease in rank category.
and so are not shown. It can be seen in Table 1 that those who were separated/divorced/widowed, single/never married, former smokers, current smokers, and those with current DSM-IV diagnoses of major depression, and pre-deployment alcohol use or dependence, were significantly more likely to be AUDIT cases. The association between current DSM-IV diagnosis of PTSD and AUDIT caseness narrowly failed to achieve statistical significance ($p=0.052$).

There was a statistically significant ($p<0.05$) negative dose–response relationship between rank and AUDIT caseness. The odds of the latter would be expected to increase by 50% with each decrease in rank category. In other words, the odds of AUDIT caseness for the other rank—non-supervisory category would be expected to be 50% higher than the odds of AUDIT caseness for the other rank—supervisory category. Finally, although the overall association between education level and AUDIT caseness was not statistically significant ($p=0.15$), those veterans with a university or college degree were significantly less likely ($p<0.05$) to be AUDIT cases.

3.3. CART subgroup analysis

The results of the CART recursive partitioning subgroup analysis of AUDIT caseness are given in Fig. 1. There was no statistically significant difference (Chi-squared=2.03, $df=3$, $p=0.61$) between the performance of the classification tree obtained for the learning subset, and the performance of that tree applied to the validation subset. Therefore, the two subsets were combined.

By default CART chooses splits by minimising the Gini impurity criterion (Breiman et al., 1984), a measure of variability. To aid interpretation we compared pairs of CART subgroups using odds ratios obtained using logistic regression, adjusted for those variables entered into the CART analyses but not selected. This procedure is similar to that employed by Schmitz et al. (2003).

The variable first chosen by CART to split the dataset was smoking status—with the best binary merging of categories being former or never smokers versus current smokers. Of the 870 former or never smokers, 178 (20.5%) were AUDIT cases. Of the 331 current smokers, 131 (39.6%) were AUDIT cases. The current smoker subgroup was more than twice as likely to exhibit AUDIT caseness than the former or never smoker subgroup (39.6% versus 20.5%, OR=2.5, adjusted OR=2.1, 95% CI=1.6, 2.9). CART then split the latter group by military rank—with the optimal merging of categories being officers versus other rank—supervisory and other rank—non-supervisory. The latter were over twice as likely as the higher ranking subgroup to be AUDIT cases (23.0% versus 8.4%, OR=3.2, adj. OR=2.1, 95% CI=1.1, 4.3).

The former or never smoker, other rank—supervisory and non-supervisory subgroup was then split by marital status. Veterans who were not married/de facto were over twice as likely to be AUDIT cases than those who were (35.8% versus 19.2%, OR=2.3, adj. OR=2.3, 95% CI=1.5, 3.4). The latter subgroup was split by current diagnosis of DSM-IV major depression. Subgroup members who had this diagnosis were over three times more likely to be AUDIT cases than were those who did not (38.7% versus 18.1%, OR=2.9, adj. OR=3.4, 95% CI=1.4, 8.0). The odds ratios given above facilitate the comparison of subgroups at each stage of the tree, but do not readily allow identification of the highest risk subgroups. Three subgroups had over three times the risk of AUDIT caseness than the reference group or subgroup with the lowest risk of AUDIT caseness, which comprised the former or never smokers who were officers. The highest risk was observed for current smokers (39.6% versus 8.4% for the reference group, OR=7.1, adj. OR=4.6, 95% CI=2.4, 9.1). Of the former or never smokers of other rank—supervisory or non-supervisory, statistically significant increased risks of AUDIT caseness were observed for not
married/de facto (35.8% versus 8.4%, OR=6.0, adj. OR=4.2, 95% CI=2.1, 8.7) or married/de facto with current diagnosis of major depression (38.7% versus 8.4%, OR=6.8, adj. OR=3.8, 95% CI=1.4, 10.5). There was no statistically significant increased risk for those veterans who were married/de facto.

Fig. 1. Recursive partitioning/classification and regression tree (CART) analysis of hazardous or harmful alcohol use (AUDIT caseness) in male Royal Australian Navy (RAN) Gulf War veterans.
but who did not have a current diagnosis of major depression (18.1% versus 8.4%, OR = 2.4, adj. OR = 1.7, 95% CI = 0.9, 3.4). PTSD was not selected by CART, even if major depression was temporarily excluded from the analysis.

4. Discussion

An overall logistic regression analysis indicated that smoking status, military rank, marital status, current DSM-IV diagnosis of major depression and pre-deployment diagnosis of alcohol use or dependence were significantly associated with AUDIT caseness. The association with current PTSD narrowly missed statistical significance ($p = 0.052$). CART recursive partitioning analysis found five subgroups of Gulf War veterans with differing risks of AUDIT caseness, defined by specific combinations of smoking status, military rank, marital status and current diagnosis of major depression.

Current smoking was shown to be a major risk factor by itself, regardless of the other variables selected in the CART analysis. It has long been established that nicotine and alcohol dependence often co-occur, while current smoking is also associated with hazardous alcohol consumption (Kranzler et al., 2002). However, little is known about the aetiology of dual-dependency, and concurrent, as well as individual, treatment can be difficult (Stotts, Schmitz, & Grabowski, 2003). Nevertheless, the current data support the case for public health initiatives aimed at those personnel who are both smokers and heavy drinkers.

For the former or never smoking group, those who had lower rank during the 1991 Gulf War were more likely to exhibit current AUDIT caseness when compared with those who were officers. This is consistent with a study of referrals for alcohol misuse in UK Royal Naval personnel which found that officers were under-represented (Micklewright, 1996). Several Gulf War studies have found an inverse relationship between rank and psychological ill-health (Hotopf et al., 2004; Ismail et al., 2000; McKenzie et al., 2004). Ismail et al. (2000) proposed that rank is a proxy for socio-economic status, inversely related with psychological ill-health in the general population. Although education level was not selected by CART, the overall logistic regression indicated that having a university or college degree, another proxy for socio-economic status, was associated with lower levels of AUDIT caseness.

Among those veterans who had lower rank, those that were currently single, separated or widowed were more likely to be AUDIT cases than were those who were married or in a de facto relationship. The transition to marriage is generally accompanied by a reduction in alcohol use, perhaps as a result of greater social responsibility, and the potentially destructive effects of heavy drinking on marital quality and stability (Leonard & Rothbard, 1999). Single persons, and those who become separated from their partners, are more likely to be problem drinkers, although other factors apart from marital status such as individual and social predisposition may be more important longitudinally (Matzger, Delucchi, Weisner, & Ammon, 2004). Micklewright (1996) found that Royal Navy personnel who were not married were more likely to be referred for alcohol problems than those who were married. Again, the data provide support for aiming messages around safe alcohol use towards single personnel, with particular emphasis on those recently separated from a stable relationship.

Married/de facto, not being a current smoker, and higher military rank would appear to be protective factors for AUDIT caseness. However, those veterans within the former or never smoking, lower rank, married/de facto subgroup with a current (past 12 months) diagnosis of major depression were at higher risk of AUDIT caseness. Cause and effect between alcohol use and depression is of course difficult to
establish (Libby et al., 2005). The association between depression and AUDIT caseness may be explained by so-called self-medication (Tomlinson et al., in press), with sufferers trying to reduce the symptoms of depression through increased use of alcohol. Alternatively, substance use disorders and depression may be independent, with the possibility of both the above developing in response to traumatic exposure such as combat or military service. Finally, of course, depression may develop secondarily to, and as a direct result of, the substance use disorder (Libby et al., 2005; Tomlinson et al., in press).

Self-report can be misleading and it is possible that married veterans, and those who had been officers during the 1991 Gulf War understated their actual alcohol use. However, this would not explain why married veterans with a current diagnosis of major depression exhibited slightly higher AUDIT caseness than those who were not married.

Comparisons of three of the above subgroups with the lowest risk subgroup—former or never smoker, officers—remained statistically significant even when other diagnoses and other confounding variables listed earlier were controlled for. It should be re-emphasised however that CART utilises cross-validation, not statistical significance, to build and test its tree structures. Statistical significance was assessed using logistic regression after the classification tree was constructed.

Current DSM-IV diagnosis of PTSD was not selected by CART, and narrowly failed to achieve statistical significance in the overall logistic regression ($p = 0.052$). PTSD is generally correlated with alcohol use (McFarlane, 1998), although a recent study of US Gulf War veterans (Shiperd, Stafford, & Tanner, 2005) failed to find such a relationship. Future studies need to further examine the effects of comorbidity, longitudinally as well as cross-sectionally. For example, some researchers have observed that it is the changes in levels of PTSD symptoms, rather than the levels themselves, that are associated with alcohol use (Forbes, Creamer, Hawthorne, Allen, & McHugh, 2003; Read, Brown, & Kahler, 2004).

In conclusion, it was possible to identify several clear subgroups of Royal Australian Navy 1991 Gulf War veterans at increased risk of hazardous or harmful alcohol use as measured by the AUDIT. Current smoking is highly associated with AUDIT caseness, regardless of other factors. Higher military rank, higher education level, and marriage appeared to be protective factors, but not when the latter was accompanied by a current (past 12 months) diagnosis of major depression.

Our study illustrates the application of recursive partitioning techniques to subgroup analysis in Gulf War veterans. Although generalising from the current results to other branches of the military or to other populations should be done cautiously, important data about subgroups of Gulf War veterans at high risk of hazardous or harmful alcohol use have been obtained. This information could be incorporated into education and other public health initiatives, as well as assisting civilian and military medical personnel in identifying high risk individuals in routine medical settings. Our findings highlight potential risk factors, particularly current diagnosis of major depression in married veterans, which should be the focus of further research aimed at elucidating the underlying mechanisms.

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