Objective: Previous research has indicated that there is an increased risk of fatal accidents in veterans of military operations and that such accidental deaths may be related to mental health problems. This study was conducted to investigate fatal accidents in Norwegian former peacekeepers. Methods: A subgroup of alcohol-related fatal accidents was identified. Interview data with next of kin, military data and police report data from 17 cases of alcohol-related fatal accidents were compared with data from 28 cases of other accidents and 43 cases of suicide among Norwegian veterans of peacekeeping service.

Results: The alcohol-related fatal accidents were found to share many common features with the suicide group, such as depression, alcohol and substance abuse, and various social problems, and were also found to differ significantly from the other fatal accidents. Conclusions: The findings indicate a need for preventive measures directed at reducing the risk of premature death not only from suicide, but also from accidental death.

Introduction

An increased risk of accidental death has been demonstrated in military populations exposed to war and trauma. However, the excess mortality from motor vehicle accidents in Persian Gulf War veterans at a 2-year follow-up was reduced at a 6-year follow-up. This suggests that the increased risk is most prominent during the first few years after completed service. Similarly, the excess mortality from motor vehicle accidents for Vietnam veterans was found to be most pronounced during the first few years after service. A study of accidental deaths in Persian Gulf War veterans concluded that fatal accidents could be predicted by military and behavioral factors. In an early study by Kettner, veterans of the U.N. peacekeeping service who were exposed to combat were shown to have a higher risk of nonfatal accidents compared with those not exposed to combat. An increased risk of accidental death was also found in Norwegian veterans of the U.N. peacekeeping service. A later study including a longer observation period showed that the risk of accidental death was no longer increased. This mirrors the findings of Kang and colleagues and indicates a possible increased risk of accidental death in the first few years after completed peacekeeping service. Why there is such an increased occurrence of accidents in veterans is not well known, although risk-taking behavior, mental health problems, and the use of alcohol have been proposed as causal factors.

Several psychological factors have been related to the occurrence of fatal accidents. It is widely recognized that accidents are not true random events, but may be influenced by human factors. Furthermore, many authors have proposed concepts that might aid our understanding of the processes involved in fatal accidents. Some of these concepts have been related to a lack of self-protection, maladaptive coping behaviors (such as alcohol and drug abuse), self-destructiveness, and suicidal tendencies. The concept of "indirect self-destructive behavior" coined byFarberow refers to "unconscious" suicidal tendencies. Shneidman proposed the term "subintentioned death" to identify cases of death caused by self-destructive behavior, including alcohol abuse, drug ingestion, excessive smoking, or various forms of risk taking. In health behavior research, the term "risk-related behavior" has been developed, referring to those behaviors that potentially influence the health of an individual through the occurrence of an injury. The term "chronic suicide" was used by Menninger to describe asceticism, self-punishment, chronic alcoholism, and other behaviors that can easily result in premature death.

Empirical support for the existence of common etiological factors for suicide and accidental death has been found in studies indicating that psychiatric morbidity increases mortality rates not only from suicide, but also from accidents. Furthermore, people who attempt suicide have been found to have an increased risk of lethal accident by self-poisoning. Conversely, a higher risk of suicide has been identified in victims of nonfatal traffic accidents. Such results might only reflect the possibility that many accidental deaths are, in reality, hidden suicides. However, investigations of motor vehicle accidents and drug-related deaths conclude that only a small proportion of these cases may be labeled suicide. Furthermore, despite the evidence that some factors seem to imply an increased risk of suicide and accidental death in certain subgroups of the population, there are obvious distinctions between victims of these two modes of death. One possible interpretation is that there are common risk factors for accidental death and suicide, but that these are only applicable to one or more subgroups of fatal accidents rather than to fatal accidents as a whole. Furthermore, because several studies have indicated the importance of self-destructiveness and alcohol/substance abuse in relation to accidental death, we hypothesized that one such subgroup might be fatal accidents that are related to the use of alcohol. The purpose of this study was to investigate whether this hypothesis would be confirmed by data from a representative sample of fatal accidents and suicides in a cohort of Norwegian veterans of peacekeeping service.
Materials and Methods

This study was conducted with Norwegian male veterans of peacekeeping operations who served from 1978 to 1995. Cause-specific mortality was obtained through linking the army registry of veterans from peacekeeping with the general population registry and the cause of death registry. The classification of causes of death followed the codes of the World Health Organization International Classification of Diseases (Revisions 8 through 10). After retrieving exact International Classification of Diseases codes from the cause of death registry, all cases of suicide, accidental, unknown cause of death, undetermined death, and alcohol-related deaths were included for closer examination. From the cohort of peacekeeper veterans (a total of 22,275 individuals), 73 suicides and 68 accidental deaths were identified. Scrutinizing the official cause of death classification revealed one additional suicide case (classified as an "unknown cause of death"), and one case of suicide and one case of accidental death were deleted from the cohort because the individuals were dismissed from military service before foreign deployment. One additional case of accidental death was deleted because the death occurred during peacekeeping service, whereas this study focused on deaths after peacekeeping service. This resulted in a total of 73 suicides and 70 accidental deaths.

Interview Procedure

Next of kin were identified through the general population registry and were mailed a letter asking them to participate in the study. In three cases, no relative could be identified and in three additional cases no address or phone number could be identified. Of the 137 relatives receiving the letter, at least one relative agreed to participate for each of the 45 cases of accidental death and 45 cases of suicide. In two suicide cases, interview data were deleted because of unreliable information in one case and withdrawal from the study in another. This resulted in interview data for 45 cases of accidental death and 43 cases of suicide, giving a response rate of 64%. No significant differences were found with respect to age at death, age at completion of peacekeeping service, length of peacekeeping service, or military rank between the cases in which next of kin participated and the cases in which next of kin did not participate.

Interviews were carried out in respondents' homes or by telephone when preferred. All face-to-face interviews were audiotaped and a random sample of 30 cases was checked for interrater agreement, which was satisfactory. The 125 informants (a mean of 1.4 per case) consisted of 61 parents, 33 siblings, 17 spouses or ex-spouses, 6 adult children, and 8 others.

The interview covered a wide range of questions. Diagnostic evaluations followed a Norwegian version of Mini-International Neuropsychiatric Interview. Suicidal communication included expressed suicidal plans, expressed intention to take one's own life, and expressed wish to be dead. Attempted suicide was defined as self-inflicted injury or potentially self-injurious behavior with suicidal intention. The CAGE questionnaire was used for assessment of alcohol dependence, with two confirmed items defining dependence. Added to the CAGE cases were individuals with drug dependence. Negative life events were measured with the Life Event Index, which comprises dichotomously scored variables with respect to changes in physical health, interpersonal loss, conflict, professional, financial or legal problems, accidents, or exposure to violence. Responses related to the following sociodemographic variables were elicited: age, employment status, marital status, and education. The use of treatment was expressed in a dichotomous fashion as whether or not the deceased had seen a general practitioner, had had outpatient or inpatient psychiatric treatment, had been on sick leave, or had received medication for psychiatric illness.

TABLE I

<table>
<thead>
<tr>
<th>Variable</th>
<th>Alcohol-Related Accidents (1)</th>
<th>Other Accidents (2)</th>
<th>Suicides (3)</th>
<th>Significance Level, (1) vs. (2)</th>
<th>Significance Level, (1) vs. (3)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age at the time of peacekeeping service</td>
<td>24.1 (SD = 3.6)</td>
<td>23.5 (SD = 4.9)</td>
<td>25.8 (SD = 6.6)</td>
<td>p = 0.71</td>
<td>p = 0.31</td>
</tr>
<tr>
<td>Age at the time of death</td>
<td>30.1 (SD = 7.9)</td>
<td>29.3 (SD = 6.6)</td>
<td>31.4 (SD = 8.6)</td>
<td>p = 0.74</td>
<td>p = 0.58</td>
</tr>
<tr>
<td>Education level: 10 years or less</td>
<td>41% (7/17)</td>
<td>25% (7/28)</td>
<td>35% (15/43)</td>
<td>0.52 (0.5-9.3)</td>
<td>1.3 (0.4-4.8)</td>
</tr>
<tr>
<td>Service stress factors: 2 or more</td>
<td>47% (8/17)</td>
<td>40% (13/28)</td>
<td>51% (22/43)</td>
<td>0.85 (0.2-3.0)</td>
<td>1.03 (0.3-4.1)</td>
</tr>
<tr>
<td>Posttraumatic stress symptoms after peacekeeping: 2 or more</td>
<td>35% (6/17)</td>
<td>29% (8/28)</td>
<td>40% (17/43)</td>
<td>1.36 (0.3-6.0)</td>
<td>0.63 (0.2-3.1)</td>
</tr>
<tr>
<td>Having served more than one 6-month peacekeeping term</td>
<td>18% (3/17)</td>
<td>36% (10/28)</td>
<td>28% (12/43)</td>
<td>p (independent sample t test)</td>
<td>p (independent sample t test)</td>
</tr>
<tr>
<td>Having served as a private</td>
<td>94% (16/17)</td>
<td>63% (17/27)</td>
<td>84% (36/43)</td>
<td>p = 0.03</td>
<td>p = 0.42</td>
</tr>
<tr>
<td>Having been repatriated from peacekeeping service</td>
<td>24% (4/17)</td>
<td>4% (1/28)</td>
<td>16% (7/43)</td>
<td>p = 0.06</td>
<td>p = 0.71</td>
</tr>
</tbody>
</table>

Independent sample t test, odds ratio with 95% CI of odds ratio, and Fisher's exact test.
used to measure U.N. service stress, covering exposure to danger, witnessing atrocities against civilians, other traumatic incidents, and social- and work-related stress. Each stress factor item was scored dichotomously as present or not present. The posttraumatic stress symptom scale\(^{35}\) was used to measure posttraumatic stress reactions in the period after the veterans returned from U.N. service.

### Alcohol Consumption

An autopsy report of blood alcohol concentration exceeding 0.5 g/L (the legal Norwegian threshold for driving) was "alcohol related." In cases where an autopsy report was missing, interview data on the veteran's alcohol consumption before the accident was used. The group of deceased from alcohol-related accidents were compared with the group of deceased from all other accidents and the group of suicide deaths regarding social and mental health problems.

### Statistical Analysis

Cohen's \(k\) was used to determine interrater agreement. Pearson's \(\chi^2\) and independent sample \(t\) test were used to determine whether respondents differed significantly from nonrespondents. Chi-square with Yates correction, Fisher's exact test, independent sample \(t\) test, and odds ratios with a 95% confidence interval were used to determine significance when comparing differences among alcohol-related accidents, other accidents, and suicides. EpilInfo\(^{6}\) was used for calculating \(\chi^2\) with Yates correction, odds ratios, and Fisher exact tests. SPSS version 11.0 (SPSS, Chicago, Illinois) was used for calculating Pearson's \(\chi^2\) and \(t\) test.

### Results

#### Types of Accidents

Of the 45 lethal accidents, 17 were identified as alcohol related. The 17 alcohol-related accidents consisted of 10 traffic accidents, and the remainder was a mixture of accidental poisonings, fall accidents, and other accidents. (To avoid breach of confidentiality, the exact distribution of accident types cannot be published.) The other 28 accidents consisted of 9 work-related accidents, 11 accidents occurring during sporting or leisure activities (9 with friends and 2 alone), and 8 traffic accidents.

#### Age-, Education-, and Service-Related Variables

For those in the alcohol-related accident group, the mean age at the time of completion of peacekeeping service was 24 years (SD = 3.6; Table I). The majority (94%) had served as a private and had served only one 6-month peacekeeping term (82%). In four cases (24%), the soldier had been repatriated from peacekeeping service. The mean age at the time of death was 30 years (SD = 7.9).

The alcohol-related fatal accidents did not differ significantly \((p < 0.05)\) from the other accidents or from suicides with respect...
to age at death, education, age at completion of U.N. service, number of U.N. service terms served, or the level of stress during U.N. service (Table I). However, the alcohol-related accidents differed significantly from other accidents with respect to military rank: 94% of the individuals in the alcohol-related accident group compared with 63% in the other accidents group had served as privates. A higher percentage in the alcohol-related accident group, compared with other accidents, had been repatriated from peacekeeping service, although this difference was not significant (p = 0.06).

**Suicide Risk Factors**

Those in the alcohol-related accident group compared with those in the other accidents group had a significantly increased level of unemployment, problems in their social network, negative life events in their last year, suicidal communication, major depression, alcohol or substance abuse, and psychiatric treatment (Table II), and an increased rate of living alone, although of borderline significance. Several other risk factors were also non-significantly elevated in the alcohol-related accident group, except psychiatric problems in first-degree family members, which was nonsignificantly lower.

We observed no significant differences between the alcohol-related accident and suicide groups for any of the variables (Table II). The levels of suicidal communication were strikingly similar in the two groups (41 vs. 43% lifetime and 24 vs. 26% for the last 6 months of life). Psychiatric problems and major depression were insignificantly elevated in the suicide group, and alcohol/substance abuse was nonsignificantly elevated in the alcohol-related accident group.

**Misuse of Alcohol and Other Substances**

Alcohol and/or drug abuse was apparent for veterans in 8 of the 17 alcohol-related fatal accidents (Table II). To further explore the importance of alcohol and drug abuse, the alcohol-related accidents associated with alcohol and/or drug abuse by veterans were compared with those in which there was no evidence of such abuse (Table III). As can be observed in Table III, most of the social and psychiatric problems that were present in the alcohol-related group occurred in the eight individuals with alcohol and/or drug problems. Social and psychiatric problems were infrequent in the nine individuals for whom there was no evidence of alcohol and/or drug abuse.

**Discussion**

**Risk Factors Do Overlap**

Our hypothesis that there are common risk factors for fatal accidents and suicide, but that these are only applicable to a subgroup of fatal accidents, namely, alcohol-related cases, were confirmed. The alcohol-related accidents in this study resembled suicides with respect to the known risk factors for suicide. The overlap in risk factors included not only general risk factors such as mental health problems and unemployment, but also the more suicide-specific variable of suicidal communication.

This finding could not be explained by misclassification of suicides as accidents. A thorough reclassification of the cause of death was completed before the risk factors were analyzed. Thus, we do not argue that the alcohol-related accident group contained what were in effect hidden suicides or that this group belonged to a suicidal population. Instead, the results indicate that the cases of alcohol-related fatal accidents may represent a subgroup characterized by self-destructiveness or a reduced interest in caring for one’s own safety. When we draw a sharp distinction between fatal accidents and suicide, such that they are two clearly distinguishable modes of death, we might overlook this subgroup of individuals with self-destructive tendencies, alcohol and/or drug abuse, and suicidal impulses.

Our findings give some support to what has previously been suggested by several authors: that a common set of risk factors may lead to an increased risk of suicide and accidental death.17,19,20,36,37

Identifying possible correlates or causal factors in different subgroups of accidental deaths has important implications for prevention. If the same set of risk factors results in an increased risk of fatal accidents and suicide, it follows that there may also

**TABLE III**

<table>
<thead>
<tr>
<th>Measure/Risk Factor</th>
<th>Alcohol-Related Fatal Accidents with Alcohol/Drug Abuse (N = 8)</th>
<th>Alcohol-Related Fatal Accidents without Alcohol/Drug Abuse (N = 9)</th>
<th>p (Fisher’s exact test)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Unemployed/on sick leave/social security</td>
<td>75% (6)</td>
<td>11% (1)</td>
<td>p &lt; 0.02*</td>
</tr>
<tr>
<td>Negative life events</td>
<td></td>
<td></td>
<td>p = 0.29</td>
</tr>
<tr>
<td>Two or more last 3 months</td>
<td>50% (4)</td>
<td>11% (1)</td>
<td>p = 0.13</td>
</tr>
<tr>
<td>Three or more last year</td>
<td>38% (3)</td>
<td>11% (1)</td>
<td>p = 0.06</td>
</tr>
<tr>
<td>Suicidal communication</td>
<td></td>
<td></td>
<td>p = 0.08</td>
</tr>
<tr>
<td>Suicidal communication, lifetime</td>
<td>88% (7)</td>
<td>0</td>
<td>p &lt; 0.001*</td>
</tr>
<tr>
<td>Suicidal communication, last 6 months</td>
<td>50% (4)</td>
<td>0</td>
<td>p &lt; 0.05*</td>
</tr>
<tr>
<td>Mental health problems last 6 months</td>
<td></td>
<td></td>
<td>p &lt; 0.01*</td>
</tr>
<tr>
<td>Major depression</td>
<td>63% (5)</td>
<td>0</td>
<td>p = 0.08</td>
</tr>
<tr>
<td>Posttraumatic stress disorder</td>
<td>38% (3)</td>
<td>0</td>
<td>p = 0.05*</td>
</tr>
<tr>
<td>Treatment last 6 months</td>
<td></td>
<td></td>
<td>p = 0.06</td>
</tr>
<tr>
<td>Visit general practitioner</td>
<td>50% (4)</td>
<td>0</td>
<td>p &lt; 0.05*</td>
</tr>
<tr>
<td>Any psychiatric treatment (outpatient/inpatient)</td>
<td>38% (3)</td>
<td>0</td>
<td>p = 0.08</td>
</tr>
<tr>
<td>Service stress factors: two or more</td>
<td>75% (6)</td>
<td>22% (2)</td>
<td>p = 0.06</td>
</tr>
</tbody>
</table>

* Significant (p < 0.05).
be an overlap in potentially effective preventive measures. In clinical practice, it may be of great importance to be aware not only of the risk of suicide, but also of the risk of dying from an accident in patients who display suicidal ideation and other self-destructive tendencies.

Alcohol consumption at the time of death was used in this study to identify a subgroup of fatal accidents, and this procedure resulted in the identification of a subgroup that turned out to resemble suicides. Alternative methods of identifying such a subgroup were not found in this study, as the groups did not differ with respect to demographic variables.

Military Context

The population in the present study consisted of former soldiers who served as peacekeepers. Previous studies of combat-exposed or peacekeeping soldiers have proposed that a combination of mental health problems and alcohol abuse may increase the risk of fatal accidents in these populations. In one study, victims of accidental death were more likely than living controls to have been hospitalized for injury, poisoning, or mental disorder, to consume more alcohol, to be unmarried, and to have had combat experience. Even though the control group in that study differed from the comparison groups in the present study, some of the same psychological correlates emerged: mental disorder, alcohol and/or drug abuse, and various social problems.

Other risk factors for fatal accidents that have been studied in military populations and have had some empirical support include combat exposure/peacekeeping stress and risk-taking behavior. Risk taking was not investigated in the present study. Although no difference in service-related stress was found between the groups, this may suggest that such stress experience might have been elevated in all three groups compared with living controls.

There are several limitations in this study that need to be addressed. First, the small sample size makes the results vulnerable to random variability and limits the possibility for using multiple analyses. However, the differences between the data from the two groups of fatal accidents in this study were sufficiently robust to be significant despite the small sample size. Type II errors are more likely in this study and caution should be exercised in rejecting differences that were not statistically significant. With a larger sample, systematic differences between the alcohol-related accident group and suicides may have been detected. Therefore, we can conclude that the alcohol-related accident group had several vulnerability factors in common with the suicide group, but may also have differed from suicides in undetected ways. Second, there are limitations to the generalization of our results. All the veterans studied were men, and these results should not be presumed to be applicable to women. In addition, our sample consisted of veterans from U.N./North Atlantic Treaty Organization peacekeeping missions and therefore might not be representative for men in the general population. In our view, this limitation is more closely related to the proportion of fatal accidents that are considered to be alcohol related. In this sample, approximately one-third of the fatal accidents (17 of 45) were identified as alcohol related. This study cannot answer what proportion of fatal accidents is alcohol related in the general population of men. However, it is likely that the psychological mechanisms involved in alcohol-related accidental death would be similar in other samples. Therefore, we consider it likely that alcohol-related fatal accidents in the general population of men also may share risk factors with suicide. Third, the response rate in this study was 64% and there might have been systematic differences between respondents and the nonrespondents that were not detected. Last, as the present study was part of a cohort study of mortality in veterans of peacekeeping missions, the individual deaths were identified retrospectively in the cohort, and in many of the cases, several years had passed between the time of death and the interview, which may have resulted in recall bias.

To conclude, the separation of alcohol-related fatal accidents from other accidents resulted in the identification of a subgroup of fatal accidents that seemed to share vulnerability factors with suicide. This subgroup of accidents was characterized by social and psychiatric problems such as depression, alcohol and/or substance abuse, unemployment, and negative life events. These findings indicate the need for preventive measures directed at reducing the risk of premature death not only from suicide, but also from accidental death, as has previously been pointed out by several authors.

Acknowledgments

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References

Risk Factors for Fatal Accidents and Suicides in Peacekeepers


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