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A Measure of the Intensity of Response to Alcohol in a Military Population

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Abstract

Background: Heavy drinking and associated problems are relatively common in young men, including those in a military setting. This paper explores characteristics of alcohol intake and associated difficulties, and their relationship to a self-report of the usual intensity of response to alcohol in a sample of U.S. Marines.

Methods: Two questionnaires related to demography and alcohol-use histories, along with a simple, 12-item self-report measure of the usual number of drinks to experience an effect (the SRE) were administered to 1,320 United States Marines. The sample had an average age of 22 years, 78% were Caucasian, and 92% were enlisted personnel. The relationships and correlations among drinking characteristics and problems, and the usual number of drinks for an effect were determined.

Results: These subjects drank an average of six days per month, consuming an average of almost six drinks per drinking day, and reported more than three times per month in which they consumed six or more drinks per occasion. Consistent with studies of other populations, the SRE measures of intensity to response to alcohol showed a positive correlation with both drinking practices and problems, with the latter remaining significant even after controlling for recent drinking practices.

Conclusion: The prodigious level of alcohol intake and associated problems, along with the SRE scores, indicate that the Marine Corps personnel are at especially high risk for alcohol-related life problems. These data also support the potential usefulness of the SRE in both identifying individuals likely to have more severe alcohol profiles, and in educating individuals regarding their levels of risk for alcohol abuse and dependence.

I. Introduction

Almost 90% of men in the general population have ever consumed alcoholic beverages, with the highest proportions reported for individuals in their late teens to early 30s (1). Among drinkers, perhaps 60% report ever experiencing life problems related to alcohol, difficulties that are often temporary, although as high as 20% of men go on to fulfill criteria for severe and repetitive problems labeled as alcohol dependence (2). These rates of alcohol-related life difficulties differ across groups, with higher levels generally reported for individuals in unskilled or semi-skilled occupations, and, presumably, those with lower levels of education (3).

In light of the demographic characteristics of young age, gender, and educational level, it is not surprising that the proportion of drinkers, the number of individuals who consume high doses of alcohol per occasion, and the rate of alcohol-related life difficulties has been reported to be high in young men serving in the military forces, even after controlling for demographic differences between populations (4). For example, in 1998 the percentage of Marines age 18-25 who were heavy drinkers (defined as consuming five or more drinks per day in four or more days during the past 30 days) was 29.4%, a rate that was two-fold higher than a comparable group in the National Household Survey on Drug Abuse (1, 4, 5). Serious alcohol-related consequences were reported by 13% of Marines, almost 20% noted reduced job productivity, and 8% reported some symptoms of dependence the prior year.

In addition to demography, other characteristics related to higher levels of alcohol intake and associated problems have also been identified. These include evidence of a lower level of response (LR) to alcohol noted early in a drinking career. This can be measured as less intense changes in physiological measures at a standard blood alcohol level, or through a self-report of a higher number of drinks historically required to experience several effects of the drug (6, 7, 8). A low LR in the laboratory or a self-report of a higher number of drinks required for specific effects have been found in about 40% of children of alcoholics. Regardless of the family history, LR functions as a significant predictor of the development of alcohol abuse or dependence over the subsequent decades (7-11). The LR to alcohol experienced by an individual is genetically influenced, with heritabilities ranging from 0.4 to 0.6 (9, 12, 13), and explains a significant proportion of the relationship between a family history of alcoholism and the future development of alcohol abuse or dependence (7, 8).

Several hypotheses have been proposed to explain why a low LR to alcohol might be related to a higher alcoholism risk (6, 7). First, individuals who live in a heavy drinking environment and who seek the same level of intoxication as their peers could be more likely to consume prodigious amounts of alcohol as they search for the effects experienced by those around them. This repeated heavy intake of ethanol could both contribute to subsequent acquired tolerance, and increase the probability of spending more time with heavy drinking friends. Second, for many people the ability to regularly control the intake of alcohol might result from behaviors learned as one compares internal feelings of intoxication with the amount of beverage consumed, a paradigm in which individuals who require much larger volumes of alcohol to have an effect might have more difficulty in adjusting their drinking behaviors to avoid intense drunkenness. In either of these instances, one might predict that the more intense the level of drinking in the surrounding environment, the greater the potential for alcohol-related problems for individuals with a low LR. One such environment could occur among young individuals serving in the military services.

The paper-and-pencil measure used to evaluate LR, the Self-Rating of the Effects of Alcohol (SRE), is a simple 12-item instrument that takes less than five minutes to fill out (14, 15). Data generated from almost 100 university students and about 500 men and women from the general population have indicated several characteristics of the SRE. The one-year retest reliability for the SRE is as high as 0.8, the measure has internal consistency with higher numbers of drinks reported for the period of heaviest drinking and for the more intense alcohol effects, and the correlation for several SRE measures and a diagnosis of alcohol dependence is as high as 0.6.

The SRE has been evaluated in relatively highly functional students and in the general population, but not in groups such as young men in the military who might be hypothesized to be at especially high risk for alcohol-related life problems. Thus, this paper reports the performance of the SRE in a group of U.S. Marines.

II. Methods

The sample consists of 1,320 men in the United States Marine Corps (USMC) who participated in a study of drinking practices in personnel who were part of a Unit Deployment Program. All subjects were members of four infantry battalions who were surveyed in the fall of 1998. The data

were generated after excluding 894 Marines who were not available due to job obligations on the day of testing, and 565 men who were lifelong abstainers and not appropriate for these evaluations. Of the remaining 2,151 men, 1,320 (61.4%) completed sufficient information on relevant forms, including the SRE, with values that were within 2 standard deviations of the mean (i.e., after excluding outliers).

The subjects had an average age (and standard deviation) of 22.5 ± 4.06 years, with a racial distribution that included 78.3% Caucasians, 13.6% Hispanic individuals, 4.0% African-Americans, 2.6% Asian or Pacific Islander backgrounds, and 1.5% Native Americans. The large majority (92.3%) were enlisted personnel with pay grades of E6 or less (56.3% were E3), while 1.7% were non-commissioned officers, and the remainder were commissioned officers. Regarding education, 7.5% had four or more years of college, 24.3% reported some college, 63.0% were high school graduates, 2.2% had technical school degrees, and 2.2% had passed a high school equivalency test, with about 1% having no high school certification.

The data reported here were gathered primarily from three research instruments. The first was the Survey of Health-Related Behaviors Among U.S. Marine Corps Personnel, which was based on the 1998 Department of Defense Survey of Health-Related Behaviors Among Military Personnel, and the second was the Alcohol Use Disorders Identification Test (AUDIT) (16, 17). The former was developed by the Research Triangle Institute as a self-administered paper-and-pencil test that reviews demography, recent drinking practices, and additional health-related topics. The AUDIT is a 10-item questionnaire that also reviews alcohol-related life problems, and which has been used to screen for alcohol dependence and other alcohol use disorders.In addition, all subjects who had experience with alcohol were asked to fill out the SRE. This measure gathers information on the number of standard drinks (approximately 12 grams of ethanol) required for each of four effects (beginning to feel any different, becoming dizzy or slurring speech, developing incoordination or a stumbling gait, and passing out or falling asleep when not desired) at three different points in a person's life (the approximate first five times of drinking, the heaviest drinking period, and the most recent three months). Scores on the SRE are generated by adding up the number of drinks required for any of the reported effects, and creating an average, or mean, by dividing this sum by the number of alcohol effects endorsed. Consistent with prior reports, the most useful subscores are the total

generated across all three time frames (TOTAL), and, reflecting the desire to understand more about the intensities of the response to alcohol early in life, the average number of drinks per effect during the first five times of consuming alcohol (FIRST 5) (14, 15).

Statistical analyses were carried out through Pearson correlations. Because some of the original data from the survey instrument reported categories of responses, those raw data were converted into continuous variables. Thus, using the frequency of drinking in the recent three months as an example, a category of never was given a score of zero, one was substituted for "1drink monthly," an average score of three was used for people who said that they consumed alcohol two-to-four times a month, and so on.

III. Results

The mean for the TOTAL SRE score was 8.4 ± 3.16 drinks, with a range of 1.0 to 19.0. FIRST 5 values averaged 5.6 ± 2.38, with a range of 1.0 to14.5. The difference between TOTAL and FIRST 5 values was significant ($t=45.78$, $df=1319$, $p=.001$). The average for the period of heaviest drinking was 11.5 ± 5.19 drinks, with a range of 1.0 to 29.3, scores that were significantly different from both FIRST 5 ($t=46.64$, $df=1319$, $p<.001$) and TOTAL ($t=42.39$, $df=1319$, $p<.001$).

Information about the patterns of use of alcohol during the three months prior to filling out the questionnaires, as well as the patterns of problems related to alcohol in the most recent six months was available from the Survey of Health-Related Behaviors among U.S. Marine Corps Personnel. Table 1 highlights representative results. It can be seen that while these men drank on an average of six days per month (mostly on weekends), they consumed an average of almost six drinks per drinking occasion. The data also reveal a mean of between three and four times per month on which they imbibed six or more drinks during a single evening.

Not surprisingly, a high rate of alcohol-related adverse consequences was also reported. These included an average of more than nine times during the prior six months when a person drank so much that he was unable to remember all or part of the preceding evening (i.e., he blacked out), 11 occasions over the prior half year when he felt he was unable to control or stop his drinking during an evening, four times when he drank alcohol upon arising, and an average of more than once per month when the individual felt he had become sick because of his drinking. Additional problems

included an average of five times in the six months when the Marine experienced tremors or shakes the morning after drinking, and three physical fights related to the drinking pattern.

The table also presents correlations between the quantity and frequency of drinking and recent problems and the two key SRE values (TOTAL and FIRST 5). The correlations related to the SRE values for the period of heaviest drinking are not reported because the results were very similar to TOTAL. All correlations are in the predicted direction, and all noted within the table are statistically significant. The correlations for TOTAL were approximately twice as high as those for FIRST 5, perhaps reflecting the narrower range of SRE values regarding early drinking experiences, as well as the possibility that some of the correlations for TOTAL not only reflect differences among individuals related to inherent intensities of reaction to alcohol, but also might relate to acquired tolerance. The correlations for most problems and SRE TOTAL were about .20 or higher, while those for FIRST 5 were about .12. These correlations remained significant even after covarying for the recent drinking pattern.

IV. Discussion

There are several conclusions that might be drawn from these results. First, the data corroborated the high rate of intense drinking among this sample of primarily young men. An average number of almost six drinks per drinking day, a level which was consumed between three and four times per month, is cause for concern. Similarly, the descriptive data demonstrated rates of alcohol-related life problems that included several times per month for blackouts, a similar frequency for situations in which it was difficult to stop drinking, and an impressive level of physical fights and experiencing sickness severe enough to interfere with functioning.

The results also indicate useful information regarding the SRE. Similar to prior reports, and despite the fact that the instrument was used as part of a wide range of measures in large groups of individuals, a high SRE score indicating a large number of drinks for an effect (and, thus, a low intensity of response to alcohol) was related to higher alcohol intake and problem profiles. These include positive correlations between the SRE and all measures of drinking quantity and frequency, as well as associated problems. The data reported here are consistent with the information from other groups, including students and men and women from the general population (14, 15). The

relationships among scores within the SRE and the correlations between the SRE and alcohol-related life problems had in the past only been evaluated in college-educated samples or a broader spectrum of individuals of a fairly wide age range from the general population.

It is interesting to compare the current SRE results with those generated from other groups. The college sample reported an average FIRST 5 SRE of 2.5 ± 1.22, while a general population group had a mean score of 3.1 ± 1.88 (14, 15). These were both considerably lower than the value of 5.6 ± 2.38 for the group studied here. The scores for TOTAL across the three samples were also different, ranging from 3.8 ± 1.94 for the college sample to 5.1 ± 3.42 for the general population group, up to 8.4 ± 3.16 for the young military sample (14, 15). Thus, the Marine sample reported here appears to have a disproportionate group of men who are carrying a risk factor for alcohol-related problems.

The current data raise the question of whether members of the military might be at even higher risk for the future development of alcoholism than the general population. Prior studies discussed in the Introduction demonstrated a robust relationship between a lower level of response to alcohol (i.e., a higher number of drinks required for an effect) and future alcohol-related life difficulties in all follow-ups carried out to date (7-11). When one considers the great amount of morbidity and mortality associated with extremely heavy alcohol intake, it might be worthwhile for large organizations, such as the military, to consider teaching personnel about the enhanced risks associated with a low level of response to alcohol, perhaps using the SRE as an educational tool. Furthermore, individuals who demonstrate the need for a large number of drinks for an effect might be offered the opportunity of additional education and help before problems develop.

Of course, the current results must be viewed in the context of the methods used. While the majority of data relating the LR score to an alcoholic outcome have been generated from alcohol challenge studies, this investigation used a relatively simple paper-and-pencil test known to correlate with the potentially more robust measure. Second, it is possible that variability in results might have occurred because the form was filled out in the context of many other paper-and-pencil tests, a factor which might have diminished the seriousness with which subjects viewed the SRE. However, this problem would have likely decreased any relationship between the SRE and alcohol-related life problems, rather than have inflated the results.

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Table 1

Pearson's Correlations between SRE Scores and Alcohol Use or Problems for 1,320 Marines

Item (with _ ± SD)	Correlations to SRE	
QUANTITY/FREQUENCY	**TOTAL**	**FIRST 5**
Days/month drank any alcohol (6.0 ± 4.90)	.24	.08
Usual drinks per day (5.8 ± 2.94)	.40	.20
Times/month drank 6+ drinks/occasion (3.3 ± 6.30)	.24	.13
PROBLEMS PRIOR 6 MONTHS (Number of times)	**TOTAL**	**FIRST 5**
Blacked out (9.2 ± 21.70)	.24	.14
Unable to stop (10.9 ± 29.67)	.21	.10
Drink in morning (4.0 ± 16.38)	.18	.08
Felt sick because of drinking (6.4 ± 16.50)	.20	.12
Shakes in morning (4.9 ± 21.13)	.17	.07*
Physical fight (2.7 ± 11.02)	.18	.12
Hit someone (0.27 ± 0.72)	.20	.11
Felt very drunk (0.27 ± 0.72)	.27	.13

* all correlations are significant at $p < .01$, except this value which is $p < .05$

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14. ABSTRACT (maximum 200 words)
Heavy drinking and associated problems are relatively common in young men, including those in a military setting. This paper explores characteristics of alcohol intake and associated difficulties, and their relationship to a self-report of the usual intensity of response to alcohol in a sample of U.S. Marines. Two questionnaires related to demography and alcohol-use histories, along with a simple, 12-item self-report measure of the usual number of drinks to experience an effect (the SRE) were administered to 1,320 United States Marines. The sample had an average age of 22 years, 78% were Caucasian, and 92% were enlisted personnel. The relationships and correlations among drinking characteristics and problems, and the usual number of drinks for an effect were determined. These subjects drank an average of six days per month, consuming an average of almost six drinks per drinking day, and reported more than three times per month in which they consumed six or more drinks per occasion. Consistent with studies of other populations, the SRE measures of intensity to response to alcohol showed a positive correlation with both drinking practices and problems, with the latter remaining significant even after controlling for recent drinking practices. The prodigious level of alcohol intake and associated problems, along with the SRE scores, indicate that the Marine Corps personnel are at especially high risk for alcohol-related life problems. These data also support the potential usefulness of the SRE in both identifying individuals likely to have more severe alcohol profiles, and in educating individuals regarding their levels of risk for alcohol abuse and dependence.

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