Gender Differences and Alcohol Use in the US Army

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Context: Operation Iraqi Freedom offered an opportunity to study the role of alcohol use among men and women serving in the US Army. The goal of this study was to determine whether there are gender-based differences in alcohol use among US Army soldiers, and if so, to evaluate the role of alcohol education efforts in the military.

Methods: In February 2005, 1200 individuals enlisted in the US Army were asked to complete a 29-item questionnaire regarding alcohol-use patterns. Survey topics included attitudes toward alcohol consumption and associated negative consequences.

Results: Six hundred eighty-five men and 325 women (N=1010) responded to the questionnaire for an overall response rate of 84%. Although men were more likely to engage in “bolus” drinking (ie, binge drinking), women exceeded established guidelines for safe alcohol consumption at a risk-adjusted rate nearly twice that of men. In addition, for individuals whose behaviors were not in conformity with public health guidelines for safe alcohol consumption, the severity of reported negative consequences was influenced by gender. Women initially experience greater psychosocial impairment, and—should harmful drinking patterns progress to alcohol dependency—they are at greater risk of injury, morbidity, and mortality than men.

Conclusion: Several gender-specific differences in alcohol-consumption patterns were found. Because the present study also found that women generally have more interest in educational interventions for alcohol abuse issues, however, researchers conclude that the efficacy of US Army risk-reduction programs would be improved by addressing gender-based differences.

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Alcohol is a popular beverage that is consumed in varying quantities by most Americans. Although alcohol consumption in the United States has decreased when measured in terms of alcohol sales data, the social consequences associated with its use have not declined. An analysis of three large national alcohol-use surveys reported no change in the negative social consequences for alcohol use.

The majority of data detailing the effects of alcohol is based on studies involving men. In the past 20 years, researchers have made a concerted effort to examine the role of sex differences in alcohol use. The present survey-based study adds to this area of investigation by exploring alcohol-use patterns among women in the US Army.

Prior to enlistment, applicants to the US Army must meet certain minimum educational requirements, specifically a high school diploma or its equivalent. Once enlisted, new recruits take aptitude tests to help match them to appropriate occupations in the military. The US Army personnel force structure fluctuates among active duty soldiers, US Army Reserve, and Army National Guard components. The US Army Reserve maintains the highest numbers of female and minority soldiers.

One practical result of research on alcohol use and abuse is the clinical confirmation that women, when compared with men, experience adverse consequences at lower levels of consumption. Public health guidelines for safe alcohol consumption, a direct outgrowth of this line of research, recommend that women consume no more than three standard alcohol drinks (142 mL [5 oz] of wine; 43 mL [1.5 oz], spirits; or 341 mL [12 oz], regular beer) at any one occasion and no more than seven such drinks per week. Alternatively, the consumption limits set for men are higher, allowing no more than four standard alcohol drinks on any one occasion and no more than 14 drinks per week. On average, a man has a higher volume of physiologic body water than an average woman. In situations where equal amounts of alcohol are consumed by an average individual of each sex, the woman will reach a blood-alcohol level higher than her male counterpart because she has less total body water to dilute the substance.

In the NSDUH Report: Gender Differences in Substance Dependence and Abuse, the prevalence of alcohol-related disorders in women was estimated. According to that survey, 4% of women met the diagnostic criteria for either alcohol abuse or dependence, a rate that is approximately half that seen in men. Several socioeconomic factors predicted an increased incidence of alcohol disorders among women, however:
employment status (12.5% unemployed versus 8% employed), marital status (4% married versus 11% divorced and 16% single), and parental status (5.5% with children versus 13% no children). Stable interpersonal relationships appear to restrain the onset of many alcohol-dependence issues in women.

Across the country, women account for approximately 30% of all substance-abuse treatment admissions. Slightly more than one third of these patients are self-admitted. This number becomes more interesting when placed side by side with admittance patterns for men. Forty percent of men admitted to inpatient substance-abuse programs arrive through the intervention provided by the criminal justice system. We believe that the importance of social context for women is clearly reflected in basic admittance statistics; 44% of women admitted for treatment in inpatient substance-abuse programs were unemployed.

It is now widely known that alcohol use during pregnancy increases risk to both mother and fetus. According to a recent survey, 4.1% of women reported binge alcohol use (ie, five or more drinks on one occasion) during pregnancy. Women who are pregnant and unmarried, and women aged 31 years or older, have the highest rates of alcohol abuse among women. Among “women who might become pregnant” (ie, sexually active women not using birth control), 12.4% met the criteria for binge drinking and another 13.2% met the criteria for “frequent drinking” (ie, seven or more drinks per week).

In addition, according to a recent survey, 36.5% of girls aged 12–17 years reported alcohol use in the preceding year, extending the potential of problem-drinking behaviors to younger age groups.

Clinical research has convincingly documented the ill-effects of prolonged alcohol use in women. When compared with men, women develop alcohol-related hepatic disorders at a more rapid pace: a minor elevation in transaminase levels can progress to cirrhosis more quickly in women than in men. By contrast, there appears to be no difference in the rate of heart disease between men and women when comparing the heaviest drinkers from both sexes. For women, heavy drinking may contribute to the occurrence of menstrual disorders, such as dysmenorrhea and irregular cycles. In addition, it may promote an early onset of menopause. The link between alcohol use and breast cancer is also an area of active clinical inquiry. Part of the interest in this potential link is based on the observation that estrogen levels increase among female drinkers. Clinical literature increasingly confirms that elevated levels of estrogen in postmenopausal women may increase the risk of breast cancer. Although some of the problems women experience as a result of alcohol consumption are medical, others represent social risks particular to women. Arguably, the greatest negative consequence of alcohol consumption for women is measured in terms of psychosocial impairment.

Women who abuse alcohol are significantly more prone to emotional and physical trauma. Two studies report alcohol-associated impairment in subjects’ interpretations of sexual cues when both parties are drinking.

One interesting result of research into the patterns and effects of alcohol consumption is the finding that women are less likely than men to drive a vehicle after drinking. Some theorists conjecture that this disparity may be the result of risk-taking behavior being more commonly found among men. Nevertheless, when men and women have similar blood-alcohol levels, the relative risk of fatal accidents is greater among women.

**Methods**

The Department of Clinical Investigation at Walter Reed Army Medical Center (WRAMC) in Washington, DC approved data collection and analysis for this study. Study participants were recruited from the Medical Center Brigade at WRAMC, which consists of two groups: (1) clinical staff who support the hospital’s mission, and (2) military patients receiving medical care.

The 29-item questionnaire, composed of “best choice” and multiple-choice questions, was designed to identify consumption patterns both in terms of frequency and quantity using guidelines for safe alcohol consumption established by the National Institute on Alcohol Abuse and Alcoholism. Several questions addressed potential consequences experienced by subjects after alcohol consumption (eg, hangover, work absenteeism). Another set of questions inquired as to subjects’ responses to others who had consumed alcohol (eg, “What would you do if a friend or roommate was highly drunk?”). Other questions were designed to assess subjects’ awareness of and knowledge about alcohol (eg, legal drinking age in the military) and their level of interest in educational interventions and alcohol-free living areas.

Subject anonymity was preserved as a result of the survey design, which required minimal identifying data from respondents. Twelve hundred questionnaires were printed for distribution by unit commanders, who were instructed to emphasize the anonymity and voluntary nature of survey participation.

Descriptive statistics were calculated for each survey response by sex. To analyze gender differences, the Fisher exact test was used for nominal categorical data and Wilcoxon rank sum test was used for ordinal data. All tests were two-tailed, and a $P$ value of .05 or less was considered statistically significant. For multiple response variables (eg, consequences of drinking), response categories were ranked by the probability of adverse versus favorable treatment outcomes. When survey participants had the option of selecting more than one answer to any given question, the most frequently selected item for that question was used for data analysis when comparing between-sex differences.
Results
Questionnaires were returned by 325 women and 685 men (N=1010) for an overall response rate of 84%. Responses were entered into an SPSS database for statistical analysis (version 13.0 for Mac OS X; SPSS Inc, Chicago, Ill).

Although all 685 men responded to the survey question inquiring about participant age, 52 (16%) women declined to report age data. However, for both sexes, the majority of survey respondents were aged 21-25 years (men, 205 [29.9%]; women, 111 [34.2%]). Overall, the percentage of participants in most age groups was roughly similar by sex: 26-30 years (men, 147 [21.5%]; women, 71 [21.8%]), 31-35 years (men, 95 [13.9%]; women, 51 [15.7%]), and 18-20 years (men, 89 [13%]; women, 40 [12.3%]). Although no female participants reported being in the two oldest age groups (36-40 years or 41 years or older), approximately 10% of male participants reported belonging to each of these demographic groups (79 [11.5%] and 70 [10.2%], respectively).

With regard to military rank, 8 (1.2%) men declined to report rank data, though all 325 female participants responded to this question. For both sexes, the majority of respondents were in the lower enlisted grades, E1-E4 (men, 361 [52.7%]; women, 156 [48%]). Similar percentages of both sexes reported being in the higher enlisted grades, E5-E9 (men, 257 [37.5%]; women, 117 [36%]). Although the number of men and women who identified their rank as officers was similar, in terms of percentages for each gender, the proportion of female officers was nearly double that of men (59 [8.6%]; women, 52 [16%]).

By sex, the percentage of respondents with a married marital status was roughly similar (men, 324 [47.3%]; women, 143 [44%]).

To examine consumption patterns and related behaviors, respondents were asked how many alcohol drinks they consumed per week (Table 1). This question incorporated standard drink equivalent examples. Men consistently reported drinking at higher levels than women (P<.001). More than half of male respondents (398 [59.8%]) reported drinking two or fewer drinks per week, while slightly more than two-thirds of female respondents (216 [70.4%]) reported the same alcohol-consumption pattern.

However, when the data was analyzed in terms of predetermined gender-specific alcohol-consumption limits (men, 14 drinks/wk; women, 7 drinks/wk), a different picture begins to emerge. Viewed from the perspective of public health guidelines for safe alcohol consumption, 5.1% of men and 9.1% of women have alcohol-consumption patterns that are either “unsafe” or borderline unsafe, with all men and 2.9% of women consuming 13 or more drinks per week, and 6.2% of women consuming between 7 and 12 drinks weekly.

An individual’s conformity to guidelines for safe alcohol consumption is evaluated based on “dosing” patterns (ie, frequency) as well as “dosage” (ie, volume). In other words, researchers are concerned with how much alcohol is consumed at one time, or in “one sitting.” Respondents were queried as to how many times they had consumed four or more drinks at one sitting during the previous 2 weeks (Table 2). Although the majority of respondents of both sexes (men, 111 [16.5%]; women, 47 [15.1%]) reported never having consumed alcohol at that level, roughly equal percentages of both sexes (men, 70 [10.2%]; women, 40 [12.3%]) admitted this level of alcohol consumption. As the number of bolus-dosing incidents increased incrementally within this timeline, the number of participants declined almost without exception.
Respondents were also asked to identify the negative consequences of alcohol consumption that they had experienced in the preceding year (Table 3). The most frequently noted negative consequence of drinking for both sexes was “hangover” (men, 259 [59.1%]; women, 94 [54.3%]). More men than women reported interpersonal conflict as a result of alcohol consumption (P = .021), as well as driving a motor vehicle while under the influence (P = .035), and missed work (P = .06).

Another way to examine the negative consequences of alcohol consumption is through a comparison of the degree of risk posed by each outcome or potential outcome. As noted, survey participants of both sexes had seriously considered suicide while intoxicated (men, 23 [5.3%]; women, 6 [3.4%]). Clearly, serious thoughts of suicide present a higher (and more final) risk of adverse outcome than a hangover. Table 4 presents a risk-adjusted analysis of the data.

In response to the question, “What would you do if another person has a serious alcohol problem?” nearly half of the respondents (men, 305 [46.2%]; women, 143 [46.7%]) indicated that they would talk to the person directly about their concerns. A minority of participants indicated that they would likely ignore the problem (men, 76 [11.5%]; women, 21 [6.9%]). Among other possible interventions (Table 5), speaking to a military supervisor or healthcare personnel about another person’s alcohol problem was an action that women were more likely to take than men (P = .024).

In response to the question, “What would you do if a friend, roommate, or unit member was highly drunk?” respondents’ answers were ranked by weighing the probability that a given response was likely to result in an adverse outcome (Table 6). For example, “doing nothing or letting them sleep it off” carried greater risk than seeking medical help. Although nearly half of the respondents indicated a preference for this kind of inaction (men, 374 [54.8%]; women, 142 [48.1%]), women were more likely than men to seek the help of a military supervisor or a healthcare professional (P = .002).

Answers in response to the question “If you needed help with a drinking problem, what would you do?” were ranked by weighting the probability that a given response was likely to result in a favorable treatment outcome (Table 7). In this instance, quitting without assistance of any kind (ie, “going cold turkey”) ranked less favorably than did seeking professional care. Slightly more than one quarter of respondents (men,
Physicians in primary care specialties should be prepared to provide guidance to any patient who requests assistance with learning to control the effects of alcohol in his or her life—and how best to respond to the substance-abuse problems of their loved ones. As noted, the majority of information about alcohol use comes from studies involving male subjects—with the findings generalized to women. Such studies are increasingly problematic given the wealth of clinical reports suggesting gender differences in both the physiologic metabolism and psychosocial consequences of alcohol consumption. Drink-for-drink, the average woman achieves intoxication more quickly than the average man. Women who drink excessively progress along an accelerated path of alcohol-related health problems, are prone to suffer greater injury from motor vehicle accidents, and find themselves more often in risk-laden social situations.

The results of this study provide two pictures of alcohol use among women in the US Army. One picture reassures us that the majority of respondents drink alcohol in a responsible manner. The other picture suggests opportunities to introduce educational interventions that emphasize gender-specific alcohol-use and -abuse patterns to reduce risks of adverse outcomes.

The majority of respondents of both sexes report drinking two or fewer alcohol beverages per week. In a similar fashion, almost two-thirds of respondents denied bolus drinking, defined as consuming four or more drinks at one sitting. When reporting recent (<1 y) negative consequences associated with alcohol consumption, most survey respondents identified the minor physiologic symptoms encompassed by a “hangover.”

With regard to interest in educational interventions and alcohol-free living areas, women were more likely than men to see the need for both. One hundred fifty-six women (52%) but only 243 (37%) men were in favor of alcohol-free barracks (P=.001).

Comment
Public health authorities regularly refer individuals who think they might have a problem with alcohol abuse to their personal physicians. Physicians in primary care specialties should be prepared to provide guidance to any patient who requests assistance with learning to control the effects of alcohol in his or her life—and how best to respond to the substance-abuse problems of their loved ones.

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a “friend in need” did not fully translate to immediate actions that might be undertaken if a friend or coworker was highly intoxicated. In that situation, the most likely response was no response: to do nothing or simply to let them “sleep it off” (Table 8).

Certain gender-related trends emerged. In terms of total consumption and bolus drinking behaviors (particularly at the highest levels), men reported drinking more than women. When analyzed in terms of public health guidelines for safe alcohol consumption, however, women were engaging in problem-drinking behaviors at a risk-adjusted rate nearly twice that of men.

Men and women reported slightly different consequences from alcohol consumption. Men reported more alcohol-related acts of aggression as compared with women. Women more frequently than men reported doing something that later caused feelings of regret. Women are more likely than men to help individuals who they perceive as having a drinking problem and individuals who are highly intoxicated. Women are generally more receptive than men to alcohol-related educational activities and are more interested in an alcohol-free living area.

The results of the current study suggest that the effectiveness of educational alcohol-awareness activities would improve with a gender-tailored approach. When current alcohol-consumption patterns are viewed side by side with public health guidelines for safe alcohol consumption, behaviors that are symptomatic of problem drinking occur among women at a rate nearly double that of men. Although many women may not be aware of the physiology underlying common alcohol-consumption limits, this information has particular relevance to them during pregnancy. Similarly, the gender-specific negative consequences experienced by women as a result of high levels of alcohol consumption provide an opportunity for physicians to tailor patient-education efforts in ways that may reduce adverse outcomes. The good news revealed by the present study is that women—more so than men—are especially receptive to educational interventions regarding alcohol consumption.

Some data gathered from the present study transcend the effects of gender, however. A casual assessment of the risk associated with a “highly intoxicated” person led over half of respondents to no action of any kind. This finding offers an educational opportunity for physicians who wish to address the serious complications that might result from lack of action in such a situation. The military stresses the concept of teamwork and “battle buddies,” twin notions that emphasize the importance of lending a helping hand in times of need. A better strategy for the health of all in this setting would be to cultivate a nonpunitive envi-

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### Table 7

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<thead>
<tr>
<th>Response by Risk Ranking</th>
<th>No. (%)</th>
<th>Asymp. Sig. (2-sided)</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Men (n=642)</td>
<td>Women (n=290)</td>
</tr>
<tr>
<td>1. None (would quit drinking without assistance)</td>
<td>157 (24.5)</td>
<td>53 (18.3)</td>
</tr>
<tr>
<td>2. Friend or family member</td>
<td>111 (17.3)</td>
<td>63 (21.7)</td>
</tr>
<tr>
<td>3. Chaplain</td>
<td>77 (12.0)</td>
<td>50 (17.2)</td>
</tr>
<tr>
<td>4. Alcoholics Anonymous</td>
<td>59 (9.2)</td>
<td>21 (7.2)</td>
</tr>
<tr>
<td>5. Military supervisor</td>
<td>59 (9.2)</td>
<td>25 (8.6)</td>
</tr>
<tr>
<td>6. Other substance-abuse program</td>
<td>179 (27.9)</td>
<td>78 (26.9)</td>
</tr>
<tr>
<td>Fisher Exact Test</td>
<td>...</td>
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</tbody>
</table>

* Participants (N=1010) did not respond to all 29 items on the survey instrument. The total number of responses received from each sex is indicated above.
† Risk is ranked by the probability that treatment response would result in an adverse outcome.

### Table 8

<table>
<thead>
<tr>
<th>Response by Risk Ranking</th>
<th>No. (%)</th>
<th>Fisher Exact Test (2-sided)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Men (n=656)</td>
<td>Women (n=300)</td>
</tr>
<tr>
<td>1. None</td>
<td>99 (15.1)</td>
<td>31 (10.3)</td>
</tr>
<tr>
<td>2. Let him/her sleep it off</td>
<td>351 (53.5)</td>
<td>152 (50.7)</td>
</tr>
<tr>
<td>3. Notify military supervisor</td>
<td>155 (23.6)</td>
<td>80 (26.7)</td>
</tr>
<tr>
<td>4. Call police</td>
<td>42 (6.4)</td>
<td>24 (8.0)</td>
</tr>
<tr>
<td>5. Call hospital</td>
<td>111 (16.9)</td>
<td>76 (25.3)</td>
</tr>
</tbody>
</table>

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† Risk is ranked by the probability that treatment response would result in an adverse outcome.
environment that would encourage a friend or coworker to report the condition of the highly intoxicated person to military supervisors or medical personnel.

Another finding that offers an opportunity for intervention involves individual self-awareness regarding alcohol-consumption patterns and help-seeking behaviors. In fairly equal quartiles, when respondents were asked what they would do if they believed they had a drinking problem, both men and women indicated that they would either “fix” the problem on their own or seek the assistance of trained counselors. The US Army has a robust employee-assistance program to identify and treat service members with alcohol-abuse disorders. The results of the present study suggest the need for a “marketing” approach within the US Army that would encourage self-referral to these resources. However, such a step may require restructuring the balance between the punitive and therapeutic approaches to favor the latter unequivocally.

Another area ripe for perception-adjustment is the use of medications that assist in maintaining sobriety by reducing patients’ alcohol cravings. Such a change may also require rebalancing therapeutic interventions to include a robust medical component—perhaps in the form of the routine consideration of pharmacologic support through the opioid-receptor antagonist naltrexone hydrochloride or the glutamate-receptor modulator acamprosate calcium. Both medications hold the promise of reducing the incidence of relapse into alcohol dependence by minimizing the distraction of alcohol cravings.21

The current study provides an encouraging glimpse at the patterns of alcohol consumption—as well as the attitudes toward and consequences of alcohol use—among a sample of men and women in the US Army. In the majority of cases, alcohol is used in a responsible manner without significant adverse consequences. However, several gender-specific differences among men and women in the US military were noted. To confirm the broader significance of these findings, a similar study with a civilian population is recommended.

The findings of this study offer opportunities for physicians to fine-tune educational activities, encourage the use of earlier intervention, and reduce the likelihood of adverse outcomes from alcohol abuse among military personnel.

References