

# U.S. Marines' Perceptions of Environmental Factors Associated With Alcohol Binge Drinking

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**ABSTRACT** Introduction: Alcohol misuse, in particular binge drinking, is a serious concern among military personnel because it is strongly associated with adverse consequences and has a deleterious effect on readiness. Although most alcohol misuse studies have focused on individual risk factors, studies are increasingly examining environmental influences and strategies for reducing alcohol risks. The purpose of this study is to address gaps in what is known about how service members' perceptions of environmental factors are related to binge drinking in the U.S. Marine Corps. Materials and Methods: The relationship between Marines' self-reports of environmental factors and alcohol binge drinking was assessed in this correlational study using data from three large Marine Corps installations drawn from the Department of Defense 2011 Health Related Behaviors Survey of Active Duty Military Personnel ( $N = 2,933$ ). We proposed several directional hypotheses based on existing civilian and military studies of alcohol use and misuse, as well as health behavior theory. Results: Agreement with the statements that alcoholic beverages cost too much, that drinking might negatively affect one's military career, and that one's immediate supervisor and installation discourage alcohol use were independently associated with decreased odds of binge drinking (i.e., protective factors). Perceptions that alcoholic beverages are difficult to get was particularly protective; the odds of having binged were lower for participants who endorsed this belief than for those who did not. Perceptions that drinking is part of being in one's unit was a risk factor for binge drinking (odds ratio = 1.29). Conclusion: Even after accounting for strong socio-demographic correlates, binge drinking was independently associated with a number of environmentally oriented perceptions. Beliefs that alcohol is affordable and easy to access were the strongest environmental correlates of increased risk of binge drinking. Addressing the threat alcohol misuse poses to both Marines and mission readiness will likely require multiple strategies, including both policy and environmental changes.

## INTRODUCTION

Alcohol misuse is a unique concern to the Department of Defense (DoD) because it has a deleterious effect on readiness, the economic cost to the DoD is considerable, and rates of misuse are higher among military personnel than among civilians. Binge drinking among military personnel is strongly

associated with adverse consequences affecting readiness, including job performance problems; binge drinkers are 6.5 times more likely to report job problems compared with nonbinge drinkers.<sup>1</sup> Speaking only in terms of medical care and lost time at work, alcohol misuse costs the DoD more than \$600 million each year, and it costs another \$132 million per year to care for infants with fetal alcohol syndrome.<sup>2</sup> In addition, the DoD 2011 Health Related Behaviors (HRB) Survey of Active Duty Military Personnel indicates that approximately one-third of active duty personnel reported binge drinking in the previous month, which is in excess of the *Healthy People 2020* objective (less than 24.4%) and higher than civilian estimates of 27.1%.<sup>3</sup> Marines reported the highest prevalence of binge drinking among the services, with 48.6% reporting binge drinking within the past 30 d.

Despite DoD-wide and service-specific alcohol policies and strengthened programs for prevention and treatment, research has shown that alcohol misuse among military personnel has remained largely unchanged over the last 20 yr.<sup>4,5</sup> Although reductions in the use of tobacco and illicit drugs have been realized, heavy drinking in the military has not shown the same pattern of reduction. One reason for the difference is that certain features of military culture (e.g., drinking norms) may be contributing to problem drinking and related consequences among military personnel. For example, there may be pressure to drink excessively to prove one's toughness, perform a rite of passage, fit into a new group culture,<sup>6</sup> or cope with combat trauma and frequent deployments.<sup>7</sup> The

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strong warrior image and perceptions of stigma associated with seeking help may prevent some from seeking help when treatment is needed.<sup>8</sup> In addition, numerous studies suggest that the transient nature of military life, coupled with other military-specific stressors, is associated with increased alcohol use and related problems.<sup>9,10</sup>

Military leaders have largely focused on individual factors related to alcohol misuse<sup>1</sup> and have developed prevention programs directed at individual service members. Looking beyond the individual, however, social ecological models assert that individual behavior is determined to a large extent by the social and physical environment. Such models pertaining to alcohol misuse emphasize the role of not only individual-level variables but also environmental, social, and policy factors.<sup>11</sup> Efforts targeted at changing both individual factors (e.g., knowledge, attitudes, and behaviors) and environment factors (e.g., availability of alcohol, laws and policies, and community norms) are considered among the strongest of prevention efforts.

Studies are beginning to examine environmental influences and strategies for reducing alcohol risks in the military.<sup>12-14</sup> Military-relevant environmental facilitators may include the ready availability of alcohol on or near bases, often at reduced prices, according to a 2012 study by the Institute of Medicine.<sup>6</sup> In addition, cultural and geographical influences while deployed in overseas countries may contribute to alcohol misuse.<sup>15,16</sup> A particularly relevant study of unit-level influences on alcohol and tobacco use, conducted by Research Triangle Institute,<sup>17</sup> analyzed self-reports of active duty military personnel at 24 continental U.S. (CONUS) and outside the continental U.S. (OCONUS) installations. For all services, rates of hazardous drinking were higher for OCONUS versus CONUS bases. Among Marine Corps personnel, the focus of the present study, those stationed OCONUS, compared with their CONUS counterparts, reported less serious consequences of alcohol use, yet greater access to alcohol in barracks, perceptions that drinking was the only recreation available, and difficulty fitting in without alcohol, as well as lower enforcement of alcohol control policies in the barracks. Regarding sociodemographic factors, younger Marines and those in lower pay grades had higher problem drinking in both OCONUS and CONUS regions.

Environmental strategies to reduce alcohol misuse are an effective broad public health approach that can reach many individuals, including those who are not yet alcohol dependent. In addition, the approach is inherently destigmatizing, in that the environmental change or policy is applied to everyone, regardless of alcohol use level or status. Targeting those at risk but not yet dependent is important because the greatest proportion of harm is from alcohol misuse not alcohol dependence or alcoholism *per se*.<sup>18</sup> Environmental efforts to curb alcohol misuse in the military have shown promise, but because these efforts have typically studied a single environmental factor or one military installation, their

usefulness to the broader issue and greater Marine population are limited.

The purpose of the present study is to address gaps in what is known about service members' reports of environmental factors as they relate to binge drinking, specifically in the U.S. Marine Corps. This study utilized secondary data from the 2011 HRB, a probability-based, self-report survey that has been the major source of health behavior information for the military since 1980. As such, this study was based on Marines' perceptions rather than objective measures of environmental risk and protective factors for alcohol misuse. We proposed several directional hypotheses based on existing civilian and military studies of alcohol use and misuse, as well as health behavior theory. Hypotheses regarding associations of sociodemographic factors and social and physical environmental factors with recent binge drinking were as follows: (1) male sex, young age, single status, OCONUS assignment, and lower pay grade will be associated with binge drinking;<sup>7</sup> (2) Marines who report that alcohol is difficult to get or costs too much will be less likely to report binge drinking;<sup>3,19</sup> (3) perceptions that drinking can have negative consequences for one's career or lead to trouble with authorities will be associated with lower binge drinking;<sup>3,19</sup> (4) perceptions that one's installation and military leadership discourage alcohol use will be associated with lower binge drinking;<sup>4,19</sup> and (5) Marines who report that drinking is a norm in their unit and that losing control is acceptable will be more likely to report binge drinking.<sup>15</sup>

## METHODS

### Source of Data

The present correlational study assessed the relationship between Marines' self-reports of environmental factors and alcohol binge drinking using data from the 2011 HRB, a web-based survey sent to a stratified random sample of all active duty service members. Data for respondents at the three largest Marine Corps installations were obtained ( $N = 2,933$ ). We focused on the three most populous bases, which together account for about 30% of the total active duty Marine Corps population,<sup>20</sup> because environmental changes could benefit the greatest number of personnel if they were made at large bases. The survey data set included post-stratification weights to adjust for nonresponse and to ensure that the sample of participants was representative of the total active duty population.<sup>3</sup> All analyses were based on weighted cases.

### HRB Measures

Marines' self-reported past 30-d binge drinking (no/yes) was the dependent variable. Binge drinking was defined as consuming five or more drinks (four or more drinks for women) on at least one occasion during the past 30 d. Five sociodemographic characteristics were examined, including the

region of the installation (CONUS vs. OCONUS), and self-reported sex, age group (18–20, 21–25, 26–35, and 36+ years), marital status (married vs. single), and pay grade E1–E4, E5–E6, E7–E9, W1–W5, O1–O3, and O4–O10. Eight items assessing perceptions of environmentally oriented deterrents and facilitators of alcohol use were assessed by agreement or disagreement with the following statements: (1) alcoholic beverages cost too much for me, (2) alcoholic beverages are difficult for me to get, (3) drinking is part of being in my unit, (4) drinking to the point of losing control is acceptable, (5) drinking might affect my military career negatively, (6) drinking might get me in trouble with police or military authorities, (7) my current immediate supervisor discourages alcohol use, and (8) this installation discourages alcohol use. Ratings of the first four items were made on a 4-point scale ranging from 1 (strongly agree) to 4 (strongly disagree) and were dichotomized into agree or disagree. Ratings of effect on military career and trouble with police or military authorities were made on a 4-point scale ranging from 1 (extremely likely) to 4 (not at all likely) and were dichotomized into general agreement with the statement (extremely likely or very likely) or disagreement (somewhat likely or not at all likely). Ratings of immediate supervisor and installation discouragement of alcohol were made on a 3-point scale ranging from 1 (not at all) to 3 (strongly discourages) and were dichotomized into general agreement with the statement (somewhat or strongly discourages) or disagreement (not at all).

**Analyses**

A generalized linear mixed model was conducted to assess the independent contribution of the sociodemographic and environmental factors to risk for binge drinking. Installation was included as a random effect to control for clustering within base.

**RESULTS**

**Participant Characteristics**

Table I presents descriptive information about Marines' sociodemographic characteristics and their agreement with the environmentally oriented perception items. Almost 60% of the sample was assigned to one of the two CONUS installations. Female Marines comprised 7.7% of the total Marine personnel at the three installations. Personnel were generally young with almost 18% under the age of 21 yr, and an additional 46% between ages 21 and 25 yr. Single Marines comprised 54% of personnel at the three installations. Most personnel (67%) were junior enlisted (E1–E4); commissioned officers comprised 7.4% of the sample. Sociodemographic characteristics of this sample were similar to those reported for the overall Marine Corps population.<sup>20</sup> Regarding drinking, the overall past 30-d prevalence of binge drinking was 48.5% (not shown in Table I).

**TABLE I.** GLMM Analysis of Sociodemographic and Environmental Factors Associated With Binge Drinking Among a Sample of U.S. Marines.

Predictor	% of Sample	Odds of Binge Drinking	
		Adjusted OR	95% CI
<b>Sociodemographic characteristics</b>			
<b>Region</b>			
CONUS	59.6	0.98	0.89–1.08 <sup>ns</sup>
OCONUS	40.4	1.00	
<b>Sex</b>			
Male	92.3	1.56	1.43–1.69
Female	7.7	1.00	
<b>Age, yr</b>			
18–20	17.8	1.22	1.07–1.39
21–25	46.1	2.37	2.11–2.66
26–35	26.1	1.58	1.43–1.74
36+	10.0	1.00	
<b>Marital status</b>			
Married	45.9	0.52	0.50–0.55
Single	54.1	1.00	
<b>Pay grade</b>			
E1–E4	66.5	1.22	1.02–1.44
E5–E6	18.7	1.47	1.25–1.72
E7–E9	6.4	1.49	1.27–1.74
W1–W5	1.1	1.59	1.25–2.01
O1–O3	5.4	1.59	1.33–1.90
O4–O10	2.0	1.00	
<b>Environmental drinking deterrents and facilitators</b>			
<b>Alcohol beverages cost too much for me</b>			
Agree	27.6	0.48	0.45–0.50
Disagree	72.4	1.00	
<b>Alcoholic beverages are difficult for me to get</b>			
Agree	3.9	0.35	0.30–0.41
Disagree	96.1	1.00	
<b>Drinking might affect my military career negatively</b>			
Agree	17.1	0.65	0.59–0.70
Disagree	82.9	1.00	
<b>Drinking might get me in trouble with police or military authorities</b>			
Agree	13.6	1.05	0.95–1.15 <sup>ns</sup>
Disagree	86.4	1.00	
<b>My current immediate supervisor discourages alcohol use</b>			
Agree	55.5	0.84	0.80–0.88
Disagree	44.5	1.00	
<b>This installation discourages alcohol use</b>			
Agree	65.3	0.85	0.82–0.90
Disagree	34.7	1.00	
<b>Drinking is part of being in my unit</b>			
Agree	13.8	1.29	1.21–1.37
Disagree	86.2	1.00	
<b>Drinking to the point of losing control is acceptable</b>			
Agree	6.1	0.98	0.88–1.08 <sup>ns</sup>
Disagree	93.9	1.00	

2011 Department of Defense Health Related Behaviors of Active Duty Military Personnel Survey weights are applied. All variables are in the model and ORs are adjusted for all other variables. Installation was included as a random effect to control for nesting within installation. All ORs are statistically significant unless otherwise indicated.

GLMM, generalized linear mixed model; OR, odds ratio; CI, confidence interval; CONUS, continental United States; OCONUS, outside the continental United States; <sup>ns</sup>Group not significantly different from reference group.

Most (72–94%) of the Marine respondents disagreed with the statements that alcohol costs too much, that drinking might negatively affect one's career, that drinking might get one in trouble with authorities, that drinking is part of being in one's unit, and that drinking to the point of losing control is acceptable (Table I). Almost all respondents (96%) disagreed that alcohol is difficult to get. Items about leadership discouraging alcohol use were more evenly split: the majority (55%) agreed that their supervisor discourages alcohol use, and approximately 65% agreed that the installation discourages alcohol use.

### **Sociodemographic and Environmental Correlates of Binge Drinking**

Table I presents the adjusted odds ratios (ORs) and 95% confidence intervals for correlates of binge drinking from the multivariate model. Region (CONUS vs. OCONUS) was the only sociodemographic characteristic that was not statistically significant. After controlling for other factors in the model, men were at greater risk than women for binge drinking. Those younger than age 36 yr, compared with those older than 36 yr, were more likely to binge drink, with the highest likelihood of binge drinking among those 21–25 yr of age. It is noteworthy that the youngest age group, 18–20 yr olds, had a greater risk of binge drinking than did the 36+ reference group, despite being under the legal age to drink. After controlling for other factors in the model, being married was protective for binge drinking, with married Marines having significantly lower risk than single Marines. Enlisted personnel and relatively lower officer ranks were more likely than the highest officer ranks (O4–O10) to binge drink.

In addition to the demographic factors, the model included beliefs about several environmental factors. The category "disagree" was specified as the reference category (OR = 1.00). After controlling for all other predictors in the model, all environmentally oriented perception correlates were significantly associated with the likelihood of binge drinking, except for the belief that drinking might get one in trouble with police or military authorities, and the belief that drinking to the point of losing control is acceptable (Table I). Agreement that alcoholic beverages cost too much, that drinking might negatively affect one's military career, and that one's immediate supervisor and installation discourage alcohol use were independently associated with decreased odds of binge drinking (i.e., protective factors). Perceptions that alcoholic beverages are difficult to get was particularly protective, with significantly lower odds of binge drinking among those who felt that it is not easy to obtain alcohol. Perceptions that drinking is part of being in one's unit was a risk factor for binge drinking (OR = 1.29).

## **DISCUSSION**

Sociodemographic characteristics are not factors we think of as environmental aspects or amenable to change. However, it is important to examine their association with alcohol use

outcomes because of their strong, consistent associations with alcohol misuse<sup>21,22</sup> and their ability to identify high-risk groups and because they often are included as control variables in analyses of environmental predictors. Several sociodemographic factors related to binge drinking in the present study were generally in line with results from other studies<sup>3,7</sup> and with our hypotheses. Overall, being younger (especially 21–25 yr of age), male, single, and in lower pay grades were independently associated with greater odds of recent binge drinking. Our results show that even those who were under the legal age to drink had increased odds of binge drinking relative to the oldest age group. Normative developmental factors related to maturity, experimentation, identity formation, autonomy from parents, and limited experiences with alcohol may place young Marines at elevated risk for alcohol misuse. Continuing to aim selective prevention and risk-reduction efforts toward Marines in these demographic subgroups is warranted.

The fact that our study did not detect a CONUS/OCONUS difference in the odds of binge drinking might seem surprising given others' findings of higher alcohol use among OCONUS personnel.<sup>3,17</sup> This is likely due to the small number of bases included in our study, or it may be due to changes in alcohol use policies on OCONUS bases in response to international incidents and other factors. However, because our study and others' differ with regard to time frame, sampling, and definitions of alcohol misuse, the present finding must be considered tentative until replicated.

Even after accounting for strong sociodemographic correlates and all other factors in the model, binge drinking was independently associated with a number of environmentally oriented beliefs. As expected, perceptions of affordability and easy access to alcohol were associated with increased odds of binge drinking and were the strongest environmental correlates. It is important to note, however, that only a very small percentage of the sample (3.9%) agreed that alcoholic beverages are difficult to get. Restricted access and higher pricing are well-documented environmental factors that have been associated with reduced alcohol misuse in civilian studies.<sup>23–26</sup> Research is needed to determine optimal alcohol pricing and availability strategies to reduce alcohol misuse by Marines and to examine differences in patterns of alcohol consumption on and off base. Perceived negative consequences of alcohol use, both legal and career related, were expected to be protective against binge drinking. However, only potential career impact (and not legal trouble) was statistically significant. This finding supports the development of campaigns such as the *Protect What You've Earned* campaign for Marines,<sup>27</sup> which capitalize on the belief that one's career can be negatively affected by alcohol misuse and emphasize accountability for one's actions.

Perceptions that one's supervisor and installation discourage alcohol use were modestly yet significantly protective against binge drinking, suggesting that leadership and command culture both uniquely influence drinking. Green and colleagues<sup>28</sup>

(2008) found that reports of smoking among military leadership were associated with uptake of smoking in young military personnel. Similarly, if leaders' patterns of alcohol use are causally related to Marines' binge drinking, enabling and training small unit and higher level Marine Corps leaders to model and support low-risk drinking or abstinence with specific actions may reduce alcohol use among Marines in their units. Indeed, the role of leaders in general—and of small unit leaders in particular—in guiding specific health outcomes among their personnel has been demonstrated in other behavioral health domains<sup>29,30</sup> and is likely key to influencing drinking behavior as well.

Social norms, including perceptions that drinking is part of being in one's unit, and that it is acceptable to drink to the point of losing control, were expected to be risk factors for binge drinking. Only agreement that drinking is part of being in one's unit was statistically significant. It is noteworthy that only small percentages of Marines agreed with these social norms that encourage drinking. However, the odds of having binged in the past 30 d were higher among the small minority of Marines who believed that drinking is part of being in one's unit than among Marines who did not.

The 2011 HRB data set has limitations in that it is entirely based on self-reports. The survey contains a relatively small number of items assessing perceptions of environmental deterrents and facilitators of alcohol use. As such, this study was based on Marines' perceptions rather than objective measures of alcohol misuse and environmental risk and protective factors. The cross-sectional nature of the study offers little information as to cause and effect. For example, whether the perceived costs of alcohol precede and directly affect the likelihood of binge drinking cannot be determined from this study design. The sample was drawn from the three largest Marine Corps installations, and although the sample appears to be demographically representative of the overall Marine Corps, there could be a selection bias in that smaller installations were not included and environmental factors may differ for installations of different sizes.

Addressing the threat posed by alcohol misuse to both Marines and mission readiness will likely require multiple strategies, including policy and environmental changes. It is important to recognize that a single approach is unlikely to work for all service members at all installations. Because there are many factors associated with problematic drinking, multiple points of intervention are needed to address them. The results of the present study suggest that environmentally oriented strategies, such as those that limit the availability of alcohol, alter social norms and enhance the perception that leadership discourages alcohol use, may contribute to reductions in risky alcohol use.

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**14. ABSTRACT**  
Introduction: Alcohol misuse, in particular binge drinking, is a serious concern among military personnel because it is strongly associated with adverse consequences and has a deleterious effect on readiness. Although most alcohol misuse studies have focused on individual risk factors, studies are increasingly examining environmental influences and strategies for reducing alcohol risks. The purpose of this study is to address gaps in what is known about how service members' perceptions of environmental factors are related to binge drinking in the U.S. Marine Corps. Materials and Methods: The relationship between Marines' self-reports of environmental factors and alcohol binge drinking was assessed in this correlational study using data from three large Marine Corps installations drawn from the Department of Defense 2011 Health Related Behaviors Survey of Active Duty Military Personnel (N = 2,933). We proposed several directional hypotheses based on existing civilian and military studies of alcohol use and misuse, as well as health behavior theory. Results: Agreement with the statements that alcoholic beverages cost too much, that drinking might negatively affect one's military career, and that one's immediate supervisor and installation discourage alcohol use were independently associated with decreased odds of binge drinking (i.e., protective factors). Perceptions that alcoholic beverages are difficult to get was particularly protective; the odds of having binged were lower for participants who endorsed this belief than for those who did not. Perceptions that drinking is part of being in one's unit was a risk factor for binge drinking (odds ratio = 1.29). Conclusion: Even after accounting for strong sociodemographic correlates, binge drinking was independently associated with a number of environmentally oriented perceptions. Beliefs that alcohol is affordable and easy to access were the strongest environmental correlates of increased risk of binge drinking. Addressing the threat alcohol misuse poses to both Marines and mission readiness will likely require multiple strategies, including both policy and environmental changes.

**15. SUBJECT TERMS**  
binge drinking, alcohol misuse, environmental strategies, risk factors, protective factors, military, Marine Corps

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