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## The Impact of Normative Perceptions on Alcohol Consumption in Military Veterans

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### Abstract

**Background and aims**—Perceptions of both descriptive norms (prevalence of drinking) and injunctive norms (others' approval of drinking) relate to alcohol consumption but mechanisms for these associations have received little attention, especially in military samples. This study tested the direct and indirect associations between perceived descriptive and injunctive norms on drinking through personal attitudes (i.e., personal approval) in a veteran sample.

**Design**—Data were collected as part of a longitudinal randomized controlled alcohol intervention study. The study involved two time points: baseline/intervention (time 1) and one-month follow-up (time 2).

**Setting**—A national sample of veterans was recruited from Facebook to participate in an online study between June and October 2015.

**Participants**—Data included responses of 621 adult military veterans (age 18–34; 17% female).

**Measures**—Respondents reported on their weekly alcohol consumption (primary outcome), perceptions of typical drinking, and approval by other same-gender veterans. Covariates included gender, intervention condition, and combat experience.

**Findings**—Regression results found no significant effects of perceived descriptive or injunctive norms on time 2 drinking when accounting for the effects of personal attitudes, time 1 drinking, and covariates. However, mediation analyses found support for personal attitudes as a mediator of the relationship between perceived descriptive norms and time 2 drinking (indirect effect = 0.003,  $SE = .001$ ,  $p = .001$ ) and between perceived injunctive norms and time 2 drinking (indirect effect = 0.004,  $SE = .001$ ,  $p < .001$ ).

**Conclusions**—Attitudes to drinking appear to mediate the association between descriptive and injunctive norms about alcohol and subsequent level of alcohol consumption in US military personnel.

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Alcohol misuse in the military has increased over the past two decades [1,2] and resulted in significant personal and organizational costs [3,4]. In 2001, rates of heavy drinking in

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military personnel (27%) were more than 10% higher than civilian populations and 5% higher than college student populations [5] with rates among veterans (i.e., separated military personnel) even higher (ranging from 30–40%) [6–8]. Thus, it is important to understand factors that can help reduce heavy drinking among veterans. One low cost, efficacious intervention technique used in other high risk drinking populations such as college students, is personalized normative feedback (PNF). PNF targets perceptions of social norms [9–11]. Studies examining the impact of these interventions on alcohol consumption in multiple populations have found lower rates of drinking at follow-up [12–14]. However, the mechanisms associated with how PNF interventions change drinking behaviors have not been closely examined.

Two types of social norms most often associated with behavior are descriptive and injunctive norms [15]. Descriptive norms refer to typical behavior in a given group or population (e.g., average number of drinks consumed per week by male/female veterans). Injunctive norms refer to the degree of approval or acceptability other people feel regarding a behavior (e.g., how many drinks a typical male/female veteran would consider acceptable to consume in a week) [15,16]. A critical distinction related to social norms is the difference between *perceived* norms and *actual* norms. For example, perceived descriptive and injunctive drinking norms refer to how much someone thinks their peers are drinking and how many drinks they think their peers would approve of drinking, respectively. As individuals are often influenced by their perceptions of norms rather than actual norms, there is frequently a large discrepancy between an individual's perceptions and the actual behaviors or attitudes of others [17].

Perceptions of descriptive drinking norms are associated with individual drinking behaviors in veterans and active duty military personnel. Specifically, perceived descriptive norms are positively associated with meeting criteria for an alcohol use disorder [18,19], higher blood alcohol levels and binge drinking behaviors [20], and greater quantity and frequency of alcohol consumption [21]. Less work has examined the direct relationship between perceptions of injunctive norms and drinking behaviors. In one study, Ames and colleagues found relationships for perceived injunctive norms and heavy drinking frequency to be similar to relationships between perceived descriptive norms and heavy drinking frequency [18]. Conversely, Pedersen and colleagues generally found no relationship between perceptions of injunctive norms and weekly drinking, binge drinking, and alcohol problems [22]. Military personnel have also been found to have exaggerated perceptions of the drinking behaviors of their fellow service members relative to actual drinking norms of their peers [23]. Preliminary evidence suggests that normative messages used in military drinking interventions reduce risky alcohol consumption over time [24]. However, few alcohol interventions tested in military populations have examined the impact of perceived social norms alone on drinking behaviors or assessed potential mechanism of change in drinking behaviors.

While there is some evidence for the relationships between descriptive and injunctive normative perceptions and individual drinking behaviors, less is understood about the potential underlying mechanisms of change or mediators of effective personalized normative feedback (PNF) interventions. In a recent review examining 22 plausible mediators

(including protective behavioral strategies, outcome expectancies, coping motives, etc.) of a wide range of interventions (including single session, in-person, online, and multicomponent), perceived norms were identified as the only consistently supported mechanism for explaining the impact of interventions on drinking [25]. However, this finding does not speak to why changes in perceived descriptive and/or injunctive norms translate to corresponding changes in drinking behaviors. One unexplored mechanism, suggested by Borsari and Carey [17], is that changes in perceived norms are effective because they adjust personal attitude levels.

High approval ratings of drinking were found to be associated with greater weekly drinking, binge drinking, and alcohol problems in a sample of veterans [22]. In college samples, more accepting personal drinking attitudes and approval of heavier drinking are positively associated with weekly drinking, drinking frequency, and quantity consumed on a drinking occasion after accounting for the impact of perceived descriptive norms [16] and injunctive norms [26,27]. In addition, the association between perceived injunctive norms for driving after drinking and engagement in drinking after drinking has been found to be mediated by personal attitudes regarding driving after drinking [27]. In sum, there is evidence suggesting that personal attitudes about drinking may mediate the association between perceived norms and drinking. However, previous work has primarily focused on college student samples and has not included comparable assessments (e.g. analogous measurement between the constructs) of injunctive and descriptive norms [16]. This research attempts to address these two limitations.

The overarching goal of this research is to better understand mechanisms associated with reduced drinking resulting from changes in perceptions of descriptive and injunctive norms and personal attitudes among veterans. Specifically, this research was designed to test the hypothesis that perceived norms impact subsequent drinking indirectly through personal attitudes about drinking. In this longitudinal study we assess whether there are significant indirect relationships between perceived descriptive and injunctive norms and alcohol consumption through personal attitudes towards drinking. Specifically, we expected that: 1) personal attitudes, perceptions of descriptive norms, and perceptions of injunctive norms would be positively associated with drinking among veterans; 2) personal attitudes would mediate associations between perceived descriptive norms and drinking; 3) personal attitudes would mediate associations between perceived injunctive norms and drinking. Thus, findings from this study may provide a solid foundation for the development and implementation of brief norms-based interventions in military and veteran populations, which have been supported in other high-risk drinking populations.

## Method

### Participants and Procedure

**Design and Procedure**—Baseline and follow-up data were collected as part of larger longitudinal randomized controlled trial designed to test the efficacy of an online normative alcohol intervention to young adult veterans [28]. While the term young adult typically refers to individuals between the ages of 18–25, only 9.6% of U.S veterans are under the age of 35 [29]. Study recruitment was conducted using paid advertisements on Facebook that

were promoted to individuals who listed military interests (e.g., “liked” veteran service organizations like Iraq and Afghanistan Veterans of America). Inclusion criteria were 1) being between 18 and 34 years of age, 2) having been separated from the Air Force, Army, Marine Corps, or Navy, and 3) scores of 3 or more (for women) or 4 or more (for men) on the 10-item AUDIT [30–32]. Active duty military, individuals affiliated with the reserve components of the U.S. military, and those active in the Coast Guard were excluded. AUDIT scores of 3 or 4 were used so that the sample included both moderate and heavy drinkers who were at-risk for hazardous alcohol consumption rather than only heavy drinkers. Participants were randomized into intervention or control conditions. Intervention participants received PNF on their drinking behaviors, while attention control participants received feedback on video game playing behaviors.

A total of 2,312 individuals clicked on the study’s Facebook advertisements, of which 1,177 consented to and completed the screening questionnaire to determine eligibility. After screening out those ineligible the final sample consisted of 784. Ineligible respondents included those reporting inconsistent responses to survey items, which did not allow us to verify these participants were actual veterans, and those who dropped out of the baseline survey prior to completing the items necessary for the analyses in this study. Of the 784 baseline completers, 622 completed the one-month follow-up survey with 621 providing information on their drinking behaviors and were included in the analysis. Veterans who agreed to participate in the longitudinal study completed two online surveys about their drinking behaviors, attitudes, and consequences. They received \$20 for completing the baseline survey (time 1) and \$25 for completing the follow-up survey (time 2). Greater detail regarding the design of the study can be found in Pedersen, et al. [33] and Pedersen, et al. [34]. Demographics of the sample included mean age 28.88 ( $SD = 3.39$ ) and 83.3% male. The average length of service was 5.60 years ( $SD = 2.79$ ) and the average number of deployments was 1.52 ( $SD = 1.24$ ). Table 1 displays the demographic characteristics of the sample including gender, race, ethnicity, and service branch percentages.

## Measures

**Alcohol use**—Weekly drinking was measured using the Daily Drinking Questionnaire (DDQ) [35]. Participants were asked to report how many standard drinks they consumed on average as well as the time period of consumption for each day of the week over the previous month (e.g., “How much alcohol, on average, do you drink on each day of a typical week?”). Weekly drinking was measured by summing the number of reported drinks on each day of the week to create a total amount consumed during a typical week in the past month. The DDQ also measures drinking frequency and the average number of drinks per occasion, which were not used as outcomes for this study. This measure has been widely used and demonstrates good test-retest reliability [36–38]. Responses ranged from 0 to 21 drinks a week. Alcohol use was measured at time 1 and time 2 and used as the primary outcome measure.

**Descriptive norms**—Perceived descriptive norms were measured using the Drinking Norms Rating Form (DNRF) [39]. This measure mirrors the DDQ and asks participants to estimate the drinking practices of same gender military veterans, such as the quantity of

alcohol consumed on each day of the week. Total perceived descriptive norms were calculated by summing the reported estimates of drinking for each day of the week. The DRNF demonstrates good convergent validity with measures of alcohol consumption [40]. Responses ranged from 0 to 30. Perceptions of descriptive norms were assessed at time 1 and time 2.

**Personal attitudes and perceived injunctive norms**—The measure of personal attitudes and perceived injunctive norms was assessed using a drink-based injunctive norms measure [16] that also mirrors the DDQ. Individuals reported the average number of drinks they would consider acceptable to consume on each day of the week (personal attitudes) and the average number of drinks a gender-matched young adult military veteran would consider acceptable (perceived injunctive norms). Personal attitudes and perceived injunctive norms scores were calculated by summing the reports for each day of the week. Responses for personal attitudes and perceived injunctive norms ranged from 0 to 30 and 0 to 15 for injunctive norms. Personal attitudes and perceptions of injunctive norms were measured at time 1.

### Analysis Strategy

Structural equation modeling using MPlus 7.3 software was used to test hypotheses. Direct and indirect associations examined in the mediation analysis were tested. Time 2 drinking was a negative binomially distributed count variable and parameters were estimated using Monte-Carlo integration and full information maximum likelihood [41,42]. Indirect effects were calculated using the ab product approach, where ‘a’ represents the association between norms and attitudes and ‘b’ represents the association between attitudes and the log rate of time 2 drinking [41]. Standard errors and confidence intervals for parameter estimates and indirect effects were estimated using bias corrected bootstrapping with 1000 samples. Bias corrected bootstrapping addresses the non-normality of the product terms used to evaluate indirect effects.

The model (displayed in Figure 1) included one endogenous variables: Time 2 drinking. Time 2 drinks per week was the terminal outcome and was examined as a function of covariates (intervention condition, previous alcohol consumption, combat experience, and gender; based on previous associations with alcohol consumption [22,43–45]), perceived descriptive norms, perceived injunctive norms, and personal attitudes. Attitudes were modeled as a function of perceived descriptive norms, and perceived injunctive norms. Covariance paths were included for associations of time 1 drinking with perceived descriptive norms, perceived injunctive norms, and attitudes. The model also included the covariance path between perceived descriptive norms, and perceived injunctive norms. Mediation tests were conducting with model constraints defined to calculate indirect paths from perceived descriptive norms and time 2 drinking through attitudes and between perceived injunctive norms and time 2 drinking through attitudes [41].

### Results

Means, and standard deviations of study variables are displayed in Table 1 along with counts and percentages from the National Center for Veterans Analysis and Statistics [29].

Hypothesis 1 was that personal attitudes, perceptions of descriptive norms, and perceptions of injunctive norms would be positively and directly associated with time 2 drinking. Personal attitudes significantly predicted time 2 weekly drinking ( $b = 0.015$ , 95%  $CI[0.009, 0.021]$ ). Conversely, perceptions of descriptive and perception of injunctive norms did not predict time 2 weekly drinking when accounting for the covariates. Detailed results are presented in the top of Table 2.

For hypotheses 2, we expected that personal attitudes would mediate the associations between perceived descriptive norms and time 2 drinking. Results revealed that personal attitudes significantly mediated the relationships between perceived descriptive norms and drinking ( $b = 0.003$ , 95%  $CI[0.001, 0.005]$ ). Finally, for hypotheses 3, personal attitudes were expected to mediate the associations between perceived injunctive norms and time 2 drinking. Analysis indicated that personal attitudes significantly mediated the relationships between perceived injunctive norms and drinking ( $b = 0.004$ , 95%  $CI[0.002, 0.007]$ ). The direct and indirect effect estimates, standard errors, test statistics, and confidence intervals of the mediation analysis are displayed in Table 2.

## Discussion

Though much work has been conducted with college students, little work has looked at the relationships between perceived norms and personal drinking behavior among veterans [18,46] with even less work examining the association between injunctive norms, personal attitudes toward drinking, and actual drinking [21]. This study attempts to expand on previous research by using a large study of veteran drinkers to assess personal attitudes as a potential mediator of the relationships between both perceived descriptive and injunctive norms and weekly drinking. Results indicate that personal attitudes mediate the relationship between perceived descriptive norms and time 2 weekly drinking. Similarly, personal attitudes mediate the relationship between perceived injunctive norms and time 2 weekly drinking.

The results of this study attempt to enhance the understanding of the relationships between normative perceptions and drinking behavior, which is needed within military samples to improve current and inform future interventions. The provision of normative messages, focused on highlighting the difference between an individual's perceptions of their peers' behaviors (perceived descriptive norms) and actual peer behavior, have resulted in reductions in drinking behaviors in veteran [24] and active duty samples [47], but the specific mechanisms through which this occurs are less clear. It is not well understood what impact, if any, perceptions of peers' attitudes (perceived injunctive norms) have on personal behavior and if correcting these perceived norms in intervention studies would add any additional impact beyond that seen in the studies that include descriptive norms only.

The findings of this study suggest that personal attitudes predict future drinking behaviors and may be a key variable in the relationship between normative perceptions and drinking behaviors. Several potential clinical implications can be interpreted from this finding. First, at least among young adult veterans, personal attitudes about drinking appear to be more proximal predictors of drinking than perceived norms. This suggests strategies which



effectively reduce positive personal attitudes about heavy drinking or increase negative personal attitudes about drinking are likely to be successful in reducing heavy drinking. While changing perceived norms has been found to be a successful strategy for changing personal attitudes, other strategies may be equally or more effective. The broader attitude change literature is extensive and attitudes have been a central construct in social psychology since at least 1935 [48]. A review of the literature on attitudes and persuasion [49] outlines factors that influence attitudes including 1) factors that contribute to the persuasiveness of communications (source credibility; message content); 2) factors associated with self-perception, cognitive dissonance, and reactance, all of which have been centrally incorporated within motivational interviewing [50]. For example, people are more likely to change their attitudes when they hear themselves arguing for reasons to change than when others tell them reasons to change. Similarly, coercive and controlling manipulations tend to backfire.

### Limitations & Future Directions

The findings of this study provide valuable knowledge but limitations should be considered when interpreting the results. First, this study did not examine the impact of drinking motives and negative emotions on weekly drinking and the mediation model. Heavy drinking is associated with drinking to cope, combat experiences, and posttraumatic stress disorder [51,52]. Replication studies should test and extend this work by assessing whether mental health symptoms and combat experiences moderate the relationship between normative perceptions, attitudes, and drinking. Belief in permissive drinking norms may exacerbate drinking for individuals who are using alcohol to cope with negative emotions. Finally, it is important to note that this sample was recruited using a social media platform and it may not be complete representative of all military veteran populations, particularly those that do not use social media. In the absence of population data comparing veteran drinkers between the ages of 18 and 34 such as those in our sample, it is unknown how representative our sample is.

### Conclusions

The finding of this study support the importance of personal attitudes, as well as, perceptions of descriptive and injunctive norms in understanding weekly drinking in a veteran sample. Results indicate that personal attitudes toward drinking are a possible mechanism of how much individuals choose drink and how changes in drinking may result from interventions that leverage perceived social norms. Furthermore, this paper lends support to the implementation and testing of interventions targeting normative perceptions and personal attitude levels for alcohol consumption in veteran populations.

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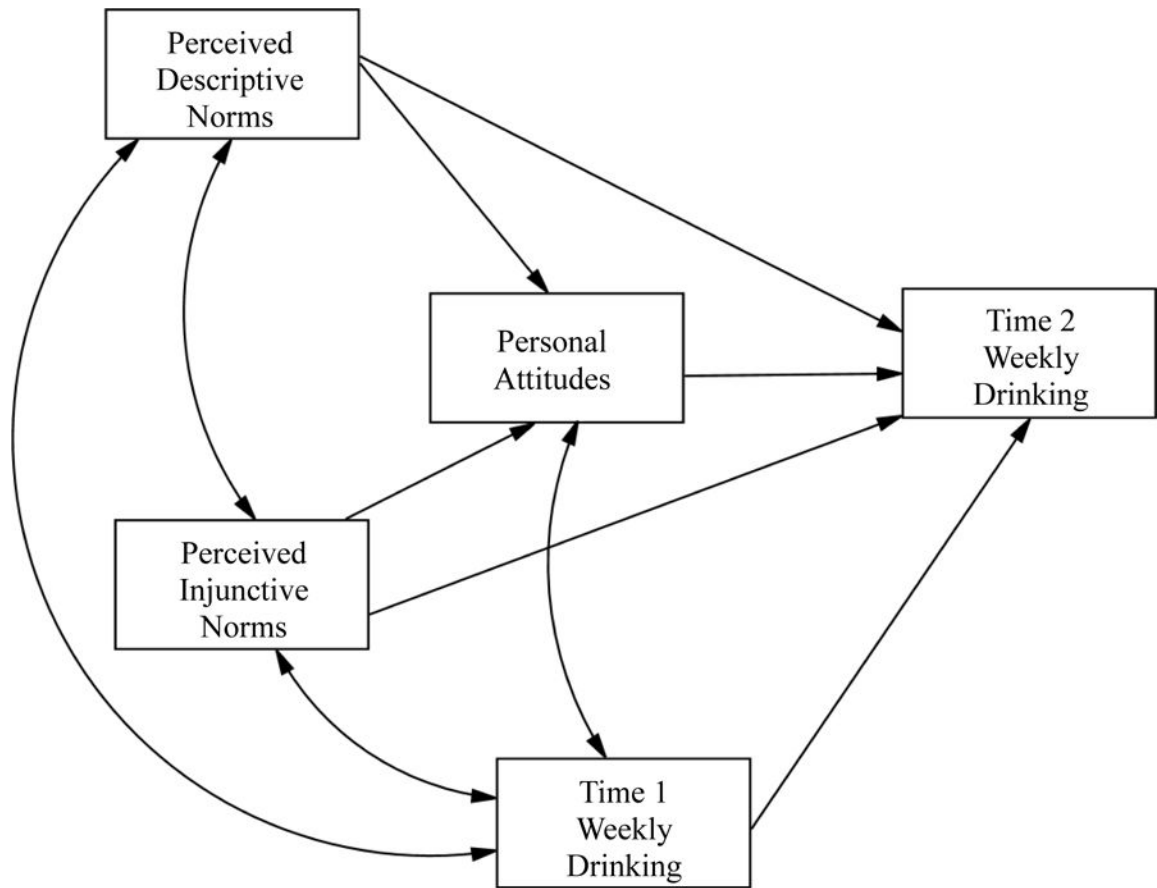
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**Figure 1.**  
Mediation Model Tested

**Table 1**

## Demographic and Descriptive Characteristics of the Sample

	Count	%
Male	513	82.61%
White	526	84.70%
Black/African American	25	4.03%
Asian	8	1.29%
Native Hawaiian/Pacific Islander	3	0.48%
American Indian/Alaska Native	13	2.09%
Multiracial	38	6.12%
Other	8	1.29%
Air Force	67	10.79%
Army	363	58.45%
Marines	133	21.42%
Navy	58	9.34%
	<b>Mean</b>	<b>SD</b>
Descriptive Norms	31.67	23.88
Injunctive Norms	31.34	23.51
Personal Attitudes	19.19	17.74
T1 Weekly Drinking	18.61	18.09
T2 Weekly Drinking	11.49	13.53
Combat Experiences (0–11)	4.85	2.73

**Note.** Counts are from time 2 (n = 621), means and SD are from time 1 unless otherwise specified.

**Table 2**

Direct and Indirect Effects Results

<b>Direct Effects on T2 Drinking</b>	<b>b</b>	<b>SE b</b>	<b>Z</b>	<b>Boot LCI</b>	<b>Boot HCI</b>
Condition	0.24051	0.06883	3.49***	0.101	0.365
Combat Experience	-0.01032	0.01162	-0.89	-0.032	0.013
Gender (Male)	0.32400	0.08955	3.62***	0.161	0.523
T1 Weekly Drinking	0.02736	0.00259	10.58***	0.022	0.032
Perc. Descriptive Norms	-0.00004	0.00267	-0.02	-0.004	0.005
Perc. Injunctive Norm	-0.00129	0.00273	-0.47	-0.006	0.004
Personal Attitudes	0.01456	0.00324	4.50***	0.009	0.021
<b>Direct Effects on Personal Attitudes</b>					
Perc. Descriptive Norms	0.19344	0.04927	3.93***	0.108	0.304
Perc. Injunctive Norm	0.30040	0.05173	5.81***	0.187	0.389
<b>Indirect Effects</b>					
Dnorm → Attitudes → T2					
Weekly Drinking	0.00282	0.00087	3.22**	0.001	0.005
Inorm → Attitudes → T2					
Weekly Drinking	0.00437	0.00129	3.38***	0.002	0.007

\*  $p < .05$

\*\*  $p < .01$

\*\*\*  $p < .001$

Note. Dnorm represents perceived descriptive norms and Inorm represents perceived injunctive norms. T1 and T2 represents time 1 and time 2, respectively.