**Expectancies for Alcohol Analgesia and Drinking Behavior among Veterans with Chronic Pain: The Moderating role of Discrimination in Medical Settings**

Victoria E. Carlin, B.S.1,2, Kyle M. White, M.S.1,2, Joon Kyung Nam, Ph.D.1,2, Grant H. Ripley, B.A.1,2, Alexa G. Deyo, B.S.1,2, Lisa R. LaRowe, Ph.D.3,4, Joseph W. Ditre, Ph.D.1,2

1 Center for Health Behavior Research & Innovation, College of Arts & Sciences, Syracuse University, Syracuse, NY, USA

2 Department of Psychology, College of Arts & Sciences, Syracuse University, Syracuse, NY, USA

3 Mongan Institute Center for Aging and Serious Illness, Division of Palliative Care and Geriatric Medicine, Massachusetts General Hospital, Boston, MA, USA

4 Department of Medicine, Harvard Medical School, Boston, MA, USA

**Corresponding Author:**

Joseph W. Ditre Ph.D.

Professor

Department of Psychology

Syracuse University

430 University Ave, Syracuse, NY 13244

Email: jwditre@syr.edu

Telephone: 315-443-1052

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**Abstract**

**Background and Objectives.** Chronic pain and alcohol use are highly prevalent and frequently co-occur among U.S. military veterans. Expectancies for alcohol analgesia (i.e., degree to which an individual believes that consuming alcohol can help reduce or manage their pain) may contribute to alcohol consumption, dependence, and related harms. Discrimination in medical settings (i.e., experiences of inequitable treatment while receiving healthcare) has been linked to various deleterious health outcomes and may amplify associations between expectancies for alcohol analgesia and indices of hazardous drinking.

**Methods.** Participants included 430 U.S. military veterans with chronic pain who endorsed past month alcohol consumption (24% female; 73% White; *M*age = 57) and completed an online survey via Qualtrics Panels.

**Results.** Expectancies for alcohol analgesia were positively associated with indices alcohol consumption, dependence, and related harms. Discrimination in medical settings moderated associations between expectancies for alcohol analgesia score and indices of alcohol consumption and dependence.

**Discussion and Conclusions.** Among veterans with chronic pain, expectancies for alcohol analgesia were positively associated with indices of alcohol consumption, dependence and related-harms, and discrimination in medical settings moderated associations between expectancies for alcohol analgesia and alcohol consumption and related harms. Future research should explore the potential clinical utility of interventions addressing expectancies for alcohol analgesia and discrimination in medical settings in the context of pain and alcohol use.

**Scientific Significance**. These findings suggest that among veterans with pain, experiences of discriminatory treatment in healthcare or medical contexts may amplify relations between expectancies for alcohol analgesia and drinking behavior.

*Keywords:*veterans, pain, alcohol, discrimination, expectancies, analgesia

**Expectancies for Alcohol Analgesia and Drinking Behavior among Veterans with Chronic Pain: The Moderating Role of Discrimination in Medical Settings**

Chronic pain and hazardous drinking (i.e., patterns of alcohol use associated with a greater risk of negative consequences) are highly prevalent and commonly co-morbid among U.S. military veterans 1,2. Indeed, 31% of veterans (vs. 20% of non-veterans) report having chronic pain 3, and nationally representative estimates indicate that approximately 1 in 4 veterans engage in hazardous drinking 4. Converging lines of research support a reciprocal model 5, which posits that chronic pain and alcohol use interact bidirectionally, leading to the escalation/worsening of both over time 5,6. For example, laboratory studies have demonstrated that the experience of pain increases alcohol consumption 7, and neurobiological evidence suggests overlap between pain processing pathways and neural pathways associated with alcohol dependence 6,8,9.

Drawing from social cognitive theory 10, a robust body of literature has highlighted the importance of outcome expectancies (i.e., anticipated consequences as a result of engaging in a given behavior; 5,10) in the initiation, maintenance, and escalation of alcohol use 11,12. Emerging evidence further implicates expectancies for alcohol analgesia (i.e., expectation that drinking alcohol will reduce or help one cope with pain; 13), as an important correlate of hazardous drinking 5,14,15, particularly among individuals with chronic pain 13,14. Alcohol has been shown to produce acute analgesic effects 16 and recent experimental research has demonstrated that individuals who anticipate that drinking alcohol will help them manage pain also tend to perceive greater pain relief after consuming alcohol 14. Notably, nearly a quarter of U.S. veterans in primary care report use of alcohol to manage pain 17, thus underscoring the importance of examining expectancies for alcohol analgesia among veteran populations.

Discrimination refers to the unfair or inequitable treatment experienced by an individual due to a salient stigmatized identity, such as race, ethnicity, gender, sexual orientation, religion, or disability status. A sizable literature has documented links between the experience of discrimination and hazardous alcohol use 18. Despite prior work highlighting the importance of examining specific types of discrimination and their role in drinking behavior 18, no research to date has examined associations between discrimination in medical settings (i.e., the degree to which an individual experiences discriminatory treatment while seeking healthcare 19) and hazardous alcohol use. This research gap is surprising, as discrimination in medical settings has been linked to deleterious health behaviors, such as tobacco smoking 20, and treatment-related factors, such as lower patient satisfaction and reduced healthcare utilization 21,22. Thus, veterans with chronic pain who have experienced discrimination in medical settings may be less inclined to seek pain treatment, potentially increasing their reliance on alcohol as a pain-coping mechanism. It is also possible that past experiences of discrimination in medical settings influence associations between expectancies for alcohol analgesia and drinking behavior. For example, veterans who hold expectancies for alcohol analgesia may be more likely to turn to alcohol for self-medication rather than seeking pain treatment from a healthcare provider, if they have had past experiences of discrimination in medical settings. However, no prior work has examined associations between expectancies for alcohol analgesia, discrimination in medical settings, and hazardous drinking.

The goal of the current study was to test the following hypotheses: 1) scores on measures of expectancies for alcohol analgesia and discrimination in medical settings will each be positively associated with indices of hazardous drinking (i.e., consumption, dependence, and alcohol-related harms); and 2) associations between expectancies for alcohol analgesia and indices of hazardous drinking will be moderated by scores on a measure of discrimination in medical settings.

**Method**

**Participants and Procedure**

Data were derived from an online survey of pain and alcohol use among U.S. military veterans with chronic pain. Participants were recruited using Qualtrics Panels, which employs a panel aggregator system to produce a national database of individuals who are willing to participate in survey-based research. Qualtrics Panels has been successfully leveraged for health-related research among veteran populations 23. Eligibility criteria included 1) being aged 18 or older, 2) current United States resident, 3) U.S. military veteran, 4) chronic musculoskeletal pain persisting greater than 3 months, and 5) past-month alcohol use. Individuals were excluded if they had previously received cognitive behavioral therapy for chronic pain, or could not read English well. Participants were first screened for eligibility, and those who were deemed eligible and provided electronic informed consent were then directed to a 25-minute web-based survey. Upon completion of the survey, participants were compensated according to prior agreements with Qualtrics. Consistent with previous web-based surveys among veteran populations 23, veteran status was verified by instructing participants to report the date listed on their DD 214 form. Individuals whose DD 214 did not align with their self-reported age or years of service were excluded. Likewise, individuals who failed an attention check (e.g., “to monitor quality, please respond with a two for this item”) or completed the survey in under 1/2 of the median completion time were excluded. All study procedures were approved by a University Institutional Review Board.

**Measures**

***Expectancies for Alcohol Analgesia.*** The Expectancies for Alcohol Analgesia scale (EAA; 13) includes 5 items which measure the degree to which individuals believe that alcohol can help them reduce or manage pain (e.g., “when I feel pain, drinking alcohol can really help”). Items are scored on a 10-point scale ranging from 0 (extremely unlikely)to 9 (extremely likely)and are summed to generate a composite EAA score ranging from 0 to 45, with higher values reflecting greater expectancies for alcohol analgesia.

***Discrimination in Medical Settings*.** Adapted from the widely used Everyday Discrimination Scale 24, The Discrimination in Medical Settings Scale (DMS; 19) reflects the degree to which an individual experiences discriminatory treatment in healthcare or medical contexts. Seven items (e.g., “you feel like a doctor or nurse is not listening to what you were saying”)are scored on a scale ranging from 1 (never) to 5 (always), generating a range of 7 to 35,with higher scores indicating more frequent experiences of discrimination in medical settings.

***Hazardous Drinking.*** The Alcohol Use Disorder Identification Test (AUDIT; 25) includes 3 subscales, including 3 items that assess patterns of consumption (AUDIT-Consumption; e.g., “how often do you have a drink containing alcohol”), 3 items measuring dependence (AUDIT-Dependence; e.g., “how often during the last year have you found that you were not able to stop drinking once you had started?”) and 4 items measuring alcohol-related harms (AUDIT-Harms; e.g., “how often during the last year have you had a feeling of guilt or remorse after drinking?”). Items are summed to generate AUDIT-Consumption and AUDIT-Dependence scores ranging from 0 – 12, and AUDIT-Harms scores ranging from 0 to 16, with higher scores reflecting greater consumption, dependence and alcohol-related harms.

***Chronic Pain.*** The Graded Chronic Pain Scale (GCPS; 26) is commonly used to assess the presence and severity of chronic pain. The GCPS consists of 3 items assessing characteristic pain intensity (GCPS-CPI), and 4 items assessing pain-related functional interference (GCPS-Disability), which are scored from 0 (no pain) to 10 (pain as bad as can be). Items were summed to generate composite GCPS-CPI and GCPS-Disability scores, with higher values reflecting greater pain intensity and pain-related disability, respectively.

***Sociodemographic and veteran-related variables.*** Sociodemographic information was collected, including age, gender identity, race, ethnicity, and income. Military service-related data included military era, military branch, combat and deployment history, and VA healthcare utilization.

**Data Analytic Plan**

Analyses were conducted using SPSS Statistics Version 27 and PROCESS macro for SPSS 27. Prior to analysis, the distribution of all variables was examined for normality. The AUDIT-Dependence subscale exceeded recommended thresholds for skewness (≥ |2|) and kurtosis (≥ |3|), and AUDIT-Harms exceeded threshold for kurtosis. Square root transformations were applied to both AUDIT-Dependence and AUDIT-Harms subscale scores, which resulted in acceptable ranges for skewness and kurtosis 28. Next, separate hierarchical linear regression models were employed to examine the unique contributions of a) EAA and DMS scores, and b) their interaction in predicting AUDIT subscale scores. Age and gender were included as covariates due to established associations with pain- and alcohol-related outcomes 29,30. Additionally, the GCPS-CPI and GCPS-Disability scores were included as covariates to isolate unique associations with expectancies for alcohol analgesia.

Model performance was assessed using change in R squared (*ΔR2*) and semi-partial correlations (*sr2*) at each step of the regression model to determine the variance explained by each model step (*ΔR2*) and each predictor (*sr2*). Significant interactions were further examined using the PROCESS macro for SPSS 27 to test conditional effects of EAA scores across low, moderate and high levels of DMS scores. These associations were probed at the 16th, 50th and 84th percentiles, following recommended guidelines 27. Conditional effects were visualized using ggplot2 31 in R version 4.3.0.

**Results**

**Participant Characteristics**

Participants included 430 U.S. military veterans with chronic musculoskeletal pain who reported drinking alcohol in the past month (24.2% women; 73.7% White; *M*age = 56.7, *SD* = 13.8 see Table 1). The most endorsed military branch was Army (47.2%), followed by the Air Force (24.0%), Navy (22.3%), Marine Corps (8.6%) and Coast Guard (0.9%). The greatest proportion of veteran respondents served during the first (1991 – 2001) and second (2001 – present) Gulf wars. Notably, military service era and military branch were not mutually exclusive categories, and some veterans reported having served in multiple eras or branches. The mean EAA score was 14.95 (*SD* = 14.47), and the mean DMS score was 12.65 (*SD* = 5.96). The average AUDIT-Consumption score was 4.33 (*SD* = 2.73), the average AUDIT-Dependence score was 1.31 (*SD =* 2.45) and the average AUDIT-Harms score was 1.87 (*SD* = 3.02). Additionally, participants reported moderately high levels of both pain severity and pain-related disability, with an average GCPS-CPI score of 18.61 (*SD* = 4.97) and average GCPS-Disability score of 18.06 (*SD* = 10.57). See Table 1 for additional sociodemographic, military service, chronic pain and alcohol-related characteristics.

**Bivariate correlations**

Bivariate analyses revealed that EAA score was positively correlated with DMS score (*r* = 0.33, *p* < 0.001), AUDIT-Consumption score (*r* = 0.62, *p* < 0.001), AUDIT-Dependence score (*r* = 0.54, *p* < 0.001), AUDIT-Harms score (*r* = 0.52, *p* < 0.001, GCPS-CPI score (*r* = 0.29, *p* < 0.001), and GCPS-Disability score (*r* = 0.31, *p* < 0.001). EAA score was negatively correlated with age (*r* = -0.31, *p* < 0.001). DMS score was positively correlated with AUDIT-Consumption score (*r* = 0.28, *p* < 0.001), AUDIT-Dependence score (*r* = 0.41, *p* < 0.001), AUDIT-Harms score (*r* = 0.38, *p* < 0.001), GCPS-CPI score (*r* = 0.21, *p* < 0.001) and GCPS-Disability score (*r* = 0.40, *p* < 0.001). DMS score was negatively correlated with age (*r* = -0.27, *p* < 0.001), and was correlated with female gender (*r* = -0.14, *p* = 0.004).

**Expectancies for alcohol analgesia, medical discrimination, and alcohol consumption**

Hierarchical linear regression analyses revealed that EAA score was positively associated with AUDIT-Consumption score and accounted for 23% of the unique variance in AUDIT-Consumption score. DMS score was not significantly associated with AUDIT-Consumption score. Furthermore, a significant interaction between EAA score and DMS score on AUDIT-Consumption score was observed (*β* = 0.29, *p* = 0.01; see Table 2). Conditional analyses further revealed a positive association between EAA and AUDIT-Consumption score at low (*b* = 0.084, *SE* = 0.011, *p* < 0.001), moderate (*b* = 0.095, *SE* = 0.018, *p* < 0.001) and high (*b* = 0.119, *SE* = 0.010, *p* < 0.001) levels of DMS scores (see Figure 1).

**Expectancies for alcohol analgesia, medical discrimination, and alcohol dependence**

Linear regression analyses indicated that EAA score was positively associated with AUDIT-Dependence score and explained 15% of the unique variance in AUDIT-Dependence. DMS score was also positively associated with AUDIT-Dependence score, accounting for 4% of the unique variance in AUDIT-Dependence score. Moreover, there was a significant interaction between EAA score and DMS score on AUDIT-Dependence score (*β* = 0.31, *p* = .005; see Table 2). Conditional analyses revealed a positive association between EAA and AUDIT-Dependence at low (*b* = 0.021, *SE* = 0.004, *p* < 0.001), moderate (*b* = 0.026, *SE* = 0.003, *p* < 0.001), and high (*b* = 0.035, *SE* = 0.004, *p* < 0.001) levels of DMS score (see Figure 2).

**Expectancies for alcohol analgesia, medical discrimination, and alcohol-related harms**

Hierarchical linear regression analyses revealed that EAA score was positively associated with AUDIT-Harms score and accounted for 16% of its unique variance. Likewise, DMS score was positively associated with AUDIT-Harms score, explaining 3% of the unique variance in AUDIT-Harms scores. DMS score did not significantly moderate associations between EAA score and AUDIT-Harms score (See Table 2).

**Discussion**

Consistent with hypotheses, expectancies for alcohol analgesia were found to be positively associated with established indices of alcohol consumption, alcohol dependence and alcohol-related harms. Notably, expectancies for alcohol analgesia accounted for 15 – 23% of the unique variance in alcohol consumption, dependence and alcohol-related harms, suggesting that military veterans with chronic pain who hold stronger beliefs that alcohol can help them reduce or manage pain may be at greater risk for hazardous drinking patterns. Results further indicated that discrimination in medical settings moderated associations between expectancies for alcohol analgesia and alcohol consumption and dependence. Specifically, relations between expectancies for alcohol analgesia and alcohol consumption and dependence were stronger among veterans who reported greater discrimination in medical settings. One possible explanation for this finding stems from evidence that discrimination in medical settings is related to reduced healthcare utilization 21,22. Indeed, prior experiences of discrimination in medical settings may increase the likelihood that veterans who hold beliefs that alcohol can reduce pain will attempt to self-medicate pain by drinking, rather than by seeking pain treatment. This is consistent with the self-medication hypothesis of addiction 32, which suggests that individuals are more likely to turn to alcohol use to alleviate distressing symptoms when other coping mechanisms are unavailable, unwanted, or perceived as ineffective. Ultimately, this may lead to the development and maintenance of hazardous patterns of alcohol use. Contrary to our expectations, discrimination in medical settings did not moderate associations between expectancies for alcohol analgesia and alcohol-related harms. Collectively, these findings broadly align with previous research among non-veteran samples 5,13–15 and extend this work by highlighting the role of discrimination in medical settings.

Results indicated that expectancies for alcohol analgesia were correlated with greater pain intensity and pain-related disability, consistent with previous work among non-veteran samples 13. Perhaps this is because individuals with more severe and disabling pain have more opportunities to experience the pain-relieving effects of alcohol, thus reinforcing their expectancies for alcohol analgesia. Conversely, linear regression results indicated that measures of pain severity were no longer associated with indices of alcohol consumption, dependence, or alcohol-related harms after accounting for expectancies for alcohol analgesia and discrimination in medical settings. It is possible that because chronic pain populations generally experience more elevated and prolonged pain, the expectancy that alcohol will relieve pain therefore contributes more strongly to drinking behaviors. Consistent with this perspective, previous work provides initial support for interventions challenging expectancies that smoking will reduce their pain 33. Future research should investigate the potential clinical utility of interventions targeting expectancies for alcohol analgesia. Furthermore, the current findings provide evidence that discrimination in medical settings warrants attention as a potential facilitator of hazardous alcohol use among veterans with chronic pain. Perhaps healthcare providers should be aware that veterans with chronic pain who have experienced discrimination in medical settings may be more likely to turn to alcohol for pain-coping – particularly if they hold beliefs about the utility of alcohol as an analgesic.

Several important limitations should be noted. First, the cross-sectional nature of these data precludes causal inference. Second, those who experience more discrimination in medical settings may also encounter more discrimination in other contexts. Given the previously observed associations between discriminatory experiences and both chronic pain 34 and hazardous drinking patterns 18, it is possible that the current results are not unique to discrimination in medical contexts, and may extend to other forms of discrimination. Third, much like the U.S. veteran population, the current sample was predominantly white and male. Future research would benefit from examining covariation between expectancies for alcohol analgesia, discrimination in medical settings, and hazardous drinking among veterans from diverse backgrounds. Fourth, the present study did not explore potential targets of interventions which may reduce the degree to which discrimination in medical settings may amplify associations between expectancies for alcohol analgesia and hazardous drinking. Future research is warranted in order to inform interventions that reduce discrimination in medical settings, which may ultimately contribute to better patient outcomes. Fifth, because the present sample was comprised of U.S. military veterans with chronic pain who drank alcohol in the past month, these findings cannot be generalized to non-veterans, non-drinkers, or individuals without pain.

**Declaration of Interest**

The authors report no conflicts of interest. The authors alone are responsible for the content and writing of this paper.

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