


Substance Use, Financial Stress, Employment Disruptions, and Anxiety among Veterans during the COVID-19 Pandemic

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Abstract

The COVID-19 pandemic has resulted in financial, employment, and mental health challenges. In general, American veterans report high rates of substance use, which may be influenced by the COVID-19 pandemic. Those with pre-existing mental health problems, employment disruptions, or financial stress may be particularly vulnerable. We examined the relationships between pre-existing self-report screens for a probable anxiety disorder, COVID-19-related financial stress, employment disruption (e.g., lost job, reduced hours), and alcohol, cannabis, and cigarette use during the pandemic

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among 1230 veterans ($M_{\text{age}} = 34.5$; 89% male). Participants were recruited through various social media sites and completed an online survey 1 month prior to implementation of the nationwide physical distancing guidelines in the United States (February 2020). Six months later (August 2020), they completed a follow-up survey. Compared to veterans who screened negative for anxiety prior to the pandemic, veterans who screened positive reported consuming more drinks per week ($b = 3.05$), were more likely to use cannabis ($OR = 6.53$), and smoked more cigarettes ($b = 2.06$) during the first 6 months of the pandemic. Financial stress was positively associated with alcohol ($b = 1.09$) and cannabis use ($OR = 1.90$). Alcohol use was heaviest among veterans with a positive pre-existing anxiety screen and high financial stress. Moreover, veterans who experienced employment disruption due to the pandemic consumed less alcohol but were more likely to use cannabis during the pandemic. Veterans with pre-pandemic anxiety and pandemic-related financial stress may be using substances at higher rates and may benefit from intervention to mitigate negative substance use-related outcomes. Findings also enhance our understanding of veteran substance use behaviors following disruptions in employment due to the pandemic.

Keywords

veterans, stress, anxiety, substance use, pandemic

Introduction

The onset of the COVID-19 pandemic has had several implications for mental health, including rises in depressive and anxiety symptomology, financial instability, unemployment, and substance use internationally (Li et al., 2020; Shigemura et al., 2020) and nationally (Bureau of Labor Statistics, 2020; Czeisler et al., 2020; Panchal et al., 2021). Reports of increased anxiety and psychological distress during the pandemic have been highlighted (Gallagher et al., 2020; Liu et al., 2020; Rajkumar, 2020). These increases may be attributed to pandemic-related factors, such as uncertainty about the future, financial challenges, and increased social isolation (Fitzpatrick et al., 2020; Horigian et al., 2020; McGinty et al., 2020; Witteveen & Velthorst, 2020). In addition to heightened anxiety and distress, some increases in the initiation and use of substances during the pandemic have also been documented (Volkow, 2020).

In the general population, having an anxiety disorder is associated with an increased risk for using substances, such as alcohol (Marmorstein, 2012), tobacco (Stewart & Conrod, 2008), and cannabis (Kedzior & Laeber, 2014; Turner et al., 2018). One review indicated that the onset of an anxiety disorder frequently precedes the onset of secondary substance use disorders among individuals who use substances to cope with negative affect (Turner et al., 2018). There are a number of theories that explain substance use behaviors, one of which is the self-medication hypothesis. This hypothesis posits that substance use often occurs in the context of stressful and/or anxiety-

provoking life situations and manifests as a means to cope with these stressors (Khantzian, 1985, 1997). Prior work has shown that self-administration of alcohol and cannabis increases positive emotions (Venerable & Fairbairn, 2020; Weiss et al., 2018) with others noting substance use alleviates unpleasant affective states, including anxiety (McHugh & Kneeland, 2019). In fact, smokers often report that smoking helps them manage negative emotional states from everyday stressful situations (Jesus et al., 2016). Alternatively, Problem Behavior Theory (Jessor, 1987) assumes that an individual's proneness toward problematic behavior (e.g., substance use) is determined by both individual and environmental factors, including the individual's commitment to the attitudes, values, and expectations of the larger society (e.g., holding a job). For example, it would be assumed that individuals who have difficulty maintaining employment also are more likely to engage in cannabis use.

American veterans are especially vulnerable to behavioral health problems. For example, the estimated prevalence of generalized anxiety disorder (GAD) among veterans is 4.8% (Trivedi et al., 2015), which is higher than the 3.1% prevalence rate among the general population (Anxiety and Depression Association of America, 2021). Veterans also engage in substance use at significantly higher rates than the general population (Hoggatt et al., 2017). When considering social determinants of health, prior deployment (Hoge et al., 2004; Stimpson et al., 2003) and combat experience (Hoge et al., 2006) are risk factors for behavioral health problems among veterans. In one study, about one-fifth of active duty and two-fifths of reserve component soldiers reported needing mental health treatment within the first 6 months after returning from deployment (Milliken et al., 2007). One-fifth of veterans recently separated from the military screened positive for alcohol use disorder in another large study (Calhoun et al., 2008).

Veterans who report anxiety symptomology prior to the pandemic may be at particular risk for substance use initiation and/or exacerbated substance use after the onset of COVID-19, especially if they have experienced financial hardships as a result of the pandemic (Witteveen & Velthorst, 2020). Although very little research has examined American veterans during the COVID-19 pandemic, more research has been devoted to non-veteran samples. For example, research indicates that pandemic-related stressors include significant socioeconomic distress and financial stressors (Brooks et al., 2020). In fact, adults who have experienced job loss during the pandemic reported higher rates of anxiety and/or depression than adults who did not experience job loss (53% vs. 32%, respectively; Panchal et al., 2021). Individuals with an anxiety disorder may attempt to manage any exacerbations in anxiety that resulted from the challenges brought on by the pandemic (e.g., financial difficulties, loss of employment, etc.) by initiating or increasing substance use behaviors. In addition, given the immediate surge in unemployment exceeding 20 million individuals during the COVID-19 era (Bureau of Labor Statistics, 2020), additional research is necessary to clarify the relationship between employment and substance use, particularly alcohol use, among veterans during the pandemic.

The Current Study

The overall aim of this study was to compare veterans who screened positive for an anxiety disorder prior to the start of the pandemic (in February 2020) to veterans who screened negative for an anxiety disorder on self-reported past 30-day use of alcohol, cannabis, and tobacco during the COVID-19 pandemic. We hypothesized that veterans who screened positive for a pre-pandemic anxiety disorder would use alcohol, cannabis, and tobacco at higher levels during the pandemic compared to veterans who screened negative. Second, we examined whether financial stress related to the pandemic would moderate the association between pre-pandemic anxiety and substance use 6 months later. We hypothesized that veterans with a pre-pandemic anxiety disorder who reported financial stress during the initial months of the pandemic would report increased substance use during the pandemic. Last, we examined whether any disruptions in employment due to the pandemic were associated with alcohol, cannabis, or tobacco use during the first 6 months of the pandemic. We hypothesized that veterans who experienced employment disruptions would endorse higher levels of substance use.

Method

Participants and Procedures

Veterans aged 18 and 40 who previously served in one of four branches of the U.S. Armed Forces (Air Force, Army, Marine Corps, Navy) were eligible for the study. In February 2020 (Time 1), approximately 1 month prior to the U.S.'s declaration of a national emergency ([American Journal of Managed Care, 2020](#)), we posted ads for the online survey study on social media websites (Facebook, Instagram, RallyPoint, We Are The Mighty). Overall, 1230 participants were recruited and eligible. Participants were determined to be eligible based on a series of validation checks (e.g., needing to endorse consistent responses between items such as rank, branch, and pay grade; excluding duplicate responders; asking "insider knowledge" questions such as job specification codes specific to military branch). Participants received a \$20 Amazon gift card for completing the 30-minute online survey. Email addresses from participants were collected to send them their payment for participation, which were delivered via email as an online code. Email addresses were subsequently deleted, and measures were taken to anonymize data. All procedures were approved by the local Institutional Review Board and all participants consented to be a part of the study.

Six months later, in August 2020 (Time 2), participants were contacted by email and asked to complete a follow-up survey, which comprised similar items to baseline with additional items regarding COVID-19. Of the 1230 invited, 1025 completed the follow-up survey and passed internal validation checks (83%). Participants each received a \$30 Amazon gift card for completing the follow-up 30-minute online survey.

Measures

Demographics and military characteristics. Participants reported on their age, race/ethnicity, gender, and branch of service.

Anxiety. Symptoms of anxiety at Time 1 were assessed with the GAD 7-item (GAD-7) measure (Spitzer et al., 2006). Anxiety symptoms in the past 2 weeks (e.g., feeling nervous; anxious; or on edge, trouble relaxing) were rated from not at all (0) to (3) nearly every day. The GAD-7 yields a total sum score from 0 to 24 and had a reliability estimate of $\alpha = 0.87$ in this sample. Those with a score of 10 or higher were considered to have positive screens for an anxiety disorder, while those with scores lower than 10 were considered to have negative screens (Spitzer et al., 2006).

Financial stress and employment disruption. At Time 2, an item informed by work from the Johns Hopkins Bloomberg School of Public Health's COVID-19 and mental health measurement working group (Johns Hopkins Bloomberg School of Public Health, 2020) asked participants to indicate how stressful they felt about their finances during the initial 3 months of the pandemic in the U.S. Participants rated from 0 "not at all" to 4 "a great deal" based on how stressed they were about their finances when thinking about their experience with the COVID-19 pandemic during March through May 2020. Higher values on the item indicated greater financial stress due to the pandemic. Two items from the Epidemic-Pandemic Impact Inventory (Grasso et al., 2020) assessed disruptions in employment at Time 2. Participants indicated if they (1) were laid off from a job or had to close their own business or (2) had to reduce work hours or were furloughed due to the pandemic. Participants were coded as having experienced employment disruptions if they indicated a positive response to either of these items.

Alcohol, cannabis, and tobacco use. At Time 1 and Time 2, participants completed the daily drinking questionnaire (DDQ), which assessed the typical number of drinks consumed on each day of a typical week in the past 30 days (Collins et al., 1985). Pictures of standard drinks accompanied the DDQ (e.g., 12 oz. beer, 5 oz. wine, 0.5 oz hard liquor). A sum score of typical drinks per week was generated as the alcohol use outcome. Participants also reported on any use of cannabis in any form (e.g., smoking, vaping, edible) over the past 30 days, which yielded a cannabis outcome for any past 30-day use. Participants were also asked to report on how many days in the past 30 they used combustible cigarettes, which yielded the cigarette use frequency outcome.

Analytic Plan

We analyzed data from all 1025 participants who completed measures of interest from both Time 1 and Time 2. The first aim of this study was to investigate the association between substance use behaviors during the pandemic and pre-pandemic anxiety disorder. Hierarchical linear regressions were used to tests hypothesized associations

for Time 2 past month drinks per week and cigarette use. Hierarchical logistic regression was used to examine hypothesized associations for any past month cannabis use. Pre-pandemic anxiety screens on the GAD-7 were the predictor of interest, and we controlled for Time 1 substance use and demographic factors. Second, we aimed to examine whether greater financial stress during the initial months of the pandemic and any disruptions to employment due to COVID-19 are associated with substance use at Time 2. We added these factors to the second step of the hierarchical models, controlling for Time 1 substance use, demographics, and Time 1 anxiety. Last, we sought to examine whether financial stress and employment disruptions moderated the relationship between anxiety and substance use. On the third step of the models, we included anxiety screen x financial stress and anxiety screen x employment disruption interactions in the models to test for moderation. Significant interactions were plotted for interpretation using low (-1 standard deviations from the mean) and high ($+1$ standard deviations from the mean) values of the moderator. All continuous variables were grand mean-centered to facilitate interpretation. Analyses were conducted using SPSS v27.

Results

Sample Description

Participants were, on average, 34.5 ($SD = 3.7$) years old (Table 1). The majority of participants were white (79.3%), followed by Hispanic/Latinx (10.9%), and male gender (85.9%). Participants were primarily veterans separated from the Army (70.4%). Most were married (88.1%) and had children living at home (64.0%). Over one-third (35.7%) met criteria for an anxiety disorder at Time 1. Participants reported a mean of 2.1 on the financial stress item, which represented a mean of “a little bit” on the scale. About one-third experienced any employment disruption due to COVID-19 (38.8%), 5.6% reported being laid off from a job or having to close their own business, and 43.9% reported reducing work hours or being furloughed due to the pandemic.

Alcohol Outcome

Overall, the sample reported drinking 6.34 ($SD = 9.65$) drinks per week at Time 2. Participants who screened positive for anxiety at Time 1 consumed, on average, 3.05 more drinks per week at Time 2 than those who did not screen positive for anxiety. Overall, a one-unit increase in drinks consumed per week at Time 1 was associated with 0.41 more drinks per week at Time 2. Main effects of financial stress and employment disruption revealed that a one-unit increase in financial stress was associated with 1.53 more drinks per week at Time 2. Participants who experienced employment disruptions consumed 1.12 fewer drinks per week on average than those who did not experience employment disruptions. When adding the anxiety x financial stress and anxiety x employment disruption interaction terms (see final model in Table 2), results indicated a

Table 1. Sample Characteristics.

	All Participants (N = 1230)	
	N/Mean	%/SD
Age	34.5	3.7
Race/ethnicity		
Hispanic/Latinx	134	10.9%
Black/African American	90	7.3%
Asian	13	1.1%
White	975	79.3%
Multiracial/other	18	1.4%
Gender		
Man	1057	85.9%
Woman	153	12.4%
Non-binary	20	1.6%
Branch		
Air force	152	12.4%
Army	802	65.2%
Marine corps	158	12.8%
Navy	118	9.6%
Anxiety (GAD-7) screen	439	35.7%
Financial stress	2.1	0.9
Employment disruption	477	38.8%

Note. Anxiety screen represents those with a score of 10 or higher on the Generalized Anxiety Disorder-7 at Time 1. Financial stress was based on a single item from Time 2 assessing COVID-19–related financial stress during the first 3 months of the pandemic. Employment disruption represents participants who reported any job loss, own business closure, reduction in work hours, or being furloughed during the first 6 months of the pandemic.

significant interaction effect for anxiety x financial stress ($b = 1.63$, $SE = 0.61$, $p = .008$; $\beta = 0.09$). Figure 1 shows the plots indicating that participants with a positive anxiety screen at Time 1 who reported more financial stress reported drinking the most at Time 2. Tests of simple slopes revealed a significant slope for high financial stress (slope gradient = 3.18, $t = 4.47$, $p < .001$) and, to a lesser extent, for low financial stress (slope gradient = 1.61, $t = 1.97$, $p = .049$). There was no significant interaction between anxiety and employment disruption.

Cannabis Outcome

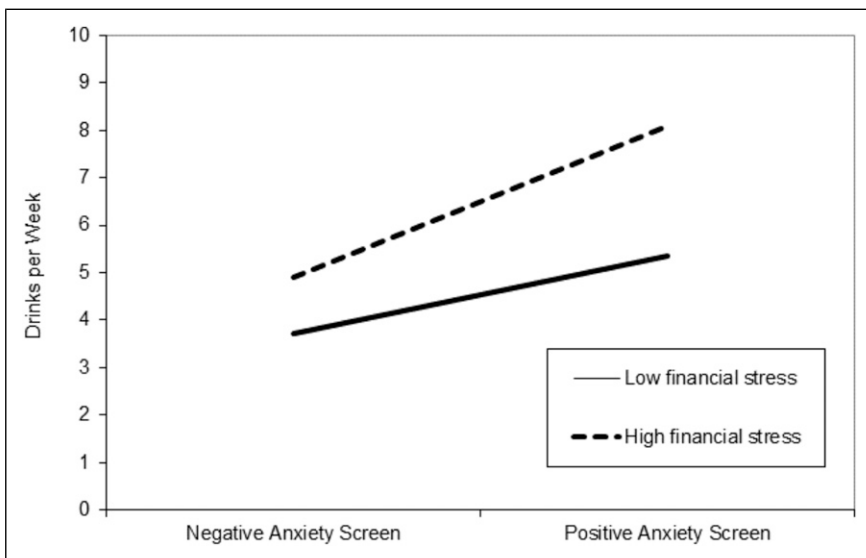
At Time 2, 14.8% of the sample reported any use of cannabis with a greater percentage of cannabis users having screened positive for an anxiety disorder. Participants who reported cannabis use at Time 1 had 4.66 higher odds of cannabis use at Time 2 than participants who reported no cannabis use at Time 1. Participants who screened positive

Table 2. Final Model Predicting Drinks Per Week, Any Cannabis Use, and Days of Tobacco Use Per Month at Time 2.

	Drinks Per Week	Cannabis Use	Tobacco Use Days
	B (SE)	OR (SE)	B (SE)
Constant	4.65 (.44)	.00 (1.33)	4.86 (.53)
Drinks per week at time 2	.41 (.03)***	—	—
Any cannabis use at time 2	—	4.66 (0.26)***	—
Tobacco use per month at time 2	—	—	.12 (.04)**
Anxiety screen at time 1	3.05 (.84)***	6.53 (.81)*	2.06 (1.03)*
Financial stress	1.09 (.33)***	1.90 (.22)**	-.25 (.39)
Employment disruption	-.76 (0.61)*	1.76 (.39)*	-.58 (.72)
Anxiety x financial stress	1.63 (.61)**	.83 (.28)	.24 (.74)
Anxiety x employment disruption	-1.55 (1.14)	1.05 (.49)	.83 (1.38)

Note. Covariates included age, gender (male gender reference group), race/ethnicity (white race/ethnicity reference group), and branch of service (Army reference group). Anxiety screen represents those with a score of 10 or higher on the Generalized Anxiety Disorder-7 at Time 1. Financial stress was based on a single item on a 5-point Likert scale from Time 2. Employment disruption represents participants who reported job loss, reduction in work hours, or being furloughed during the first 3 months of the pandemic. B = unstandardized regression coefficient; OR = odds ratio; SE = standard error.

* $p < .05$. ** $p < .01$. *** $p < .001$.

**Figure 1.** Interaction between anxiety screen at Time 1 and financial stress at Time 2.

for anxiety at Time 1 had 4.69 higher odds of cannabis use at Time 2 than those with negative anxiety screens, 95% CI [2.87, 7.68]. When adding financial stress and employment disruption to the model, a one-unit increase in financial stress was associated with 1.70 higher odds of cannabis use at Time 2, 95% CI [1.30, 2.22]. Those who reported experiencing employment disruptions during the pandemic had 1.81 higher odds of cannabis use at Time 2 relative to those who did not experience disruptions in their employment, 95% CI [1.12, 2.91]. There were no significant interaction effects on the final step when the interactions for anxiety x financial stress and anxiety x employment disruption were entered (see final model in [Table 2](#)).

Cigarette Smoking Outcomes

Overall, the sample reported using cigarettes on an average of 5.96 (SD = 9.60) days in the past 30 days at Time 2. Participants who screened positive for anxiety at Time 1 reported greater use of cigarettes at Time 2 than participants who did not screen positive for anxiety. Female veterans reported 2.62 fewer days of cigarette use and non-binary veterans reported 9.15 greater cigarette use days compared to male veterans. Hispanic/Latinx participants reported 3.26 greater cigarette use days than White participants. In the overall sample, a one-unit increase in cigarette use days at Time 1 was associated with a 0.12 increase in cigarette use days at Time 2. A positive screen for anxiety at Time 1 was associated with 2.38 greater days of cigarette use at Time 2 than those who did not screen positive. When financial stress and employment disruption were entered into the model on the second step, neither factor was associated with cigarette use at Time 2. In addition, no interactions were significant. The final model can be found in [Table 2](#).

Discussion

The present study investigated the relationship between pre-pandemic anxiety symptoms, financial stress, employment disruption, and substance use during the first 6 months of the pandemic in American veterans, a high-risk population who are generally subject to poor behavioral health outcomes ([Hoggatt et al., 2017](#)). Compared to veterans with a negative screen for anxiety prior to the pandemic, veterans who screened positive for anxiety in February 2020 (1) consumed more drinks per week, (2) were more likely to use cannabis, and (3) smoked cigarettes on more days per month during the first 6 months of the pandemic. This fit with non-veteran research that those with pre-existing mental health challenges may be having difficulties coping with the pandemic and are turning to substances to cope ([Alonzi et al., 2020](#); [Ettman et al., 2020](#); [Rajkumar, 2020](#)). In line with the self-medication hypothesis, veterans with pre-existing anxiety may be consuming more alcohol and using more cannabis because of their anxiolytic effects ([de Mello Schier et al., 2014](#); [Knight et al., 2020](#)). Further, acute doses of nicotine can also lead to anxiolytic effects ([Anderson & Brunzell, 2015](#)),

which could also account for the higher levels of cigarette use seen in those with pre-existing anxiety.

Prior to the pandemic, substance use and mental health problems were generally more prevalent in veterans than the general population (Hoggatt et al., 2017), which has since likely been exacerbated by numerous stressors related to the pandemic. Stressors may include factors that were examined in the current study (i.e., financial challenges, employment disruptions) or others, such as death of a loved one from COVID-19 or disruptions in daily living (Ettman et al., 2020). However, it is unclear whether these increases in substance use among veterans who screened positive for pre-existing anxiety were indeed due to coping with stress. It is possible that these increases may be due to other reasons, such as social reasons or out of boredom from social isolation. A “one-size-fits-all approach” may not be adequate; thus, future research should assess for plausible reasons for this increase among vulnerable veterans, which may differ based on the individual.

Those who endorsed higher levels of financial stress during the initial 3 months of the pandemic reported consuming more drinks per week and were more likely to use cannabis 6 months after the start of the pandemic. However, higher levels of financial stress were not associated with days of cigarette use. Epidemiological studies indicate that major financial problems are associated with alcohol consumption and alcohol use disorder (Keyes et al., 2011) as well as cannabis use disorder (van der Pol et al., 2013). Alcohol use was heaviest among veterans who screened positive for anxiety and endorsed high financial stress. This is consistent with a report of the general population indicating that households experiencing income insecurity were more likely to endorse increases in alcohol consumption or substance use due to stressors caused by COVID-19 compared to households without income insecurity (Panchal et al., 2021).

Disruptions in employment due to COVID-19 were associated with decreased alcohol consumption. This finding is in line with previous work demonstrating that a loss of employment leads to a decrease in income, which in turn reduces alcohol use (Davalos et al., 2012). Although some studies suggest protective effects of employment on alcohol use in which employed individuals are less likely to drink than those who are unemployed (Henkel, 2011; Popovici et al., 2012), more recent reports indicate that employment can increase alcohol use (Bamberger & Cohen, 2015; Frone, 2018). Moreover, results from the National Survey of Drug Use and Health (NSDUH) indicate that prevalence of alcohol use is higher among individuals who are employed full-time (Substance Abuse and Mental Health Services Administration, 2014). Another study reported that alcohol use increases during unemployment periods particularly among individuals receiving unemployment benefits, which is likely due to increased income (Lantis & Teahan, 2018). On the other hand, veterans who experienced disruptions in their employment were more likely to use cannabis during the pandemic. According to Problem Behavior Theory (Jessor, 1987), cannabis use is associated with coexisting negative outcomes across a range of economic domains, such as unemployment (Thompson et al., 2019). Our findings are in line with this theoretical approach and with data from the National Survey on Drug Use and Health indicating that unemployed

individuals endorse higher rates of cannabis use than employed individuals (Compton et al., 2014).

Limitations and Strengths

Results should be considered in light of some limitations. First, the use of self-report to collect information on substance use may be subject to bias or minimization of actual substance use behaviors due to social desirability, although there is increasing evidence to support the validity of self-reported substance use (Simons et al., 2015). Second, the majority of the study's sample is comprised of predominantly white male Army veterans, limiting the generalizability of our findings. Racial/ethnic minorities have reported worse mental health and heavier substance use during previous economic downturns (Mulia et al., 2021). Similarly, the pandemic has disproportionately affected mental health and substance use outcomes for minority communities, with Hispanic or Latino adults (46%) and non-Hispanic Black adults (48%) more frequently reporting anxiety and/or depression than non-Hispanic White adults (41%; Panchal et al., 2021). Future studies should explore the relationships between mental health, financial stress and employment disruptions, and substance use outcomes among a more diverse veteran sample. Last, analyses were conducted using a convenience sample. Despite these limitations, our study comes with a number of distinctive strengths. First, we utilized data from two crucial assessment timepoints immediately prior to and during the pandemic. Second, we reported findings from a largely understudied, yet vulnerable, sample of veterans who historically have reported higher rates of negative mental health and substance use outcomes than civilian populations. Therefore, this study offers additional insights that may have important clinical implications for an understudied population.

Conclusions

The pandemic and the resulting economic downturn have negatively affected the mental health of American veterans and created new barriers among those already living with anxiety. The present study is among the first to examine changes over time in substance use behaviors among U.S. military veterans during the pandemic. In terms of potential social and psychological implications of the current study, veterans with pre-existing anxiety disorder may be susceptible toward using substances at higher rates than veterans without pre-pandemic anxiety and may benefit from prevention and/or intervention to mitigate any potential negative consequences of substance use. For example, clinical providers working with veterans may consider screening their patients for anxiety symptoms and offer follow-up resources or referrals for mental health and substance use problems, as needed. Veterans experiencing financial stress because of the pandemic may be at risk for consuming alcohol and using cannabis at higher rates. In addition, veterans who experienced disruptions in their employment status may also be using cannabis at higher rates; thus, veteran financial and/or employment

assistance programs may be of particular importance for mitigating risks associated with excessive alcohol and cannabis use, as well as provide potential economic benefits for veterans financially impacted by the pandemic. Future studies should assess the trajectory of substance use rates in veterans, especially veterans with pre-existing mental health conditions, as the pandemic continues to progress as well as the longitudinal effects of financial and employment disruptions on veteran health outcomes.

Declaration of Conflicting Interests

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