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## Substance Use in the Performing Artist with Chronic Pain

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### Abstract

**OBJECTIVES:** To evaluate how performing artists (PAs) with chronic pain may differ on measures of substance use compared to non-PA controls.

**METHODS:** 157 participants reporting chronic pain (89 PAs, 68 non-PA controls) completed an online cross-sectional survey. Participants were assessed for self-reported current pain severity using the Brief Pain Inventory Short-Form, opioid misuse risk using the Screener and Opioid Assessment for Patients with Pain–Revised, opioid withdrawal using the Subjective Opiate Withdrawal Scale, and symptoms of opioid use disorder (OUD) using a modified version of the DSM-V checklist.

**RESULTS:** PAs had lower pain severity ( $p < 0.05$ ,  $t = 2.196$ ,  $df = 155$ ) and lower pain interference ( $p < 0.05$ ,  $t = 2.194$ ) than non-PA controls. 24% of PAs and 13% of controls reported using opioids within the past month. Among PAs, the number of days using opioids in the past month was positively associated with hours spent practicing per week ( $r = 0.508$ ,  $p < 0.05$ ). PAs (66%) were more likely to endorse current alcohol use than controls (44.1%,  $t = -2.136$ ,  $\chi^2 = 7.72$ ,  $p < 0.01$ ). Importantly, PAs (19%) were more likely than controls (3%) to endorse symptoms of at least mild OUD ( $\chi^2(3) = 11.3$ ,  $p < 0.01$ ) and higher ratings of opioid misuse risk ( $t = -2.166$ ,  $p < 0.05$ ). Past month opioid withdrawal was also greater in PAs than controls ( $t = -2.136$ ,  $p < 0.05$ ), and 5.6% of PAs and 1.5% of controls reported at least one prior incident of opioid overdose in their lifetime ( $\chi^2 = 1.80$ , NS).

**CONCLUSIONS:** Among persons with chronic pain, PAs may have higher risk for opioid-related consequences, including OUD, and should be screened during health care encounters.

**ILLICIT SUBSTANCE USE** is a major public health problem in the United States, with 21.4% of individuals aged 12 and older engaging in illicit substance use in 2020.<sup>(1)</sup> In addition to the associated risks of overdose<sup>(2)</sup> and co-occurring psychiatric disorders,<sup>(3)</sup>

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illicit substance use is often associated with chronic pain.<sup>(4)</sup> Many occupations confer increased risk of chronic pain through heavy lifting or non-ergonomic or repetitive movements that are required to perform work-related tasks. Thus, many occupations may carry increased risk of the development of chronic pain and thus related illicit substance use and/or development of substance use disorders (SUDs).<sup>(5)</sup> Alternatively, occupations where substance use is common, such as bartending, working at musical and sports arenas, etc., may increase the risk of substance use which can then lead to chronic pain and SUDs.

The experience of chronic pain and substance use is under-researched in performing artists (PAs). PAs often experience pain that is specific to their profession and may accept it as a sign of “giving their all” to the performance. For example, doctors have diagnosed a unique type of muscle tightness called musician’s dystonia, otherwise known as “musicians’ cramp.” This is a specific type of focal dystonia where individuals experience a loss of control of the muscles in their face or hands<sup>(6)</sup> that cause pain as it progresses. Dancers also experience chronic pain specific to their profession, with musculoskeletal pain remaining a major health issue within the field.<sup>(7)</sup> While there is a noticeable gap in the literature pertaining to acting, previous research has shown that actors experience 1–2 injuries per year, which may place them at higher risk for the development of injury-related chronic pain.<sup>(8)</sup>

PAs may also turn to pharmacological management of stressors other than chronic pain, including the use of beta-blockers by musicians to aid in reducing anxiety during performances.<sup>(9)</sup> This can stem from debilitating stage fright and concern over judgmental attitudes from others. Some studies have evaluated substance use as it pertains to performance anxiety, and although the results have been mixed, substance use occurs frequently.<sup>(10)</sup>

PA research has traditionally reported substance use and SUDs only as it relates to specific types of artists, such as in musicians,<sup>(11)</sup> dancers,<sup>(12)</sup> and actors.<sup>(13)</sup> However, there is a dearth of information on the effects of substance use on PAs as a whole and how occupational factors such as pain might exacerbate drug use in PAs. As most subtypes of PAs have been associated with illicit substance use,<sup>(14)</sup> PAs are known to have higher levels of sensation seeking (a risk factor for substance use disorders<sup>(11,14)</sup>), and each PA is at risk for a repetitive use injury, pooling PAs is justified. Prior large national surveys and smaller cross-sectional reviews<sup>(15)</sup> have also pooled PAs. The current study evaluated the association between chronic pain and substance use in PAs and non-PA controls. Due to the repetitive movements that are characteristic of the work of many PAs, we hypothesized that PAs would have higher pain severity ratings compared with chronic pain patients who were not PAs. Furthermore, we postulated that PAs would be more likely to misuse opioids, to endorse symptoms of opioid use disorder (OUD), and to experience more severe symptoms of opioid withdrawal compared with chronic pain patients who were not PAs, as substance use in general is highly prevalent among PAs.<sup>(16)</sup>

## METHODS

Participants with chronic pain who either were or were not PAs were recruited to participate in an online survey about their pain and substance use from March to May 2017 through Amazon Mechanical Turk. Amazon Mechanical Turk (AMT) is an internet crowdsourcing platform that allows persons to register as “workers,” who can then be hired to complete tasks, such as survey assignments; AMT is often used in research to target nationally representative samples, including those with chronic pain.<sup>(17)</sup>

A screening questionnaire was filled out by each participant before obtaining access to the survey, to ensure the participant properly fit the inclusion and exclusion criteria. Inclusion criteria included being aged 18 or older, currently residing in the United States, and endorsing current chronic pain. Exclusion criteria included pain that was only related to opioid withdrawal (i.e., not a chronic pain condition). Chronic pain was defined as experiencing physical pain, other than everyday kinds of pain, for at least 3 months prior to survey completion. PAs were defined as those who had held a job as a singer, musician, dancer, actor, or other type of PA for 1 or more years. The comparator chronic pain group was defined as those who were not a PA but experienced chronic pain. De-identified survey information was collected through an online platform (Qualtrics, Provo, UT). The Johns Hopkins University School of Medicine Institutional Review Board reviewed this study (#IRB00054890) and determined that it did not constitute human subjects research because data collection was de-identified and collected through a voluntary online system.

Participants provided basic demographic information such as their age, sex, and employment status. Annual income was self-reported categorically. To differentiate PAs from non-PAs, and to further categorize the PA group, participants reported whether they worked in one or more of the following fields: singer, musician, dancer, actor, or other field of performing arts. Participants who identified with one of the PA categories also reported information about their performing and practicing schedules, such as how many hours they spent practicing and performing in a week, and how many years they spent working as a professional PA.

Participants also completed the Brief Pain Inventory-Short Form (BPI), which is an 11-item assessment that measures the intensity of pain in the last 24 hours (worst, least, average and current) and the interference of pain with general activity, mood, walking, normal work, relationships, sleep, and life enjoyment. Items from the BPI are scored on a numeric rating scale of 0–10.<sup>(18)</sup> Pain severity is calculated by an average of the intensity ratings. Pain interference is calculated by an average of the interference ratings. Participants also reported whether they were currently prescribed an opioid, and symptoms of OUD were self-endorsed using a modified version of the DSM-V checklist.<sup>(19)</sup> Participants also completed the Screener and Opioid Assessment for Patients with Pain–Revised (SOAPP-R), which is a 14-item questionnaire that assesses the potential of opioid misuse in patients with chronic pain who are being considered for opioid therapy.<sup>(20)</sup> Each item is rated on a 5-point scale, and the scores are summed to produce a total score. The survey also included questions from the Subjective Opiate Withdrawal Scale (SOWS),<sup>(21)</sup> which is a 16-item validated scale that assesses the subjective effects of opioid withdrawal.

Both PAs and non-PAs were queried on questions regarding substance use. These questions included which substances they had used in the last 30 days and in their lifetime, the age they first used these substances, how they first obtained opioids upon opioid use initiation (i.e., a prescription from a doctor, from a pain clinic, online, from a dealer/on the street, someone else's prescription, a friend/family member) and any current opioid prescriptions. The substances that were listed included marijuana, methamphetamine, cocaine, opioids, and alcohol. A list of example opioids was provided that consisted of "Vicodin, Percocet, Oxycontin, Dilaudid, Suboxone, etc." Additionally, participants reported whether they had experienced opioid-related overdoses and any past psychiatric diagnoses.

Participants were dichotomized into two groups of chronic pain patients: PAs and non-PA controls. We hypothesized that the PA group would report greater chronic pain, opioid misuse, and would be more likely to have OUD when compared with controls. Dichotomous variables including sex, US citizenship status, Hispanic ethnicity, self-reported mental health diagnosis (yes/no), employment status, self-reported symptoms of OUD, past 30-day substance use, current opioid prescription status, lifetime substance use, and history of opioid-related overdose (yes/no) were analyzed using chi-square analysis. Continuous variables, including age, age of first drug use, BPI severity score, BPI interference score, SOAPP-R total score, and SOWS total score, were analyzed using independent sample *t*-tests. Alpha levels were set a  $p < 0.05$ . Analyses were conducted using SPSS, ver. 25.0 (IBM, Armonk, NY).

## RESULTS

There were 423 individuals who attempted to take this survey. Participants who met inclusion criteria ( $n=157$ ) included 89 PAs and 68 non-PA controls. In this study, PAs were 47% female, 82% white, 33.3 years old on average (SD 9.6), and had a median annual income of \$52,000. There were no statistically significant differences regarding basic demographic characteristics comparing PAs and non-PAs (Table 1).

PAs who participated in this study included musicians (53%), dancers (16%), actors (16%), singers (14%), or "other" (2%). PAs reported practicing an average of 23.0 hours/week and performed an average of 17.6 hours/week. This cohort had on average 10 years of experience as a PA (Table 2).

Contrary to the study hypotheses, when compared with the PA group (mean [M] 2.5, standard deviation [SD] 1.68), non-PA controls (M 3.17, SD 22.03) in this study reported higher pain severity ( $p < 0.05$ ,  $t=2.196$ ,  $df=155$ ) (Fig. 1A). Furthermore, non-PA controls (M 3.409, SD 2.41) reported higher pain interference ( $p < 0.05$ ,  $t=2.194$ ) compared to PAs (M 2.62, SD 2.08). There was no difference between groups on self-reports of having a current opioid prescription. Despite these findings, PAs (19%) were more likely than controls (3%) to endorse 2+ symptoms on the DSM-V checklist, consistent with a diagnosis of at least mild OUD ( $\chi^2(3)=11.3$ ,  $p < 0.01$ ), and PAs (M 14.63, SD 9.04) were more likely than controls (M 11.6, SD 8.12) to have higher SOAPP-R total scores, indicating higher risk of opioid misuse ( $t=-2.166$ ,  $p < 0.05$ ) (Fig. 1B). Past 30-day opioid withdrawal was greater in

performing artists (M 19.5, SD 15.96) than controls (M 7.2, SD 9.72) ( $t=-2.136$ ,  $p<0.05$ ; Fig. 1C).

Regarding opioid overdose, though not significant, 5.6% of PAs and 1.5% of controls reported at least one opioid overdose in their lifetime ( $\chi^2= 1.80$ , NS). Of the participants who indicated how they first obtained opioids, 17/29 (59%) of PAs and 5/10 (50%) of non-PA controls reported it was a prescription from a doctor.

Twenty-three percent of PAs and 13% of non-PA controls reported using opioids within the past 30 days. Within the PA group, the number of days using opioids in the past 30 days was positively associated with hours spent practicing per week ( $r=0.508$ ,  $p<0.05$ ). While there was no significant association between group and lifetime substance use, or age of onset of substance use of any kind, PAs (66%) were more likely to endorse current alcohol use than controls (44.1%,  $\chi^2=7.72$ ,  $p<0.01$ ). There were no significant differences in self-reported history of psychiatric diagnoses between groups ( $\chi^2=3.26$ , NS).

## DISCUSSION

PAs reported more problems associated with opioid use and experienced greater opioid withdrawal severity, despite reporting lesser pain severity than non-PA controls. In understanding the particular vulnerabilities PAs may have to the harmful effects of opioids, physicians should exercise caution and provide close monitoring whenever providing prescription opioid pain medications to this population. Previous pain research demonstrates that repetitive muscle movements and even static postures, both of which PAs may experience, can cause nerve compression and musculoskeletal pain<sup>(22)</sup>; thus, we expected that current PAs would endorse having higher levels of pain severity compared with controls. However, pain severity and pain interference were rated higher in the control group. Given that the experience of chronic pain is highly variable and individualized, it might be that currently employed PAs have better coping strategies or higher pain tolerance compared with non-PAs. Likewise, PAs may experience less pain overall as they are able to still perform, supported by having a higher mean annual income. PAs might also seek medical care less often than other same-aged individuals. One study evaluated use of primary care service use by dancers and noted that only 54% of dancers had a physical examination within the past year.<sup>(23)</sup> Chronic pain experienced by PAs might be well managed by steroids and anti-inflammatory medications,<sup>(24)</sup> but other studies have also noted overall higher drug and alcohol use among PAs.<sup>(23)</sup>

PAs were more likely to have used opioids in the past 30 days and were more likely to report symptoms associated with an OUD diagnosis. Moreover, the PA group endorsed greater ratings of opioid withdrawal and SOAPP-R ratings consistent with higher risk of opioid misuse compared with controls. Though not significant, it is still clinically relevant to note that more PAs in this study endorsed having at least one opioid overdose in their lifetime (5.6% for PA and 1.5% for controls), and 24% reported using opioids in the past 30 days, while only 13% of control indicated the same. Furthermore, the number of days having used opioids in the past month was positively associated with hours spent practicing per week for the PA group.

One possible explanation for the use of opioids in this population could be work-related injury. PAs, including dancers, actors, musicians, and visual artists, experience specific types of chronic pain related to their vocation,<sup>(25)</sup> which can severely restrict daily performance-related activities.<sup>(26)</sup> One example would be musician's dystonia, a specific type of muscle cramp associated with playing an instrument<sup>(27)</sup> that can become painful as the condition progresses. Other types of pain experienced specifically by performing artists include skin lesions, bruises, ulcers, arthritis, headaches, tinnitus, and face, neck, and temporomandibular joint pain.<sup>(9,28)</sup> In fact, one study that surveyed freshman music students, a group typically considered to be in good health, found that 79% of these students had a history of performance-related pain.<sup>(29)</sup> Another qualitative study demonstrated that orchestral players considered pain to be a show of weakness, failure, and poor musicianship.<sup>(30)</sup> This study suggested that stigma may sway musicians to play through a considerable amount of pain in order to continue to practice and perform<sup>(30)</sup>; because of this, PAs may feel the need to self-administer pain relief treatments in order to perform.

In addition to physical pain, PAs can also experience high levels of social pressure and psychosocial stress. Previous research reports that PAs can have low self-esteem, high general anxiety, as well as increased rates of depression,<sup>(31)</sup> which could increase their overall susceptibility to experiencing general and performance anxiety and increase the risk of substance use and SUDs.<sup>(32)</sup> One study noted that of 157 students, 34% indicated that they had used a substance in order to cope with musical performance anxiety, and of these students, 33% considered abandoning their musical career.<sup>(33)</sup> However, the current study found no significant difference in the PA group and the non-PA group in lifetime substance use or age of onset of any substance use. Over half of PAs and half of non-PA controls noted that a prescription from a doctor is how they first obtained opioids. Some PAs have indicated that they use substances to ensure a successful performance.<sup>(34)</sup> PAs were more likely to endorse symptoms of OUD and current alcohol use, despite reporting lower chronic pain severity and life interference than controls. This study did not find an increased incidence of self-reported history of mental health in PAs compared with controls, but further research is necessary to fully understand whether this group is at increased risk of mental health conditions due to their profession and/or if they experience persistent or event-related depressive or anxiety symptoms that could lead to SUDs.

This study was one of the first to evaluate substance use, and more specifically opioid use, among performing artists, as it relates to chronic pain. However, potential limitations of this study include the small sample size, although the sample was larger than many other studies on this population. Also, this study relied on self-reported data collection through an online platform, although we used blinded screening criteria to identify PAs and non-PAs and to ensure that individuals without chronic pain were excluded from the study. Future research would benefit from understanding the effects of adverse childhood events (ACE) on PAs as it relates to drug use, treatments specific to PAs, and ways for the entire community to destigmatize pain, and to study the long-term effects of performance anxiety, performance-related pain, and substance use.

PAs might have specific occupational hazards that put them at risk for chronic pain and SUDs. This study highlights the need to better understand risk factors for substance use in



PAs who experience chronic pain, as well as strategies to engage PAs in SUD treatment that take into account their demanding performance and practice schedules.

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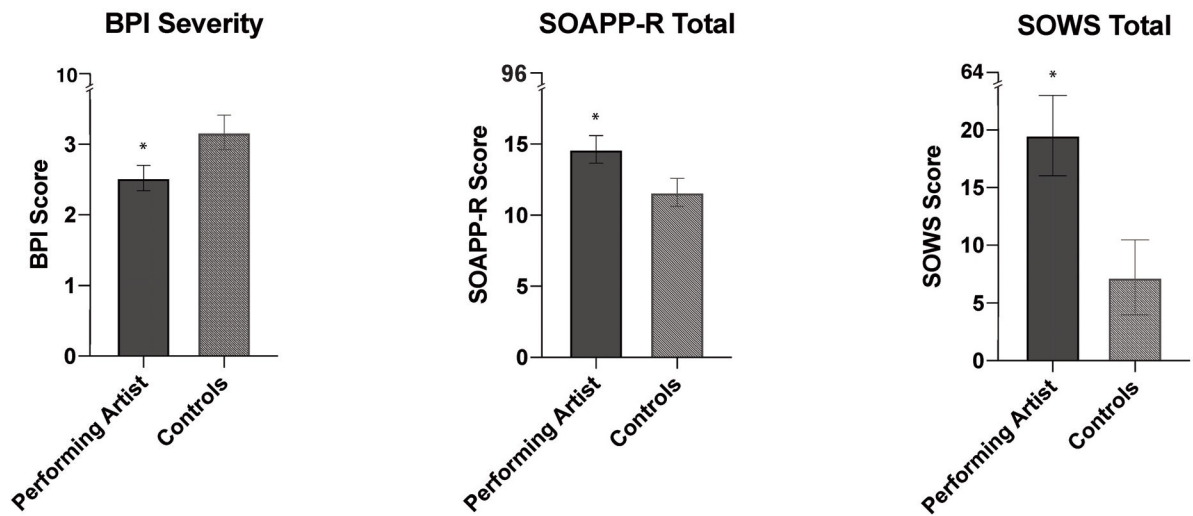
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**FIGURE 1.**

Between-group comparisons showing **A**, mean BPI severity score, **B**, SOAPP-R total score, and **C**, mean SOWS total score. Error bars indicate standard error of measurement (SEM). Asterisk indicates significant difference at  $p < 0.05$ .

**TABLE 1.**Participant Demographics ( $n=157$ )

	PA Group ( $n=89$ )	Control Group ( $n=68$ )
Age, yrs, mean (SD)	33.3 (9.6)	35.0 (10.5)
Female (%)	47.2	54.4
White/Caucasian (%)	82.0	85.3
Hispanic (%)	12.4 *	2.9
Median annual income (range)	\$52,000	\$37,500

\* $p<0.05$ .

Cohort demographic characteristics with statistical analysis performed. Age was compared using independent samples  $t$ -test; gender, race, and income were compared using chi-square tests.

Respondents ( $n=157$ ) self-reported their annual income.

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**TABLE 2.**

## Information on Performing Artist

	PA Group ( <i>n</i> =89)	Control Group ( <i>n</i> =68)
Artist type (%)		—
Singer	33.3	
Musician	47.2	
Dancer	82.0	
Actor	13.5	
Other	2.2	
Time spent practicing and performing		—
Mean practice hrs/wk (SD; range)	23.1 (16.1; 0.7–81)	
Mean performance hrs/ wk (SD; range)	17.6 (20.3; 0–69)	
Mean years as PA (SD)	10.0 (7.8)	
Past 30 day drug use (%)		
Marijuana	24.7	20.6
Alcohol	66.3*	44.1
Nicotine	27.0	30.9
Cocaine	0	0
Prescription opioids	23.6	13.2
Heroin	0	0
Psychedelics	1.1	0

Respondents (*n*=89) self-reported their chosen profession and were able to select more than one type of profession. Respondents also self-reported the years they spent working as a professional PA and time spent practicing and performing each week.

\*  $p < .01$  using chi-square test.