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Reasons for prescription opioid use while playing in the National Football League as risk factors for current use and misuse among former players

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Abstract

Objective—Prescription opioid misuse has become a significant public health issue. Previous research has examined predictors of prescription opioid use and misuse among former National Football League (NFL) players. The present study aimed to describe how reasons for prescription opioid use while in the NFL corresponds to use and misuse in retirement.

Design—Former NFL players reporting prescription opioid use during their playing careers (N = 336) were included in this secondary data analysis. Participants reported reasons for prescription opioid use, including pain management, use “to function”, to improve mood, to reduce stress, and to aid sleep.

Results—Among retired NFL players with exposure to prescribed pain medication during their playing career, 26.2% reported recent use of prescription opioids (past 30 days) and 73.8% reported no use. Specifically, 14.3% of retired players reported opioid use only as prescribed, while 11.9% reported misuse (not prescribed or use other than as prescribed). Using prescription opioids to function while in the NFL was associated with any opioid use in the past 30 days (OR = 1.30, 95% CI: 1.12, 1.50, $p < .001$). Further, opioid use in the NFL to reduce stress and anxiety was associated with increased odds of past 30-day misuse of prescription opioids (OR = 1.45, 95% CI: 1.01, 2.11; $p = .048$).

Conclusions—The present study adds to the literature on elite athletes at high-risk for pain and prescription opioid use and misuse. The findings may help to identify and provide early intervention for professional athletes most at risk for misuse of prescription opioids.

Keywords

Prescription opioids; drug use; athletes

Introduction

Misuse of prescription opioid medication accounts for over 20,000 overdose deaths per year in the United States^[1]. To properly address this epidemic, it is critical to understand risk factors and groups most vulnerable to prescription opioid misuse. Previous studies indicate that chronic pain, prior history of legitimate opioid prescriptions, male gender, and history of mental illness or substance use disorders are associated with prescription opioid misuse^[2]. In 2016, approximately 4.3% of the general U.S. population reported misuse of prescription pain killers in the past year^[3]. Current and former elite athletes represent a population at particular risk for opioid use and misuse due to high rates of serious injuries and chronic pain. The present study aims to further our knowledge of this important topic by exploring opioid use and misuse among retired professional American football players. The last decade has seen a significant increase in attention on the health and wellbeing of former National Football League (NFL) players due to the long-term impact of head injuries and chronic traumatic encephalopathy (CTE)^[4]. However, few studies have examined the role of behavioral health factors, such as mental health and substance use, that likely impact health outcomes for retired athletes.

Reports estimate that approximately two out of every three NFL players experience at least one serious injury per year, including concussions, spine injuries, and knee injuries^[5]. Such injuries may lead to long-term consequences, including chronic pain, disability, and increased risk for prescription opioid misuse^[6, 7]. Data suggest that as many as 80% of retired NFL athletes reported suffering from daily joint pain^[8]. Chronic pain has been reported as the most common difficulty experienced during retirement from professional football, and is significantly associated with drug and alcohol use, difficulty transitioning to retirement, trouble sleeping, and elevated risk of several psychosocial problems^[9]. Perhaps unsurprisingly, retired NFL players report experiencing high rates of pain and use of prescription opioids during their playing careers^[10]. Past month prescription opioid misuse was reported by 7% of retired NFL players^[10], which was nearly 4.5 times the age-matched rate of prescription opioid misuse (1.6%) in the general population at the time of the study^[11]. In addition, self-reported undiagnosed concussions and moderate-to-severe pain were associated with use of opioids while in the NFL, and that opioid use in the league was predictive of use in retirement^[10]. Importantly, NFL athletes appear to use these medications for several reasons in addition to pain management while they are active players, which may predispose them to chronic use or misuse extending into retirement.

Specific mental health disorders found to be associated with prescription opioid misuse in the general population include panic, depression, anxiety, and personality disorders^[12, 13]. In a study of elite rugby league players, rates of anxiety and alcohol use were found to be higher when compared to the general population^[14]. Of great concern for overdose deaths is the comorbid use of prescription opioids with either alcohol or sedative medications^[15], as these are known to intensify the depression of the central nervous system^[16]. Prior research found concurrent use of alcohol and sedatives to be 12.4% and 31.9%, respectively, among daily opioid users^[17]. These findings suggest the need to assess past and current substance use when evaluating opioid misuse and overdose risk potential.

The present study sought to further the emerging literature on risk factors for opioid use and misuse among elite athletes. The primary objective was to examine whether the specific reasons players used prescription opioids while in the NFL were associated with continued opioid use and misuse in retirement. It was hypothesized that NFL use for reasons other than pain management, including improving functioning, mood, anxiety, and sleep, would be associated with increased odds of current use and misuse among former players. Furthermore, concurrent alcohol and sedative use were hypothesized to be associated with opioid use and misuse. Information gleaned from this study may benefit prevention of opioid overdoses among this high-risk group.

METHODS

Data source and sample

The data for the present study comes from the cohort described previously of former NFL players listed in the 2009 Retired NFL Players Association Directory^[10]. The directory included 1,788 retired players at the time of study recruitment (March-August 2010.) Attempts were made to contact 1,331 retired players, many of whom were found to have disconnected or incorrect phone numbers ($n = 599$), refused to participate ($n = 83$), or were deceased ($n = 5$)^[10]. Due to limited time and financial resources to complete the initial phone-based survey, a total of 457 retired players in the directory were unable to be called by study staff. As a result, the total sample for the parent study was 644 retired NFL players. The current secondary analyses included a subsample of the retired NFL players who reported prescription opioid use at some point during their playing career ($N = 336$).

Ethical Considerations

Interviewers and study staff completed research ethics training through the Collaborative Institutional Training Initiative (CITI). Interviewers conducted outreach calls using a standardized script with details of the study and obtained informed consent from participants. Participation was voluntary and no compensation was provided for completing the study. The Human Research Protection Office at the Washington University School of Medicine approved the original study protocol and the University of Florida Institutional Review Board approved the present secondary data analysis.

Measures

Participants were administered the Survey of Retired NFL Football Players (supplement available online^[10]) which is a 62-item assessment administered via an approximately 20 minute telephone survey for which no compensation was offered. The survey was pre-tested using NFL players who were not included in the recruitment pool. Questions included demographic and health information, including age, race, employment, current health status, and disability. Participants also provided information about their football playing career, including position, number of seasons in the league, number of injuries, and concussion information (both diagnosed and undiagnosed). Use and misuse of prescription opioids was assessed through a detailed series of questions previously described^[10]. Participants who reported prescription opioid use were asked how they received the medication (team doctor, friend, teammate, or others) and whether they took the drugs as instructed. Misuse of

prescription opioids was considered any use that exceeded physician recommended dosage or use of opioids that were not prescribed to the participant. Participants were asked to report whether (*yes/no*) they used opioid medication in the NFL and in the past 30 days for any of the following reasons: a) to function; b) to change mood, be happy, or get high; c) to relax, calm down, or relieve stress; d) to sleep; and e) for pain. While use “to function” represents a broad construct and may have overlapping meaning with pain management, the present study conceptualized this item as use to improve physical functioning and performance level necessary to sustain play or daily activities. All five reasons for use were included in the analytic models, as described below.

Alcohol consumption, prescription sedative use, marijuana use, and use of other drugs in the past 30 days were assessed. For the purpose of this report, risky drinking was identified as greater than 14 drinks per week, based on the National Institute on Alcohol Abuse and Alcoholism (NIAAA) and the Dietary Guidelines^[18] criteria for males.

Statistical analyses

Univariate analyses were used to examine descriptive statistics for the overall sample and to assess differences among those reporting: 1) no prescription opioid use of any kind (prescribed or otherwise) in the past 30 days, 2) use of opioids only as prescribed in the past 30 days, and 3) persons who misused prescription opioids in the past 30 days, whether non-prescribed or use other than as prescribed. Logistic regression analyses were conducted with reasons for prescription opioid use while playing football as independent variables predicting the odds ratios (OR) and 95% confidence intervals (CI) of opioid use and misuse. Opioid use for pain was also included in the models to ensure that non-pain factors contributed uniquely to use and misuse. Current alcohol and sedative use were also included in the models, as recent literature has found high rates of comorbid use and implications for overdose potential^[15]. All data analyses were conducted using IBM SPSS Statistics Version 21.

RESULTS

Factors associated with opioid use in the past 30 days

The 336 former NFL players (mean age 47.1 ± 9.0 years) who reported a history of prescription opioid use at some point throughout their professional playing career were stratified into three groups based on the recency and type of use of prescription opioids (Table 1). Among retired NFL players, 26.2% reported any use of prescription opioids in the past 30 days and 73.8% reported no opioid use. Specifically, 14.3% of retired players used opioids only as prescribed while 11.9% misused opioids (not prescribed or use other than as prescribed). There were no significant differences in demographic characteristics or years of involvement in the NFL among the three groups.

Prescription opioid use was next collapsed to include any use of prescription opioids in the 30 days prior to study participation, regardless of misuse. As shown in Table 2, retired NFL players reporting current opioid use compared to those who did not were significantly more likely to report opioid use “to function” while in the NFL (OR = 1.30, 95% CI: 1.12, 1.50, *p*

< .001). Specifically, 56.8% of those currently using opioids reported prior opioid use in the NFL "to function" compared to only 28.2% of those not currently using opioids. No other statistically significant differences were observed for non-pain related reasons for use. Former players using opioids in the past 30 days were significantly more likely than those not currently using opioids to report concurrent use of prescription sedatives (30.7% vs. 4.8%; OR = 1.67, 95% CI: 1.38, 2.03, $p < .001$). The association between current risky alcohol use and current opioid use was not statistically significant ($p = .266$), though risky drinking was observed to be high among retired players using opioids compared to non-opioid users (21.6% vs. 10.5%).

Factors associated with opioid misuse in the past 30 days

Finally, as shown in Table 3, we compared those who reported using opioid medications in the past 30 days only as prescribed ($n = 48$) to those misusing opioids in the past 30 days with or without use as prescribed ($n = 40$). Two variables were associated with current misuse; the strongest association was with risky drinking. Former NFL players currently misusing prescription opioids were also over three times as likely as those using opioids as prescribed only to report concurrent risky drinking (OR = 3.25, 95% CI: 1.05, 10.00; $p = .040$). Secondly, prior use of opioids while playing in the NFL to relieve stress or relax was associated with greater odds of current opioid misuse (OR = 1.45, 95% CI: 1.01, 2.11; $p = .048$). Specifically, 35.2% of former NFL players currently misusing prescription opioids reported prior use in the NFL to relax or relieve stress compared to only 14.6% of players currently using opioids as prescribed. Self-reported use "to function" while in the NFL was not associated with increased risk of current opioid misuse compared to current use as prescribed (57.5% of misusers vs. 56.3% of using as prescribed). Rates of prior use to improve mood (22.5% vs. 10.4%) and or prior use to sleep (47.5% vs. 37.5%) were not statistically different between those reporting misuse and those reporting use as prescribed. Both current misusers and users as prescribed reported high levels of concurrent sedative use, thus no significant group difference was observed.

DISCUSSION

Approximately one in every four retired NFL players previously exposed to prescribed pain medication during their playing career are currently using prescription opioids, with half of those reporting misuse or abuse of the prescription drugs. The present study sought to identify early risk factors for prescription opioid use and misuse among former professional athletes by considering reasons for prior use while in the NFL. Studies have previously highlighted the prevalence of injury^[9], pain, and prescription opioid use among NFL players^[10]. Rates of recent prescription opioid misuse among retired NFL players (7%) is comparable to rates among military veterans (6.9%) and far surpass rates in the general population (1.6%)^[10, 11, 20]. There are few studies to date examining the correlates of opioid misuse in retired professional athletes, a group at elevated risk for severe injury, chronic pain, and exposure to legitimate prescribing of opioid medications.

Former NFL players reporting the use of prescription opioids while in the NFL to improve functioning were more likely to report continued use while in retirement. Furthermore,

prescription opioid use was highly comorbid with prescription sedative use, which is known to increase risk of overdose. Use of prescription opioids to function may be related to improving ability to play football despite pain related to an injury. Prescription opioids are often prescribed with the goal of reducing pain and improving overall functioning; thus, players may have previously used prescription opioids in the NFL to improve or maintain a performance level necessary to sustain their career and fulfill their playing contracts. In other words, using prescription opioids may have allowed players to play through severe injuries and pain that otherwise would compromise their playing time and, subsequently, financial gain.

Reporting prior opioid use “to function” did not discriminate between current use as prescribed and current misuse. However, opioid use while in the NFL as a means of relaxation and stress reduction appeared to heighten risk for current misuse compared to current use as prescribed. This finding suggests that players using prescription opioids to improve psychological functioning while in the NFL may be at risk of continued reliance on opioids for reasons other than pain management following their playing career. Alarming, those misusing prescription opioids were over three times as likely to be drinking alcohol at risky levels when compared to those only using as prescribed. This level of alcohol consumption not only increases risk of overdose potential, but by reducing inhibition may also increase violence and suicidality. The NFL and its medical staff should consider regularly monitoring for potential misuse of prescribed opioids, with particular focus on self-reported reasons for use. If an athlete is reporting stress relief or other psychological outcomes as a reason or benefit of prescription opioid use, this may serve as a warning for misuse and appropriate interventions should be offered.

While prescription opioids may be effective at managing acute pain, there is weak scientific evidence for long-term opioid regimens to treat chronic pain^[20]. Furthermore, the Center for Disease Control and Prevention recently released stricter guidelines for determining when the use of opioid medications is appropriate for chronic pain management. These new guidelines call for the use of non-opioid medications or nonpharmacological, behavioral-health interventions as front-line treatment recommendations^[21]. Therefore, those responsible for their health care would benefit from being able to identify those at greatest risk for chronic pain and opioid misuse. Elite athletes themselves should also be empowered to make their own risk assessment about their pain treatment. This would enhance the ability to make recommendations for evidenced-based treatments, such as non-opioid medications and behavioral interventions for pain management. Abuse-deterrent, controlled-release formulations (e.g., morphine sulfate, naltrexone) have been found to be as effective as non-abuse-deterrent opioids for pain reduction, while decreasing the potential for misuse^[22]. In addition, cognitive behavioral therapies (CBTs) have been developed specifically for pain management and have been found to be effective at improving wellbeing and functioning^[23]. Behavioral interventions may also be utilized to increase pain acceptance, which has been found to reduce the risk of prescription opioid misuse^[24]. However, these are inherently more difficult applications in populations of current athletes who require or expect instant pain relief allowing for minimal time missed from sport participation.

There is a clear need for improvements in opioid risk screening and development of prevention-based interventions that mitigate opioid addiction risk and provide effective treatments for those who are already chemically dependent^[25]. However, retired NFL athletes represent a difficult clinical population when considering general reluctance to engage treatment and perceived barriers to treatment for health concerns. Approximately two-thirds (66%) of retired athletes in one survey did not believe their current health issues were important enough to warrant attention, and over half perceived engaging in treatment as weak or embarrassing^[9]. Previous studies consisting of retired NFL players have also highlighted the lack of help seeking for depression, which often accompanies chronic pain. One study found that 75% of former NFL players surveyed who received a prior major depressive disorder diagnosis had not had treatment for their depression, while another study identified that of 40% of former players who were classified as depressed, only 7% had been assessed or treated for their depression^[26, 27]. Despite low rates of psychological treatment seeking, former NFL players have reported that they are interested in assistance programs that may help with distress and depression following retirement^[9, 28]. The importance of reducing the stigma of mental illness and physical pain during a player's career is paramount so that players not only seek the care they need during their playing career, if necessary, but also seek help when their career is over and they may be vulnerable to chronic health issues.

The present study has several limitations. While the overall sample was large, this secondary data analysis consisted only of players who reported use of prescription opioids while in the NFL. As previously noted^[10], this sample may overestimate health and functioning and underestimate substance use behavior of former NFL players as the present sample consisted solely of former players who are members of the Retired Players Association. Thus, the finding may not be representative of all retired NFL players. The study is also specific to professional football and further research should be conducted to examine effects of pain and opioid use among other elite sports. These findings are also limited by the use of self-reported data, which may be influenced by social desirability.

Despite these limitations, the present study adds to the current literature on prescription opioid use and misuse among former elite athletes. Reported use of prescription opioids “to function” while in the NFL was linked to higher risk for current opioid use (either as prescribed or misuse), and prior opioid use in the NFL to reduce anxiety and stress was associated with current opioid *misuse*, specifically. High rates of concurrent alcohol and sedative use are also alarming, as these are known to be involved in most prescription opioid overdose cases. This information is critical in screening for abuse potential and identify those in need of evidenced-based treatment, including abuse-deterrent opioid formulations or psychological intervention in retirement. In addition to helping with pain acceptance and management, CBTs for pain will also address highly comorbid psychological and substance use disorders commonly associated with chronic pain, such as depression and anxiety.

Sports psychologists and behavioral health specialists are becoming more common in professional and collegiate athletics and research has highlighted the importance of assessing biopsychosocial contributors when assessing injury outcome, considering treatment options, and determining etiological attribution in a population of individuals at risk for several influential, comorbid, and complicating factors. Studies assessing such

interactions among current physical, behavioral, and cognitive functioning in these retired athlete populations are underway. Future research should also continue to evaluate factors associated with prescription opioid use and misuse among current and former athletes and further validate the effectiveness of cognitive behavioral interventions in this population. Future research is needed to investigate the complex relationships among pain, mental health, and drug use. To the author's knowledge, there have been no randomized control trials (RCTs) examining the effectiveness of non-pharmacological pain management strategies in a populations of collision sport athletes such as that of retired NFL players. Such studies will help to identify the most efficacious treatments for this population.

CONCLUSIONS

The health and wellbeing of retired NFL players receives significant attention due to the wealth of factors that may contribute to poor long-term outcomes^[4]. The data presented here may be useful in identifying those at risk for one such factor – prolonged opioid medication use throughout retirement. Education and prevention programs related to opioid misuse risk should be developed to provide appropriate information to professional sports organizations, sports medicine professionals, players, and their families. Those experiencing chronic pain or currently misusing opioids should be referred to evidenced-based pain management treatments.

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Past 30 day use of prescription opioids among 336 former NFL players who used prescription opioids during their playing career

Table 1

	Total Sample (N=336)	No Use in Last 30 Days (N=248)	Used as Rx'd Last 30 Days (N=48)	Misused in Last 30 Days (N=40)	<i>p</i>
Age					.33
Mean age in years (SD)	47.1 (9.0)	47.5 (8.9)	45.8 (9.6)	45.8 (9.6)	
Race					.27
% White/Caucasian	56.8	55.6	56.3	65.0	
% Black/African American	39.9	41.9	39.6	27.5	
% Other	3.3	2.4	4.2	7.5	
Employment					
% Currently Employed	89.9	91.1	85.4	87.5	.42
NFL Involvement					
Mean (SD) years played	7.6 (3.6)	7.7 (3.6)	7.4 (3.6)	7.1 (3.9)	.64
Mean (SD) years since retire	16.5 (8.6)	16.0 (8.6)	18.7 (8.6)	16.9 (8.6)	.12

Table 2

Logistic regression comparing current non-users of prescription opioidsto those who reported **any current use** among former NFL players.

	No Use in Last 30 Days (N=248)	Any Use in Last 30 Days (N=88)		
	%	%	OR (95%CI)	<i>p</i>
Substance Use				
15+ Drinks in Past 7 Days	10.5	21.6	1.54 (0.72–3.27)	.266
Sedative Use Past 30 Days	4.8	30.7	1.67 (1.38–2.03)	<.001
Reason for Use While in NFL				
To Function	28.2	56.8	1.30 (1.12–1.50)	<.001
Change Mood/Make Happy	5.2	15.9	1.27 (0.98–1.65)	.067
Relax/Relieve Stress	12.9	23.9	0.95 (0.80–1.18)	.662
To Sleep	25.0	42.0	1.08 (0.93–1.26)	.322

Table 3

Logistic regression comparing those currently using as prescribed to those who reported **current misuse** of prescription opioids among former NFL players.

	Used as Rx'd Last 30 Days (N=48)	Misused Last 30 Days (N=40)		
	%	%	OR (95%CI)	<i>p</i>
Substance Use				
15+ Drinks in Past 7 Days	12.5	32.5	3.25 (1.05–10.0)	.040
Sedative Use Past 30 Days	29.2	32.5	1.10 (0.86–1.40)	.467
Reason for Use While in NFL				
To Function	56.3	57.5	0.89 (0.69–1.14)	.346
Change Mood/Make Happy	10.4	22.5	0.93 (0.62–1.39)	.711
Relax/Relieve Stress	14.6	35.0	1.45 (1.01–2.11)	.048
To Sleep	37.5	47.5	1.05 (0.83–1.33)	.683