

Differences in Pain Management Practices in College Athletes by Sex at a Single Academic Institution

Heather F. Thiesset, Melinda Barber, Maren Clark, & Merilee Larsen
/ Utah Valley University

Abstract

Objectives: The purpose was to assess attitudes, perceptions and self-reported practices of pain management following injuries incurred as an athlete.

Methods: This study was a descriptive cross-sectional survey. The Likert scale questionnaire given to student athletes asked questions regarding student's mental health, resilience, and use of opioids to manage pain. Descriptive statistics were calculated on categorical variables, results from the survey compared differences in attitudes, perceptions, and practices by sex.

Results: Students often lacked information on alternatives to opioids in their pain management needs.

Conclusions: Survey results demonstrated educational interventions should be encouraged and used to assist in the management of pain to prevent addiction.

Implications: Opioids can be essential when treating pain and can be helpful when administered by a prescribing provider in small doses for a short amount of time. A lack of following these criteria can lead to opioid dependence, addiction and often overdose.

Introduction

It is estimated that 14.3 million people in the United States alone misuse or abuse prescription opioid narcotics.¹ Emergency room visits for opioid misuse consequences alone increased 153% from 2004-2011.² Death rates from opioid misuse quadrupled from 2000-2014 to 5.9 deaths per 100,000 persons and have

continued to increase.³ The 2017 economic impact of opioids and opioid related mortalities were estimated at \$1.02 trillion.⁴ While the impacts of the opioid epidemic are staggering, society has continually failed to provide sufficient safety nets when it comes to pain management and consumption of opioid narcotics.^{2,3}

Access to opioids through a medical prescription can result from many conditions including injury, treatment of chronic pain, and post-surgical procedures.¹ However, consumption of opioids for extended periods of time increases the potential risk for misuse and dependence.^{5,6} It is therefore appropriate to ensure that patients are exposed to prescription pain relievers for the least amount of time and lowest dose possible to avoid the effects of opioid abuse and/or dependence.⁵ The majority of those who abuse opioids obtain their drugs from family or friends. Therefore, efforts to encourage pain management, without the use of reliance on opioids, is a benefit not only for patients, but to society as a whole.⁷

According to the Centers for Disease Control and Prevention (CDC), Utah has an opioid mortality age adjusted rate of 22.4 per 100,000, which is in the highest index category (21.1 to 52.0) in the nation.^{8,9} Furthermore, Utah has remained in the highest category for well over a decade despite multiple patient-focused educational and public health interventions such as marketing campaigns, the availability of Naloxone, and prescription take back programs.⁸ Utah has historically low rates of alcohol, tobacco, and other illicit drug use, yet consistently has one of the highest mortality rates due to opioid abuse.^{10,11}

College athletes experience high rates of injury which

puts them at an increased risk for needed pain management interventions.¹² Adolescents, in general, have high rates of exposures to opioids and substance use from a variety of sources including their social environment and peer-pressure.¹³ While opioids are used often for short-term pain management, taking opioids to manage chronic pain increases the risk of dependence and misuse.^{1,7}

The theory of planned behavior describes human behavior as guided by three principles: beliefs about the likely consequences of the behavior (behavioral beliefs), beliefs about the normative expectations of others (normative beliefs), and beliefs about the presence of factors that may facilitate or impede the performance of the behavior (control beliefs). This theoretical framework allows understanding of human behavior in relation to pain management needs.¹⁴

Depression plays a key role in pain management and affects the rates of opioid misuse, in fact, opioids often are used to mask symptoms of depression and other mental health issues.¹⁵ Volkow, et al., identifies the association between the prevalence of depression and suicidality and the risk of relapse as well as fatal opioid overdoses.¹⁵

Resilience is an important measurement in athletes and pain management in general as it helps in understanding a patient's ability to cope with difficult circumstances. This is critical to determine long-term educational intervention strategies for pain management.^{14,16}

The purpose of this study was to understand athlete's pain management strengths and confidence in pain management skills at a single academic institution. We hypothesized that athletes have high rates of opioid use from current or past injuries which can be predictive of long-term use and abuse.¹⁷

Methods

A single academic institution, descriptive cross-sectional study was conducted at Utah Valley University in Spring 2022. An anonymous and voluntary, 54 question instrument including multiple choice and five-point Likert scale items was developed with an expert committee of public health professionals, coaches, and

mental health advocates. The questionnaire assessed attitudes, perceptions, and self-reported practices of pain management following injuries incurred as an athlete. Approval was given by the Institutional Review Board prior to initiating research activities.

Theoretical Framework

This questionnaire was based on the public health theory of planned behavior. The survey was based on the major constructs of attitudes, perceived norms, perceived behavioral control, and behavioral intention.

Primary Measures

PHQ-9 Depression Scale -

This study sought to understand how an athlete's mental health status affects their pain management perspective, practices, and skills in the face of injury. The PHQ-9 depression survey¹² is a 9-question instrument that objectively determines depression in an individual.

Resilience Scale-

Resilience questions come from the Connor-Davidson Resilience 10 item scale which measures the degree to which a person is able to recuperate from adverse events including trauma, tragedy, and stressful events. The Connor Davidson Resilience Scale measures several components of Resilience: The ability to adapt to change. The ability to deal with what comes along. The ability to cope with stress. The ability to stay focused and think clearly. The ability to not get discouraged in the face of failure. The ability to handle unpleasant feelings such as anger, pain or sadness. The Connor-Davidson Resilience Scale has high internal consistency with reliability coefficients $\geq |0.70|$.¹⁸ Total resilience scores were calculated as a sum of all 10 items on a scale of 0-40, with 40 representing the greatest ability to be resilient despite challenges.

Statistical Analysis

Descriptive statistics were calculated on categorical variables. Univariate analyses were conducted using the chi-squared tests or Fisher's exact test, as appropriate. The primary outcomes were self-reported practices of pain management and mental health status.

Likert scale questions were combined to show agreement ("agree" and "somewhat agree") and

disagreement, neutral was kept in a separate category. Frequency statistics compared differences in attitudes, perceptions, and practices by sex. Data analysis was completed using Stata 17.1 software (College Station, TX).

Results

The study resulted in 42 participants. A total of 72% of students were female. 41% of all students were sophomores. Lower extremities were the most common anatomical location for injuries lasting longer than 2 weeks with no differences between female and male athletes ($p=0.36$). Significant differences were found in the type of sport played with females more likely to play soccer ($p=0.03$) than males (Table 1). 100% of

students reported significant injuries necessitating prescription opioid pain management though there were no differences between sexes in the number of times they were injured ($p=0.14$). No differences were noted by sex in reporting consistent versus intermittent pain ($p=0.47$). 55.3% of student athletes reported having pain for longer than 3 months.

Student athletes acknowledged use of various methods to control their pain. Though significant differences were not seen by sex (Table 2). No student athletes reported using illegal drugs (heroin, fentanyl, etc.) to control their pain. Overall, athletes acknowledged using other non-invasive methods of pain control such as using ice/ heat only sometimes or never by 23% of total students with 33% of females stating that they only used it sometimes (Table 2).

Table 1: Demographics of Athletes, by Sex.

		Males (n=11)	Females (n=28)	Chi2 pvalue
Year in School	Freshman	2 (18%)	2 (50%)	p=0.07
	Sophomore	5 (45%)	11 (39%)	
	Junior	4 (36%)	3 (11 %)	
	Senior	0 (0%)	10 (36%)	
	Graduate school	0 (0%)	2 (7%)	
What sport do you play on your university's extramural team?	Basketball	0 (0%)	2 (7%)	p=0.03
	Baseball	2 (18%)	0 (0%)	
	Cross Country	1 (9%)	1 (3.5%)	
	Golf	0 (0%)	1 (3.5%)	
	Soccer	1 (9%)	15 (54%)	
	Softball	0 (0%)	2 (7%)	
	Track and field	6 (55%)	6 (21%)	
	Volleyball	0 (0%)	1 (3.5%)	
	Multiple sports	1 (9%)	0 (0%)	
How many times have you sustained serious injuries (where your pain lasted longer than 2 weeks) that affects your abilities to perform your sport?	None	2 (18%)	3 (11%)	p=0.14
	One	2 (18%)	16 (59%)	
	Two	5 (45%)	5 (19%)	
	Three	2 (18%)	3 (11%)	
Location of injury resulting in pain for longer than 2 weeks.	Head/Brain (concussion or contusion)	0 (0%)	2 (8%)	p=0.36
	Upper extremity: arms, hands, elbow, shoulder	0 (0%)	1 (4%)	
	Lower extremity: legs, knees, hips, feet	8 (73%)	20 (80%)	
	Internal organs	0 (0%)	0 (0%)	
	Multiple locations	3 (27%)	2 (8%)	

*Significant at pvalue <0.05

Anti-inflammatory medication use was also reported at 21% of athletes saying they never used it. 49% of athletes declared never using meditation to control pain and 23% of athletes used rest never or only some of the time, with no significant differences between sexes ($p=0.39$). 43.6% of students did not feel that they were able to control their pain.

The questions of mental health and resilience showed that, 44% of athletes either somewhat or strongly agreed with the statement that they feel weak if they have pain. Overall, 56.4% of students agreed that having pain makes them perceived as weak by others and again another a majority of athletes felt that coaches,

teammates, friends, and or family expected them to push through the pain (56.4%) ($p=0.75$). Female athletes in particular felt they needed to push through the pain at 53.6% (Table 2). There were no significant differences in total average resilience scores by sex (males 29.7 vs females 30.7).

When looking at pain treatment methods, male athletes (73%) were significantly more likely to use transcutaneous electrical nerve stimulation (TENS) when compared with female athletes (33%) ($p=0.03$). Females were more likely to use trigger point injections (9% males versus 37% females, $p=0.08$).

Table 2: Use of Various Methods of Controlling Pain, by Sex

		Males (n=11)	Females (n=28)	P value
How often do you use these methods to control your pain?				
Prescription opioid medications	Never	9 (81%)	24 (88%)	p=0.52
	Sometimes	2 (18%)	2 (7%)	
	Often	0 (0%)	1 (4%)	
Anti-inflammatory medication	Never	3 (27%)	5 (18%)	p=0.80
	Sometimes	5 (45%)	15 (56%)	
	Often	3 (27%)	7 (26%)	
Non-prescription pain medication	Never	5 (45%)	15 (56%)	p=0.80
	Sometimes	4 (36%)	7 (26%)	
	Often	2 (18%)	5 (18%)	
Illegal drugs (heroin, Fentanyl, etc.)	Never	11 (100%)	27 (100%)	p=1.0
	Sometimes	0 (0%)	0 (0%)	
	Often	0 (0%)	0(0%)	
Exercise/ Physical Therapy	Never	1 (9%)	2 (7%)	p=0.63
	Sometimes	4 (36%)	6 (22%)	
	Often	6 (55%)	19 (70%)	
Rest	Never	0 (0%)	1 (4%)	p=0.39
	Sometimes	1 (9%)	7 (26%)	
	Often	10 (91%)	19 (70%)	
Meditation	Never	7 (64%)	12 (44%)	p=0.38
	Sometimes	2 (18%)	11 (41%)	
	Often	1 (9%)	4 (15%)	
Ice/ Heat	Never	0 (0%)	0 (0%)	p=0.35
	Sometimes	2 (18%)	9 (33%)	
	Often	9 (82%)	18 (67%)	
Resilience and Expectations - Agreement with the following phrases:				
I feel that I am weak if I have pain	Strongly disagree	2 (18%)	1 (45%)	0.33
	Somewhat disagree	1 (9%)	7 (35%)	
	Somewhat agree	4 (50%)	10 (50%)	
	Strongly agree	1 (13%)	2 (7%)	
I feel that having pain makes me perceived by others as weak.	Strongly disagree	0 (0%)	1 (4%)	0.46
	Somewhat disagree	3 (%)	2 (7%)	
	Somewhat agree	5 (45%)	11 (41%)	
	Strongly agree	2 (18%)	4 (15%)	
I feel that others (coaches, teammates, friends, family) expect me to push through the pain.	Strongly disagree	3 (27%)	4 (15%)	0.75
	Somewhat disagree	1 (9%)	2 (7%)	
	Somewhat agree	2 (18%)	2 (7%)	
	Strongly agree	5 (45%)	13 (46%)	

*Significant at pvalue <0.05

Table 3: Use of Pain Treatments, by Sex

What pain treatments have you tried?		Males (n=11)	Females (n=28)	P value
Surgery	Yes	2 (18%)	9 (33%)	p=0.31
	No	9 (82%)	17 (63%)	
Prescribed Opioid Narcotics	Yes	1 (9%)	5 (18%)	p=0.47
	No	10 (91%)	22 (81%)	
Anti-Inflammatory Medications	Yes	9 (82%)	25 (93%)	p=0.33
	No	2 (18%)	2 (7%)	
Physical therapy	Yes	10 (91%)	24 (89%)	p=0.85
	No	1 (9%)	3 (11%)	
Trigger Point Injections	Yes	1 (9%)	10 (37%)	p=0.08
	No	10 (91%)	17 (63%)	
Acupuncture	Yes	2 (18%)	7 (26%)	p=0.61
	No	9 (82%)	20 (74%)	
Epidural Injections	Yes	1 (9%)	0 (0%)	p=0.11
	No	10 (91%)	27 (100%)	
Transcutaneous electrical nerve stimulation (TENS)	Yes	8 (73%)	9 (33%)	p=0.03
	No	3 (27%)	18 (67%)	
Psychology/Counseling	Yes	0 (0%)	5 (18%)	p=0.13
	No	11 (100%)	22 (81%)	
Biofeedback/Relaxation techniques	Yes	1 (9%)	3 (11%)	p=0.85
	No	10 (91%)	24 (89%)	
Group Therapy	Yes	0 (0%)	0 (0%)	p=1.0
	No	11 (100%)	27 (100%)	
Cannabidiol (CBD)	Yes	1 (9%)	3 (11%)	p=0.85
	No	10 (91%)	24 (89%)	
Muscle Relaxants	Yes	2 (18%)	5 (18%)	p=0.98
	No	9 (82%)	22 (81%)	

*Significant at pvalue <0.05

A small portion of students, roughly 10% had used biofeedback/ relaxation techniques before. No athletes acknowledged attending group therapy and only 18% of females and 0% of males acknowledged psychology/ counseling (p=0.13) (Table 3). Which may indicate either a lack of services or time constraints given a busy academic and athletic schedule.

A total of 3% of athletes acknowledged using opioids not prescribed to them. None of the athletes

acknowledged being currently addicted to opioids. 14% of female athletes were concerned about friends/ teammates or family being in danger of addiction to opioids. 14.3% of athletes took opioids as prescribed on the bottle regardless of pain (Table 4). 10% of both female and male athletes acknowledged taking opioids according to the directions on the bottle regardless of the amount of pain they were having. 21% of athletes reported not using any of the opioids that were prescribed to them (p=0.83) (Table 4).

Table 4: General Opioid Use, Taking Prescribed Opioids, and Disposal of Opioids, by Sex

		Males (n=11)	Females (n=28)	P value
General Opioid Use				
Are you currently using an opioid pain medication prescribed by your doctor?	Yes	1 (9%)	0 (0%)	p=0.11
	No	10 (91%)	27 (96%)	
Have you ever used an opioid pain medication that was prescribed to someone else?	Yes	1 (9%)	0 (0%)	p=0.10
	No	9 (82%)	25 (89%)	
Have you ever been addicted or not been able to stop taking opioids?	Yes	0 (0%)	0 (0%)	N/A
	No	11 (100%)	27 (96%)	
Are you currently addicted or not able to stop taking opioids?	Yes	0 (0%)	0 (0%)	N/A
	No	11 (100%)	27 (96%)	
Do you have friends/ teammates or family that you have seen addicted to opioids?	Yes	2 (18%)	4 (14%)	p=0.70
	No	8 (73%)	23 (82%)	
Do you have any concerns about any friends or family who could be or are in danger of being addicted to opioids?	Yes	0 (0%)	4 (14%)	p=0.44
	No	10 (91%)	23 (82%)	
Use of Prescribed Opioids				
If you have ever been prescribed opioids, how have you used them?	Only when you have pain	4 (36%)	8 (29%)	p=0.83
	Only took a few	2 (18%)	2 (7%)	
	Didn't use any	2 (18%)	6 (21%)	
	Follow the directions on the bottle exactly- ie: take every 6 hours, etc. regardless of amount of pain.	1 (9%)	3 (11%)	
Disposal of Opioids				
How did you get rid of left over opioids?	Threw them away	1 (9%)	3 (11%)	p=0.38
	Gave them to a friend/ family	0 (0%)	1 (4%)	
	Saved them for future use	1 (9%)	3 (11%)	
	Finished the bottle completely	2 (18%)	6 (21%)	
	Lost them	0 (0%)	1 (4%)	
	Took them to a pharmacy, police station, or official take back site.	2 (18%)	9 (32%)	
	Flushed down the toilet	1 (9%)	1 (4%)	

*Significant at pvalue <0.05

When asked about opioid disposal practices, 10.3% of student-athletes acknowledged that threw the remainder away while 2.6% gave them to a family/ friend. 10.3% of athletes saved the remainder opioids for future use, while 15.4 finished the bottle completely, and 5.1% flushed them down the toilet. Only 7.7% of students properly disposed of left over prescription opioids by taking them to a police station, or other pharmacy/health department take back program.

Discussion

Analyzing the constructs within the theory of planned behavior allowed for an understanding of student athletes knowledge, attitudes, perceived norms, perceived behavioral control, and behavioral intention. There is also a dearth of information in the literature regarding female athletes.

While student athletes acknowledged low rates of

opioid utilization, they were at greater risk due to their behaviors of using opioids not prescribed to them and not taking opioids based on a taper plan but only as prescribed i.e.: every 6 hours. These represent areas for improvement in pain management education for student athletes that are at high risk for injury. This is similar to a study by Ekhtiari, et. al, which showed low rates of opioid use during college. However, in that same study it was determined that any use of opioids during college was a predictor for long-term misuse and abuse.

Furthermore, it is concerning that a substantial number of student athletes in our study did not utilize more non-invasive methods of pain control such as rest, exercise and physical therapy, meditation, and Ice/ heat. Non-invasive pain management techniques have shown great effectiveness in acute and chronic pain control.¹⁹ Reliance on medication or the lack of effective pain management (ie: just toughing it out)

is disturbing because this sets up athletes for future addiction or pain medication misuse risk.²⁰ No differences between sexes were found for use of more non-invasive methods also suggest a lack of overall pain management training and not specific to male versus female sports. More lucrative and male dominated programs, usually have more ability to provide sports medicine providers and athletic trainers²⁰ so this result could be explained by the institution studied not having a football program.

Students also reported high levels of not feeling confident in their ability to manage their pain. This sets them up for future opioid addiction due to lifelong injuries sustained in their during college. Furthermore, student responses indicated that their resilience and perceptions of themselves indicate a need for education. Resilience gives us the ability to thrive in the face of adversity. Those who are resilient are better able to move through the traumas of life.¹⁹ This is important for athletes who again are at higher risk for injury due to the nature of competition and the sports they play but unmanaged pain, also compounds the risk for future narcotic misuse and abuse.²⁰ A study by Campbell-Sills, et.al. 2009, found a mean score of 31.8 (SD = 5.4) was obtained using the CD-RISC 10 in a community based survey of 764 adults.²¹ Despite rigorous athletic training, student athletes were similar in their resiliency scores to that of the general population.

It was especially concerning that athletes perceived themselves as weak and that others thought them weak if they had pain. This self-perception weakens resilience and complicates one's ability to fully thrive and enjoy life.^{22,23} This self-perception indicates a lack of resilience and was further compounded by female athletes feeling like they needed to push through pain. "Pushing through pain" or overactivity, as it is known in the literature, increases an athletes' risk to not fully heal from injuries and instead turn acute issues into lifelong complications and incapacity.²⁴ This creates

an opportunity to also educate the social networks of athletes including friends, family, coaches, and support staff to ensure that athletes are encouraged to properly heal before fully engaging in their sport.

Only a small portion of students (10%) acknowledged taking opioids as directed instead of according to the amount of pain they were in. This is consistent with general trends of patients not having personalized pain management plans nor education about tapering off pain medications²⁵ (Table 4). Furthermore, 21% of students reported not taking any of the pain medications that were legitimately prescribed to them. This again alludes to the fact that over prescription of opioid narcotics is still occurring.²⁶ When that is combined with improper disposal practices such as giving leftover opioids to family/friends, saving them for future use, losing them, etc. then we can better understand the continued prevalence of opioids in our society.²²

This study is limited by a small sample size that limits the generalizability of the results. Furthermore, the study is based on self-reported data which could potentially lead to bias by students giving socially desirable responses, but this bias was mitigated by having it be anonymous, voluntary, and confidential. Again, this data could be biased by not having a football program which is common in other universities and could indicate a lack of sports medicine providers.

Health Implications

Students often lacked information on alternatives to opioids in their pain management needs. Furthermore, survey results showed that there is room for pain management educational interventions at this institution and resiliency training to ensure that injuries sustained during an athletic career do not become a life-long catalyst for chronic pain and addiction.

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