

Substance Use in Athletes

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- Objectives

- Athletes and Drugs of Abuse
 - Rates of Substance Use in Elite Athletes
 - Most Commonly Used Substances
- Understanding Reasons why Athletes Use Drugs of Abuse and PEDS
- Drugs of Abuse
 - Alcohol
 - Cannabis
 - Tobacco/ Nicotine
 - Prescription Opiates
 - Stimulants
 - Anabolic Androgenic Steroids
- Recommendations for monitoring, assessing, and treatment of Substance Use Disorders in Athletes
- Evidenced Based Treatment Interventions for Substance Use Disorders in Athletes

Pyramid of Substance Use

- **Top Rung- Substance Use Disorder**
 - Significant functional impairment affecting multiple life domains including: school/work, important relationships with loved ones, medical comorbidity, legal/disciplinary ramifications.
 - Continued use despite significant, negative consequences
- **Middle rung- Misuse**
 - Heavier use associated with risk and potential negative consequences; problematic use
- **Bottom rung- Recreational use**
 - Occasional use often in social situations; experimentation



Substance Use Disorders and the Athlete

- In General, elite athletes use substances at lower rates than the general population, but the five most commonly-used and misused substances by elite athletes are:
 - Alcohol
 - Cannabis
 - Nicotine
 - Prescribed opioids
 - Psychostimulants.

Student-Athlete Use Within the Last Year Compared to National Data (Similar Age)

	NCAA [2017]	CORE [2013]	MTF [2016]
Alcohol	77.1%	81.3%	78.9%
Cigarettes	10.5%	-	18.7%
Marijuana*	24.7%	32.5%	39.3%
Amphetamines*	1.5%	5.4%	9.8%
Anabolic Steroids*	0.4%	0.6%	-
Cocaine*	3.8%	4.1%	4.0%
Ecstasy*	1.9%	-	4.7%
Heroin*	0.2%	-	0.2%
LSD	1.7%	-	3.1%

*Substance banned for use by the NCAA.

For more information on the SIU Core Institute's Alcohol and Drug Survey data:

<http://core.siu.edu/>

SIUC/Core Institute. (2013). Core alcohol and drug survey long form: Executive summary. Retrieved from: https://core.siu.edu/_common/documents/2013.pdf

For more information on the Monitoring the Future data:

<http://www.monitoringthefuture.org/>

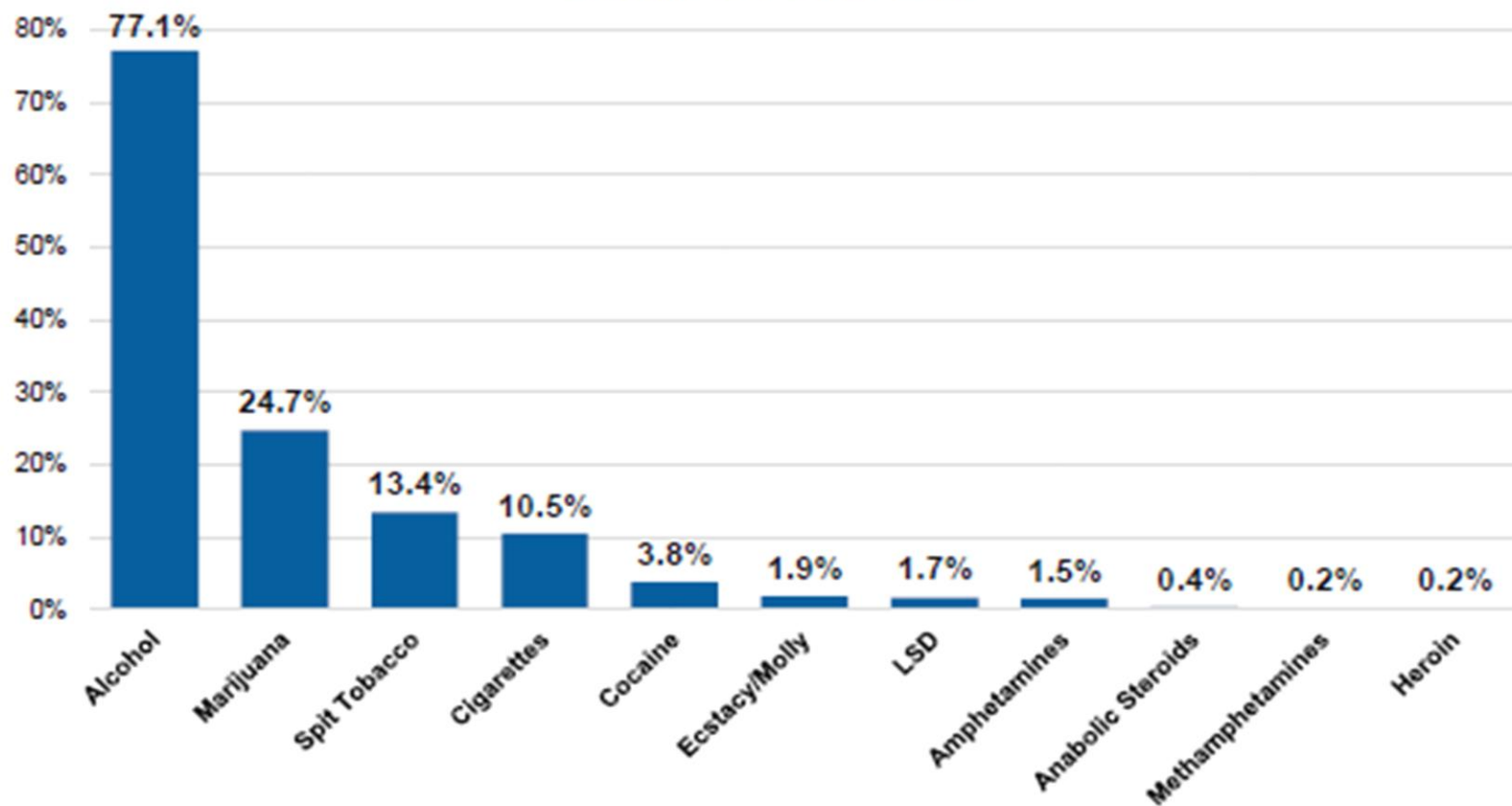
Schulenberg, J.E., Johnston, L.D., O'Malley, P.M., Bachman, J.G., Mlech, R. A., Patrick, M.E. (2016). Monitoring the Future national survey results on drug use, 1975-2016: Volume II, college students & adults 19-55. Retrieved from: http://www.monitoringthefuture.org/pubs/monographs/mtf-vol2_2016.pdf

**23,000 Student
Athletes
Surveyed in
2017**



Substance Use

Within the Last Year



Potential *Recreational* reasons why an athlete may use substances include:

- Socialization purposes
- Increase alertness and energy in the context of a vigorous training schedule
- Stress relief either before or after competition
- Manage or reduce acute or chronic pain related to training or competition
- Improve self confidence in the context of important competitions or games
- Manage cravings and withdrawal.

Ergogenic/ Performance-Enhancing reasons why Athletes use

- Increase strength, power, and endurance
- Increase focus and concentration abilities
- Increase aggression in sport
- Increase blood's oxygen carrying capacity
- Increase lean body mass
- Reduce fatigue associated with a vigorous training and game schedule.
- Enhance recovery from exercise and injury.

Pharmacology of Substances

- **Alcohol**- CNS depressant; potentiates activity at GABA receptors
- **Cannabis**- Potentiates activity at the CB-1 receptor which is responsible for Dopamine release involved in the key reward pathway in striatum and substantia nigra.
- **Nicotine**- agonist at nicotinic Acetylcholine receptors in the Central Nervous System, including the mesolimbic dopamine pathway involving the nucleus accumbens, which plays a central role in the reward/ pleasure pathway.
- **Prescription opioids**- full agonists at all opiate receptors, mu 1 and 2- (supraspinal analgesia and respiratory depression), kappa (spinal analgesia and sedation), and delta (spinal analgesia) found in the Central Nervous System pain transmission system.
- **Psychostimulants**- Blocks presynaptic reuptake of catecholamines, Dopamine and Norepinephrine. Amphetamine based medications have an additional mechanism of causing the presynaptic release of catecholamines, Dopamine and Norepinephrine, in addition to reuptake blockade. Targeted areas of the CNS include the Prefrontal Cortex

Alcohol

- Most commonly used substance by young, elite athletes
- Higher rates of binge drinking in certain sub population of athletes: athletes who use PED, white men, athletes who engage in problematic gambling behavior.
- In athlete population Alcohol Abuse/ Dependence prevalence rate of 7% to 10%

Alcohol Ergogenic versus Ergolytic Effects

Desirable Effects

- Before Competition
 - Reduce Anxiety
 - Boost Self confidence/ self esteem
- After Competition
 - Reduce Stress
 - Increase social connectedness
 - Improve team cohesion
 - Strengthen atheletic identity

Negative Effects

- Dehydration
- Insomnia
- Psychomotor impairment
- Weight gain
- Increased risk of accidents and injuries
- Increased risk of missing important appointment and obligations

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Cannabis

- Most widely used illicit substance in athletes and the general population. Although athletes still use less than their non-athlete peers.
- Higher rates of use in states where medical or recreational cannabis is legal. Currently legal in 18 states
- Higher rates in D III Athletes compared with D I athletes.

Cannabis: Desired effects versus Negative Effects

Desirable Effects

- Pain Control
- Stress Relief
- Socialization
- Depression

Negative Effects

- Impaired hand eye coordination
- Decreased strength and endurance
- Reduces maximum exercise capacity
- Reduced motor coordination, perceptual accuracy, and tracking ability
- Impaired memory, learning, and concentration
- In some cases, exacerbation of anxiety
- Increases injury risk with impaired visual motor coordination abilities
- Chronic respiratory infections

Nicotine

- Smoked or used orally
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- Widely used- Annual Prevalence rate of approximately 44% to 46 %, with 20 % reporting daily tobacco use
- Annual prevalence rate of Spit Tobacco, according to a 2017 NCAA Study of college athletes 13.4 %; down from 17.4 % in 2009
- 8 % of collegiate athletes use nicotine through vaping devices.

Nicotine: Ergogenic versus Ergolytic Effects

Performance Enhancing/ Ergogenic

- Improved alertness
- Increased energy
- Increased muscular strength
- Improved concentration and memory
- Enhanced endurance
- Relaxation/ calmness
- Weight control

Performance Impairing

- Increased Blood Pressure
- Increased Anxiety
- Insomnia
- Chronic respiratory infections

Prescription Opiates

- Prescription Opioids, used to treat acute and chronic pain, are the most commonly-used prescription medications that are mis-used by elite athletes.
- For 2017, the Prescription opioid misuse rate was 2.9 %. Down from 5.1 % in 2009.
- Even higher rates of opioid use in injured athletes; 17.9 % for males and 10.6 % for females, in comparison to prescription opioid use in the general population (7.9 % for men and 6.7 % for women).

Opiates: Benefits and Risks

- Desired Effects for Use
 - Euphoria
 - Acute and Chronic Pain control
- Risks of Use
 - Increased tolerance
 - Withdrawal symptoms associated with increased heart rate, blood pressure and anxiety symptoms
 - Respiratory depression
 - Constipation
 - Overdose risk with increased tolerance

Prescription Drugs- Stimulants

- Psychostimulants used for treatment of ADHD
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- Used to increase alertness, reduce distractibility, combat fatigue, boost energy, improve reaction time, enhance focus and sustained attention, and reduce hyperactivity and impulsivity
- Studies show positive effects on muscle strength, acceleration, endurance, and power
- In a 2017 NCAA study, the Stimulant misuse rate was approximately 5 %, meaning 5 % of college athletes used psychostimulants without a prescription. 7 % of college athletes used it with a prescription and medical exemption.

Stimulants: Ergogenic versus Ergolytic Effects

- Positive, Desired Effects (Ergogenic)
 - Improve reaction time
 - Increase arousal
 - Improved memory
 - More energy
 - Improved energy in fatigued athletes
- Negative Effects (Ergolytic)
 - Particularly in high doses or when “stacked”
 - Anxiety
 - Insomnia
 - Gastric Irritation
 - Tachycardia
 - Tremors

Performance Enhancing Drugs- Anabolic and Androgenic Steroids

- A lot of variability regarding AAS use across different sports
- Higher rates of AAS use in power/ collision sports compared to other sports. 1989 Kersey et al study cites a AAS use rate of 37.5 % in men and female competitive body builders and a rate of 66.7 % in elite male power lifters
- In a 2009 study of retired NFL players, 9.1 % of study participants reported using AAS during their professional career; highest rates in offensive and defensive lineman (16.3% and 14.8% respectfully).
- Hon and Colleagues Sports Medicine 2017, gathered data from randomized reported questionnaires in conjunction with monitoring of biological parameters to obtain a more accurate estimate of AAS use; found to be a range between 14 % and 39 %, with variation noted between subgroups of sports.

Anabolic and Androgenic Steroids

- Make up approximately half of the positive findings on drug testing from WADA labs.
- Increasing popularity of the SARMS (Selective Androgen Receptor Modulators) : Non-Steroid Compounds like: **Ostarine, RAD 140, and LGD-4033**, are used because of their perceived advantage of:
 - Increasing muscle mass, while not getting the undesired androgenic effects like hirsutism, clitoromegaly, and gynecomastia.

Androgenic-Anabolic Steroids: Ergogenic & Ergolytic Effects

- Positive (Ergogenic)
 - Increased muscle mass
 - Increased strength and power
 - Increased speed
 - Decreased body fat
 - Weight gain
 - Increased endurance
- Negative (Ergolytic)
 - Cognitive impairment
 - Negative mood symptoms
 - Psychosis
 - Aggression
 - Overuse injury (fracture, tendon rupture)
 - Hypertension
 - Liver damage

AAS Use: Chronic Side Effects

- **Females:** hirsutism, alopecia, deepened voice, clitoromegaly, menstrual disturbances
- **Males:** acne, gynecomastia, testicular atrophy, libido & fertility changes, impotence, behavioral problems, aggression, lipid abnormalities
- **General:** death from cardiovascular disease, sterility, masculinization, addiction, liver problems, immune system changes, psychosis, depression

Screening for Substance Use Disorders

- Self report and competition-day urine testing for substance use likely contributes to *underestimating* the rate of substance use and misuse among elite athletes.
- Newer strategies to monitor for substance use/misuse implement use of a **biological passport**, hair testing, early off-season testing, total team testing, post game testing, doping attitude scale administration, and obtaining collateral information from teammates and family members.

Assessment of Substance Use Disorders

- Age when use started
- First Drug Used
- Use Pattern
- Current Use
- Legal charges and Functional impairment related to substance use
- History of Withdrawal Symptoms- Review what substances are potentially associated with a life-threatening withdrawal (alcohol and sedative/hypnotics)
- History of Overdose and Medical Complications related to Substance use

Management of Substance Use Disorders in the Athlete

A treatment model to consider:

- Full Time Mental Health/ Substance Use Treatment Provider that monitors for SU onsite, all year round.
- Screening which starts preseason and continues through the season with frequent testing.
- Follow-up evaluations for those who screen positive.
- Easy access to FDA approved Medication Assisted Treatments for Substance Use Disorders.
- Brief, targeted individual and group interventions, utilizing motivational interviewing strategies.
- Medical Withdrawal management is clinically indicated for withdrawal syndromes associated with alcohol, sedative/hypnotics, and opiates.

FDA Approved Medication Assisted Treatments for Substance Use Disorders in Adults

- Tobacco Use Disorder- NRT, Bupropion SR, Varenicline
- Alcohol Use Disorder-
 - Benzodiazepenes (for withdrawal management only)
 - Disulfiram (aversive treatment)
 - Naltrexone (opiate antagonist)
 - Acamprosate (NMDA antagonist/ GABAergic)
- Opiate Use Disorder-
 - Methadone (full opioid mu agonist)
 - Buprenorphine/Naloxone (partial opioid agonist) (FDA approved down to age 16)
 - Naltrexone (full opioid antagonist)- full abstinence required

Evidenced Based Psychotherapy for Substance Use Disorders

- Cognitive Behavioral Therapy- focuses on tying together emotions, thoughts, and resulting behaviors
- Family Therapy- looks at family dynamics and relationships which impact the individual's pattern of substance use
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- Contingency Management – rewards desired behaviors/ operant conditioning technique
- Motivational Enhancement Therapy/ Motivational Interviewing- Rolling with resistance to making change to substance use pattern.

References

1. Recreational and Ergogenic Substance Use and Substance Use Disorders in Elite Athletes: A Narrative Review. British Journal of Sports Medicine, McDuff, David, Stull, Todd, Castaldelli-Maia, Hitchcock E Mary, Hainline Brian, Reardon Claudia, L. 2019, 53:754-760.
2. Substance Use and its Impact on Athlete Health and Performance, Stull, Todd et al. Psychiatric Clinics Fall 2021.

WADA (Worldwide Anti Doping Agency) Criteria for Its Prohibited List

1. It has the potential to enhance or enhances sport performance
2. It represents an actual or potential health risk to the athletes
3. It violates the spirit of the sport

Meets two of the three above criteria

<https://www.wada-ama.org/en/what-we-do/the-prohibited-list>

WADA 2020 Prohibited List

Prohibited at all times (in & out of competition)

Anabolic steroids

Other anabolic agents

Peptide hormones & growth factors & related substances

Beta-2 agonists

Other non-approved substances (not approved for therapeutic human use)

Hormone & metabolic modulators

Diuretics and masking agents

Manipulation of blood or samples

Gene and cell doping

Prohibited in competition

*Stimulants (can have a TUE), *Opioid Narcotics (including buprenorphine)

*Cannabinoids (except CBD), *Glucocorticoids

Prohibited in particular sports (e.g. archery, shooting, darts, billiards, skiing, golf)

Beta-blockers (formerly also alcohol)

Monitoring Program

Stimulants (e.g. bupropion, caffeine, nicotine, phenylephrine, synephrine)

Opioid Narcotics (e.g. codeine, hydrocodone, tramadol)

<https://www.wada-ama.org/en/what-we-do/the-prohibited-list>

NCAA 2020-2021 Banned Substances

<http://www.ncaa.org/sport-science-institute/topics/2020-21-ncaa-banned-substances>

1. Stimulants (e.g. amphetamine, caffeine, cocaine, ephedrine, methamphetamine, methyphenidate, modafinil, phentermine, synephrine)

Note: phenylephrine & pseudoephedrine are not banned

2. Anabolic Agents (e.g. androstenedione, boldenone, clenbuterol, nandrolone, stanozolol, testosterone, trenbolone)

3. Alcohol & beta blockers-for rifle only (e.g. alcohol, atenolol, metropolol, propranolol)

4. Diuretics & masking agents (e.g. chlorothiazide, furosemide, hydrochlorothiazide, probenecid, sprionolactone, triameterene)

5. Narcotics (buprenorphine, fentanyl, hydrocodone, hydromorphone, methadone, morphine, oxycodone, pentazocine)

6. Cannabinoids (e.g. marijuana, synthetic cannabinoids, tetrahydrocannabinol)

7. Peptide Hormones, growth factors, related substances (e.g. growth hormone, human chorionic gonadotropin, erythropoietin, IGF-1 (deer antler velvet), ibutamoren)

8. Hormone and metabolic modulators (e.g. aromatase inhibitors, clomiphene, fulvestrant, SERMS)

Beta-2 agonist (e.g. bambuterol, formoterol, salbutamol, salmeterol)

Substances & methods subjected to restriction (e.g. blood & gene doping, local anesthetics, manipulation of urine, beta-2 agonist (permitted only via inhalation with an RX, tampering of urine samples, **Nutritional/Dietary Supplements**)

Thank You !

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