

A2 LEVEL

FACT FILES

Sports Science

Subject content link:

**A2 Unit 2 : The Application of Science to
Sports Performance**

- Ethics in Sports Performance

FACT FILE

sports
science
and the active leisure industry

A2 Unit 2: Ethics in Sports Performance



Learning Outcomes

Students should be able to:

- demonstrate knowledge and understanding of the following scientific developments which can impact on sports performance:
 - drug taking (use of legal and illegal drugs); and
 - technology (sports clothing and equipment);
- discuss the implications of these developments on sports performance;
- review the strategies taken by sports governing bodies to counter illegal drug use in sporting performance;



Course Content

Ethics

Sport has been around as long as civilised man has occupied the planet and has been described by Billie Jean King as a microcosm of society. Societal values are reflected through sport and therefore ethical considerations are just as relevant. The profile of sport has grown tremendously with the advances in technology and media. Sport is admired by the masses because of the physical challenge, the discipline and the feats of human excellence that can be reached. It is also governed by rules and requires self sacrifice and discipline so it is inevitable that top athletes exist as role models for the next generation. With increased profile comes increased scrutiny and athletes are at the centre of many contemporary ethical arguments.

Drugs in Sport

The Lance Armstrong saga (2010-2013) put sport under the microscope and brought the issue of drugs in sport to forefront of the global media. Armstrong felt that by doping he was competing on a level playing field. If everyone was taking drugs surely this creates a level playing field. So why are so many substances on the banned list? Can we truly have a level playing field if highly paid athletes have access to the most advanced technology and doctors and chemists who

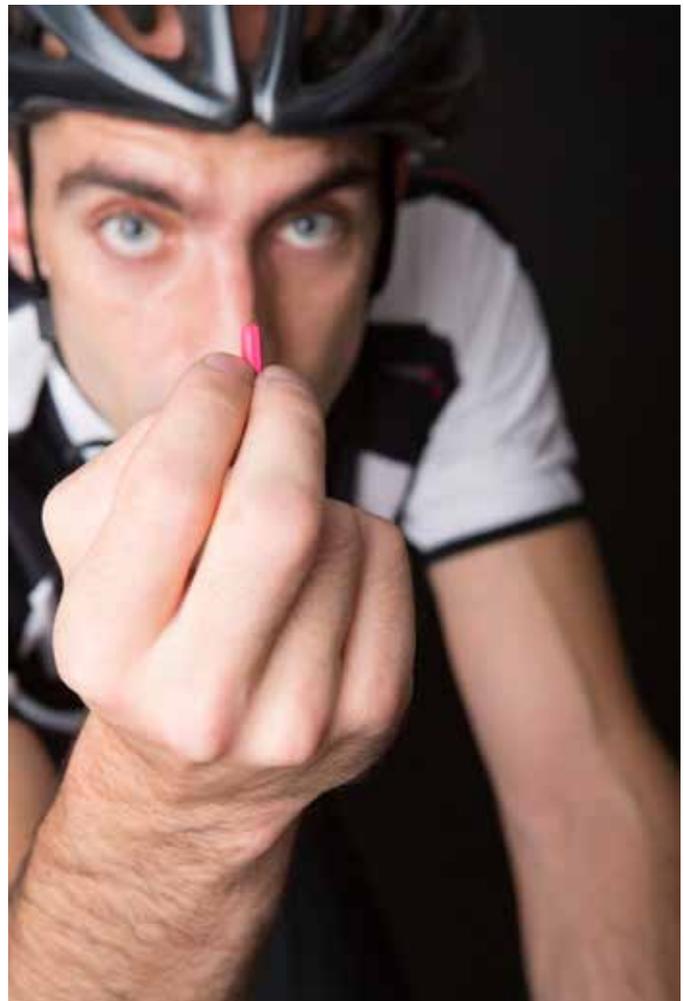
can administer the most efficient and safe doses? The health implications and possible side effects are well documented and lives would certainly be put at risk if there was a blanket acceptance of drug use. Doping procedures have become more and more sophisticated with advancements in science and technology and therefore detection has become more challenging for the authorities. Random testing and life time bans are among the deterrents. Even honest athletes need to be very careful as many banned substances can be found in over the counter drugs and nutritional supplements.

Type of drug	Benefits	Side effects	Athletes likely to use them
Anabolic steroids	<ul style="list-style-type: none"> • Train harder for longer • Promote muscle growth • Repair of muscle tissue 	<ul style="list-style-type: none"> • Liver damage • Heart failure • Increased aggression • Masculine effects on females • Testicular atrophy • Reduced sperm count 	<ul style="list-style-type: none"> • Weight lifters • Body builders • Strength and power athletes • Sprinters
Peptide hormones	<ul style="list-style-type: none"> • Build and repair muscle • Increase transport of oxygen 	<ul style="list-style-type: none"> • Muscle atrophy • Increased blood viscosity 	<ul style="list-style-type: none"> • Weight lifters • Body builders • Strength and power athletes • Sprinters
Beta blockers	<ul style="list-style-type: none"> • Calms nerves • Steady hands • Improved fine motor control 	<ul style="list-style-type: none"> • Low blood pressure • Chronic fatigue • Slows heart rate 	<ul style="list-style-type: none"> • Shooting • Snooker • Archery
Narcotic analgesics	<ul style="list-style-type: none"> • Reduce pain 	<ul style="list-style-type: none"> • Addictive • Sickness • Respiratory complications 	<ul style="list-style-type: none"> • All sports
Stimulants	<ul style="list-style-type: none"> • Increased endurance • Increased alertness • Reduces fatigue 	<ul style="list-style-type: none"> • Higher blood pressure • Higher temperature • Possible death • Addictive 	<ul style="list-style-type: none"> • Cycling • Boxing
Diuretics	<ul style="list-style-type: none"> • Quick weight loss 	<ul style="list-style-type: none"> • Dehydration • Dizziness • Faintness 	<ul style="list-style-type: none"> • Jockeys • Boxers

Blood doping – freezing and re- injecting red blood cells to increase haematocrit	<ul style="list-style-type: none"> • Higher red blood cell count therefore increased oxygen transport and cardiovascular endurance 	<ul style="list-style-type: none"> • AIDS • Hepatitis • Blood clotting • Allergic reaction 	<ul style="list-style-type: none"> • Long endurance events • Cycling • Running • Skiing
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High profile scandals

Lance Armstrong is one of the most high profile athletes to ever be branded a drug cheat. His notoriety was compounded by his high profile ‘confession’ on USA television. A massively popular athlete who beat cancer and went on to win a record 7 Tour de France; he cemented his place in history as one of the greatest ever athletes.

“Did he use EPO? Testosterone? Cortisone? Human growth hormone? Illegal blood transfusions and other blood doping? Armstrong answered “yes” on all counts”, according to CNN’s edition. www.edition.cnn.com

This admission came in spite of the fact that Armstrong never actually failed a drug test. He was involved in one of the most sophisticated drugs programmes in history, according to USADA, a practice which in his opinion put him on a level playing field with the worlds’ elite cyclists. For such an extent of drug abuse to go undetected for so long was a major issue for anti doping agencies, and for sport. Other high profile cases include:

Ben Johnson

During his career the Jamaica-born Canadian was considered one of the greatest sprinters in history. He won two Olympic bronze medals in LA and set consecutive world records at the 1987 world championships and 1988 Olympics where he won gold. He was stripped of both world records and the Olympic title after he tested positive for stanozolol in 1988.

Floyd Landis

Before Armstrong, cycling came under the microscope as

Landis was unceremoniously stripped of his 2006 Tour de France victory in 2010.

Marion Jones

United States sprinter Marion Jones was stripped of all of her five Olympic medals she earned in Sydney in 2000, when she admitted drug-use 7 years later. She served a jail sentence for perjuring herself to federal authorities.

Alberto Contador

The Spanish cyclist is one of only five riders in history to win all three “Grand Tours” of road cycling. He was stripped of his 2010 Tour de France and 2011 Giro d’Italia titles when the drug clenbutero was found in his blood in 2010.

Chinese Swim team

Eleven members tested positive for dihydrotestosterone at the 1994 Asian Games. More than 40 Chinese swimmers since 1990 have failed drug tests. Just before the 2000 Sydney Olympics, China removed four swimmers from its team because of “suspicious” drug test results.

Nadzeja Ostapchuck

One the biggest scandals from the recent London Olympic Games, Belarusian shotputter Nadzeja Ostapchuck was stripped of her gold after she tested positive both before and after her more than 21-metre winning throw.

Shane Warne

In 2003, just before the Cricket World Cup, the Australian spin bowler tested positive for diuretics hydrochlorothiazide and amiloride, which can also be used to mask performance enhancing drugs. Warne claimed he had been given a tablet by his mother to aid in weight loss, and did not know it contained the banned substances. The International Cricket Council banned him for a year.

Dwain Chambers

Chambers is one of 3 British athletes to campaign to be considered for selection in the London Olympics despite being banned for drug offences in the past. Dwain was banned for taking anabolic steroids in 2004 but was cleared to compete in London 2012.

David Millar

Millar was banned in the same year as Chambers for taking



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performance-enhancing drugs, but like Chambers, has since reformed and returned to some success in other competitions.

Christine Ohuruogu

The third athlete has even more controversy surrounding her case, as she was banned originally in 2006 for a year for missing three tests. She was also given a lifetime Olympics ban after failing to attend three out-of-competition drug tests. The ban was overturned in 2007 and she was allowed to compete in the Beijing Olympics in 2008, winning gold in the 400m and silver in London 2012.

Implications for sports

“The science of cheating has become so advanced that testers simply cannot detect them.” This was the Daily Telegraph’s report after the inaugural briefing between ASADA and all six NRL clubs implicated in the Australian Crime Commission’s report into performance-enhancing drug use. www.dailytelegraph.com

The reasons that sports stars turn to drugs are hard to pin down as they are surely many fold. Pressure from coaches, peers and family, the ambition to succeed by any means,

the financial incentive, the glory and exposure or just possibly the inclination to cut corners may all help explain the enticement of drugs. It is an issue that is at the forefront of public minds with the London Olympics fresh in the memory, and the Lance Armstrong saga still reverberating around the world. As a much loved and admired athlete many would have hoped that it was not true. Such is the responsibility of the modern athlete to be a positive role model. Christine Ohuruogu one of Britain’s top athletes, and best hopes for a gold medal in London 2012 enjoyed the support of the fans despite a questionable drugs background at best. Jonathon Edwards, an Olympic gold medalist with a squeaky clean image voiced his support for second chances and if sport is to be reformed then surely we must allow for the reformation of individual athletes. Bradley Wiggins, Tour de France champion and Olympic Gold medalist, has been very vocal in his condemnation of drug cheats in his attempts to repair the reputation of cycling.

In the 1972 Olympics, the East German women’s swim team won a total of zero gold medals. In 1976, they won 11 gold medals in 13 attempts. These days, a story like that would make for a Hollywood movie. The swimmers were later found guilty of taking anabolic steroids. The athletes however were unaware that their own government was administering these drugs!

Today any radical improvement in skill and speed is scrutinised and can often undermine the hard work of innocent athletes. This is the legacy of the culture of doping in sport. Unlike the East Germans, modern athletes are making their own decisions about drug use. New technology means that testing is becoming more accurate and effective, but it also means that new drugs are being developed to allow athletes to avoid detection.

All around the world sport is part of life. People play and compete to pit themselves against their opponent in a battle of skill, ability and determination. Drugs cause an imbalance in favour of those who can afford and access them. It undermines the integrity of competition. Talent, ability and hard work become less important than affluence, access and opportunity robbing potential champions of success.

As incentives for sporting success become more lucrative and drugs become more prevalent competitors are finding that cheating is almost necessary to compete. When you know your competitors are gaining an advantage by taking drugs then it is only fair to level the playing field once again. As well as the ethical consideration, sports governing bodies and anti doping organisations are finding it difficult to agree on what is and isn’t an unfair chemical enhancement. Caffeine and alcohol are illegal while energy



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drinks remain legal. With so many substances on the banned list, there is no room for error, even if it's taking an over-the-counter head ache tablet.

Drug use in sport does not only affect performers, but also those who spectate. The respect for sports and its athletes can easily be tarnished if even a single athlete is caught doping.

A further implication is the subsequent affect on sponsorship. Companies will not back sporting events or athletes if drug use is even suspected. Once a sport is tainted with doping allegations, cleaning up is a very hard task as we have seen with tour cycling. Evidence shows that sponsorship, advertising and TV rights heighten the profile of sport attracting participants and supporters and raising popularity. Therefore, the reverse will be true. If companies opt out due to the negative publicity attached to drug use the sport will suffer.

Strategies employed by sports governing bodies

Drug testing is the first and foremost strategy to prevent drug use in sport. It came about as a necessity when it was discovered that athletes were beginning to look for ways to boost performance by any means. Since the 70's drug testing has become more frequent and rigorous amongst professional athletes in every sport. In Australia, for example, all competitive athletes at a high level of competition are entered into the ASADA 'testing pool'. In other words they are placed on a list and can be tested at any time. This means that it is much more difficult to stay 'under the radar' and beat the testing system.

In 1998 a large number of banned substances were found by police in a raid during the Tour de France. The scandal led to a major reappraisal of anti-doping policies. There was a need for cooperation between international sports authorities and various governmental agencies. Before 1998 different organisations had varying definitions, policies, and sanctions which led to disputes often being overruled in civil courts. The Tour de France scandal highlighted the need for an independent international agency and hence

the World Anti-Doping Agency (WADA) was established on November 10, 1999.

The World Anti Doping Authority publishes the mandatory guidelines for testing and athletes can be tested at any time in or out of competition. National and International committees like the British Olympic Association and the International Olympic Committee are bound by the International Standards for testing set out by the WADA "Code". There are 2 types of test.

1. Urine Samples – used to detect the presence of substances on the banned list
2. Blood testing – used to monitor the profile of an athletes haematocrit to detect irregularities that result from blood doping

There are very strict guidelines on testing to help ensure the anonymity of the athlete and the validity and accuracy of the tests. However, ways of beating the tests have been tried and tested by athletes. The most common methods are sample manipulation, sample adulteration and masking.

- **Sample Manipulation** involves of altering the nature of the sample by simple substitution and the use of products to affect the amount of drug a present in the urine.
- **Sample Adulteration** involves introducing chemicals into a urine sample to interfere with the testing process. These chemicals also include some drugs that may interfere with the testing technology to cause a "false negative" report.
- **Masking** involves rapidly removing drugs from the body prior to a test, or blocking the removal of a drug from the body through the kidney and urine. The intent is to use one drug or chemical to greatly reduce the urine concentration of an illegal drug.

Strategies to defend against these attempts to "beat the test" include:

1. A limit on the amount of time between notification and administration of the test. This makes it more difficult to employ the aforementioned methods.
2. Strict control on access to liquids consumed at the time of testing to ensure that foreign products are not being taken to compromise the sample.
3. Direct observation should be used when collecting samples and if not bluing agents in toilets and taping off faucets so water cannot be used to dilute a sample are advised.

While drug testing is the most effective deterrent for drug users in sport, more ethically challenged doctors and chemists continue to come up with more advanced ways of avoiding detection. In addition to drug testing sports governing bodies, international, national and local authorities must also employ other strategies to combat the drug cheats.

Education – society as a whole and especially competitive athletes need to be educated about the dangers of drug use first and foremost as well as the rules and policies and the punishments involved.

Supply – police and customs can take steps to reduce the supply

Demand – reduce demand through effective education and apply greater taxation to offending substances

Policy – consistently implement and apply policy at all levels of sport

Equipped for Sport

Pressure to win has led to performers adopt virtually any means to gain an edge, sometimes illegally as we can see from the drugs example. The incentive value of success has motivated everyone involved in sport to look for ways to achieve that extra millimetre or hundredth of a second which determines the winner. Technological developments in sports equipment has had a massive influence on the advances performers have made. It seems the human body is capable of improving performance levels beyond what we could believe possible. This can be attributed in no small part to improvements in equipment.

The improvement of design in **sports facility design** has led to improved performer and spectator comfort which has led to increased enjoyment and therefore higher profile and uptake in the sport. Better playing surfaces and floor surfaces are among the developments.

The drawback of this is that facilities can become obsolete much quicker and facilities are updated before they have worn out. Organisations, teams or countries who have more money and better facilities will be at an advantage and enjoy the knock on effect that improved facilities may have, thus widening the gap between the have's and have not's even further.

Electronic and digital devices have increased the enjoyment for the spectator and improved accuracy in sport specific measuring. Photo finish devices, timers, slow motion replays, scoreboards and live broadcasting considerably improves the sporting experience.

Computers have vastly influenced sport through a variety of means. Computer aided design facilitates the design of state of the art equipment for performers and grounds such as the Olympic Stadium, for the spectators. Computers are also instrumental in performance analysis and evaluation as well as fitness assessment.

The financial resources available to athletes differs greatly and therefore so too does the opportunity to benefit

Raw materials have contributed to great advancements in sports and often helped performers to higher levels of achievement. Light weight carbon fibre in bikes and racing cars, lycra in running suits, strong super light metals in tennis racquets and bicycle helmets, fibreglass in cricket bats have all helped the athlete get faster and more efficient movement on land, air and water.

Officiating has altered with assistance from video referees, photo finish devices, microphone and radio communication systems in most instances improving the accuracy of decision making.

However, as we have seen with the debate on the introduction of goal line technology to football, there is some resistance to certain developments for the following reasons:

- it may undermine the referees authority
- take too much time
- change the way the game is played.

Equipment design has developed from a greater understanding of the biomechanics of sporting movements and the properties of physics in relation to objects, implements and vehicles. It seems that every month a new design is being tested by Formula One teams. Golf clubs, helmets, racquets, balls and basically all equipment used in sport have undergone specification changes over the years with the improvement in performance and safety the main motivators.

Sports clothing

The same technological advances have led to the improvement in design and manufacture of clothing for sports. These developments enhance the athletes performance as a result of the some or all of the following features:

- Comfort
- Breathability (prevents heat loss, prevents over heating)
- Less friction (air, water)
- Safety
- Support
- Efficiency and flexibility of movement
- Cushions impact (footwear)



Activities

Once again the athlete who can afford the best gear reaps the benefit while the rest may experience inhibition of their full potential.

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In competitive sport, the smallest advantage can make an enormous difference and consequently, the use of ergogenic aids has been prevalent in elite sport for many years. These 'aids' include any external influences that enhance performance and can be mechanical (such as ergogenic fabrics), pharmacological (legal and illegal examples are well documented), physiological, nutritional (sports supplements), and psychological.

1. Research and explore developments in ergogenic aids (remember that some are illegal but are still widely used) - see examples below.
 - Mechanical aids e.g. aerodynamic cycling helmets.
 - Pharmacological aids e.g. anabolic steroids, beta blockers.
 - Physiological aids e.g. physiotherapy, sports massage, acupuncture.
 - Nutritional aids e.g. creatine, sports supplements.
 - Psychological aids e.g. Hypnosis, imagery.

2. Present your findings in a table using the following headings (example included below):

Type & name of Ergogenic Aid	Description or design	Implications for performance
Mechanical Aid: Cyclists helmet	Aerodynamic 'tear drop' shape with magnetic mirror visor	Less air resistance therefore greater speed

3. Present a selection of your findings as part of a class discussion.

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