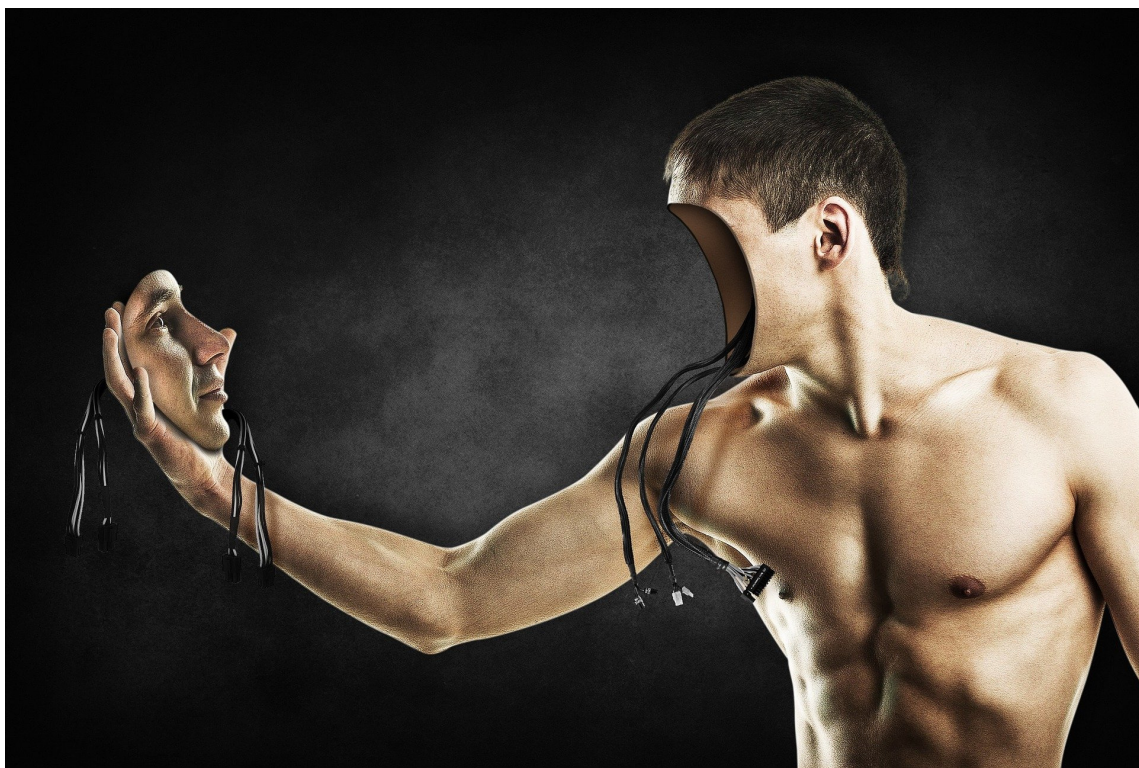


# HED Matters

**Theme:** Human Enhancement Drugs and  
Technology

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**HUMAN**  
ENHANCEMENT  
DRUGS NETWORK

# Editorial

Welcome!

The Latin motto of the Olympic Games is well known. The words *citius, altius, fortius*, or faster, higher, stronger, are used to “...encourage athletes to give their best during competition” (The International Olympic Committee, 2020). We, the viewer, tune in for those precise reasons. We want to see athletes jumping higher, running faster, lifting stronger. The introduction of the World Record Line technology at the Sydney 2000 Olympics further engaged the television viewing public. The technology – a yellow superimposed line that appears in events such as swimming to show how fast an athlete needs to go to beat an existing world record – has been used at every Olympics since. We want to see athletes reach the peak of human performance, and the spectacle of a sometimes decades-old world records get beaten.

But what happens when athletes stop going higher, going faster, and getting stronger?

Traditionally athletes have resorted to performance enhancing substances and methods to help push their bodies beyond their normal abilities. Lately, though, advances have come through technology, such as specialised swimsuits and, more recently, specialised running shoes. It was the controversy surrounding Kenyan runner Eliud Kipchoge’s use of the Nike Vaporfly in early 2020 to become the first person to run a marathon distance in under two hours that inspired this edition of HEDN Matters, entitled ‘Human Enhancement Drugs and Technology’.

As always, this edition starts with a focus on the forthcoming work from HEDN members. We shine a spotlight on early career researcher Dr Lewis MacGregor from the University of Stirling in Scotland and his work on foam rolling as a natural enhancement. Next, Prof Andy Miah from the University of Salford in England discusses the technological imperative within the enhancement debate. Then Dr Deborah Trevaillon, from the University of Newcastle in Australia, discusses human enhancement technologies with a focus on the so-called ‘fast suits’ used by a number of swimmers to smash world records. The baton is then handed over to Dr Robert Page from Sydney in Australia, who gives an ultramarathon runner’s perspective of the Vaporfly and its use in competition. Last, but not least, PhD student Aleksi Hupli from the University of Tampere in Finland makes the case for moving beyond a pharmacocentric understanding of drugs to a more context-sensitive conception of drugs as ‘pharmacological neurotechnologies’.

Yours sincerely  
The HEDN Board



Dr Katinka van  
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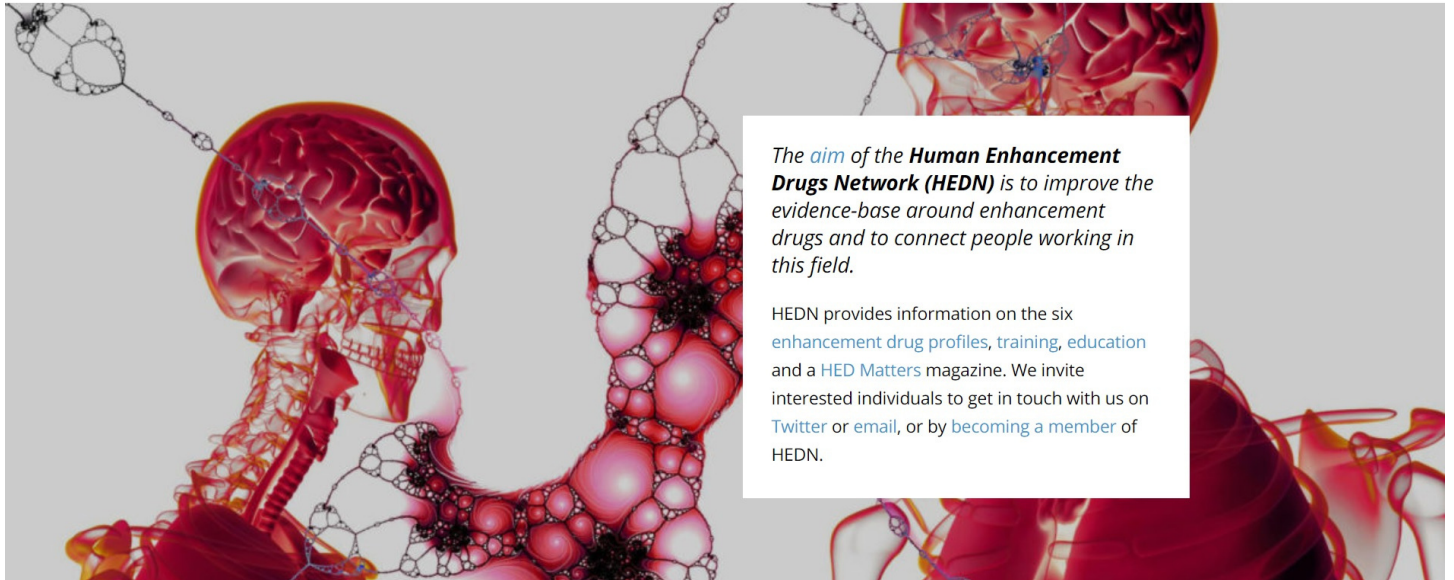
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# New HEDN website!



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We are proud to announce that the new website of the Human Enhancement Drugs Network has been officially launched! The website has been generally improved to enhance user accessibility and to further promote the members of the network and their research as well as activities within and related to the network.

Make sure to visit our new website and check out:

- The new 'Members' page and the updated 'HED profiles' page
- Our latest news and projects such as 'Blowing the whistle on doping in sport' by Susan Backhouse and colleagues
- Our educational materials such as the new IPED infographics for needle and syringe programme workers by Ian Boardley, Martin Chandler, and Katinka van de Ven.

## Your feedback is important!

If you experience problems using the website or if you have any suggestions for improvements, please don't hesitate to contact us.

Get in touch with the HEDN team here: <https://humanenhancementdrugs.com/about/contact/>.



**[www.humanenhancementdrugs.com](https://humanenhancementdrugs.com)**

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# ECR Spotlight: Foamrolling as "natural enhancement"?

*By Lewis MacGregor, Lecturer in Physiology and Nutrition, Faculty of Health Sciences & Sport, University of Stirling, Scotland*

## Natural Enhancement

Utter the words “performance enhancing” and instantly a swarm of negative connotations leaps to mind. Just the term “enhancement” on its own can conjure up images of something from science fiction. This undertone is culturally embedded, thanks to pioneering authors like Frank Herbert, John Taine, and Aldous Huxley. Quite cynically, we seem predisposed to always question anything considered to provide a competitive advantage. We need only cast our minds back as recently as Eliud Kipchoge’s monumental performance to run a marathon distance in under two hours. Before the dust had even settled, every facet of this achievement came under scrutiny.

Perhaps the most heavily examined (and most controversial) was the pair of Nike Vaporfly trainers that Kipchoge wore during his 42.2 km run. Calls to ban the use of these shoes have only grown with the continuing dominance of athletes who don the controversial footwear. It may seem inevitable that Nike’s Vaporfly – which is suggested to increase running economy by ~4% – will follow LZR Racer swimsuits and anchored golf putters into the annals of banned sports equipment.

But surely we can think about enhancement a bit more optimistically. Allen Buchanan, author of *From Chance to Choice: Genetics and Justice*, describes any attempt to overcome the existing physically or mentally limited capabilities of the human body, either temporarily or permanently, through technological, artificial, or natural means. So, we could box equipment like Nike Vaporflys under the bracket of technological enhancement, but what about natural enhancement? If we’re exploring the concept of enhanced performance it would be inappropriate to draw a line at the world of competitive sport.

Buchanan’s definition refers to overcoming the human body’s physical and mental limitations. From that point of view, we should consider performance to encompass all aspects of day-to-day life – “performance enhancing” can simply be regarded as living better. Unsurprisingly, natural enhancements that can help athletes to run faster, jump higher, and throw further are the same enhancements that can lead to everyday better-quality living.

## The rise of foam rolling

Partly due to the rise of social media and the power of fitness marketing some of the bizarre quirks and idiosyncrasies that have long been adopted by athletes as “natural enhancers” have, in recent years, started to take root in gyms and fitness centres around the world. For instance, myofascial release – manipulation of muscle and soft-tissue using anything from the skilled hands of a masseuse to a foam roller or lacrosse ball – was once reserved for the treatment rooms of professional athletes only. Nowadays it is difficult to set foot in a gym without stumbling over someone rolling around on a neoprene tube. This particular foam may be a whole lot less controversial than the extra-thick sole of Eliud Kipchoge’s trainers, but there are no less questions to be answered.

The all-conquering foam roller was first patented in the US by Stacy Barrows in 2004 as “a piece of exercising apparatus for improving balance and equilibrium”. But this, and later incarnations of foam roller, owes a great deal to an Israeli engineer, physicist, and judo black belt by the name of Moshé Feldenkrais. In the 1950s, Feldenkrais pioneered work on body movements designed to improve physical performance before popularising his system for physical improvement a couple of decades later after he moved to the US; with Michael Clark, an American sports therapist, helping to introduce Feldenkrais' approach to a wider audience with his 2001 book, *Integrated Training for the New Millennium*.

From these humble beginnings we now find ourselves in an age where “foam rolling” returns over 600,000 video hits on YouTube, guiding viewers through everything from the basics of how to use a foam roller, to different types of foam rollers available, and the optimal routine to get the most out of your foam roller. Meanwhile, even the most casual internet search will yield ~40 million results claiming that foam rolling will prevent muscle soreness following exercise, increase your flexibility, and even improve your circulation and enhance cardiovascular health.

**“... prior to 2017, fewer than five research papers had been published each year relating to the effects of foam rolling. To date, evidence from research suggests that we are some way from discovering an optimal routine or best practice approach**

But just because something is popular and widely endorsed, that doesn't mean there's any scientific evidence to support it. In fact, prior to 2017, fewer than five research papers had been published each year relating to the effects of foam rolling. To date, evidence from research suggests that we are some way from discovering an optimal routine or best practice approach (Wilke et al, 2019) – researchers have adopted protocols involving intermittent or continuous bouts, ranging from 10 seconds to over 2 minutes, and basing the pressure applied by the foam roller on factors including personal preference or specific percentages of bodyweight.

Throughout my PhD, I worked closely with some of the most successful athletes in Scotland, with close focus on how to maximise muscle function in relation to training and competition (Macgregor, 2016). One thing that became apparent to me was that the vast majority of athletes carried a foam roller with them to every training session, but few if any really had any idea why. So, now that researchers are beginning to catch up to the hype, can we endorse the popular opinions that surround foam rolling?



*Photo by Anders Schmidt Vinther, HEDN*

## How does foam rolling work?

Most people assume that flexibility is positive, that the state of being loosened up helps with mobility and postural control; despite recent suggestions to stop considering flexibility as a key factor in physical fitness (Nuzzo, 2019). If we however stick to our earlier definition of performance as living well, increasing flexibility can have a range of positive benefits (Behm & Chaouach, 2011). However, being too loose can lead to reduced muscle tone and weakness, hampering functional capacity.

Superficial massage techniques like myofascial release – the basis for foam rolling – are sold on the concept that they increase flexibility without impairing strength. This appears to fly in the face of flexibility and strength being incompatible bed fellows – if a muscle is stretched to become more flexible, then muscle tension (tone) will decrease, so how can rubbing the muscle with a piece of foam affect one of these properties but not the other?

The target site for this particular performance enhancement, as the name myofascial release suggests, is the myofascia – a layer of connective tissue that envelops all muscles (think of it like the skin around a sausage). But the myofascia in and of itself might not be altered at all by foam rolling (Behm & Wilke, 2019). Myofascia is densely populated with nerve endings, making it a highly sensitive neural tissue.

In our research, we found that after two minutes of foam rolling it took less effort to complete a specific exercise compared to doing the exact same exercise following two minutes seated rest (Macgregor et al, 2018). As a result, this saved effort led to volunteers retaining the same strength levels on subsequent days, where they had shown signs of fatigue when foam rolling was substituted with a rest period. All this means that treating the muscles to a bout of foam rolling seems to increase the efficiency of their activity.

This suggests that it's not the muscle that's being enhanced, it's the nervous system and the motor control centres of the brain – and that might just be the finest target for enhanced performance that we could think of. Now that we are starting to get to grips with what is actually going on when somebody uses a foam roller, we should hopefully be able to start developing more targeted approaches. The next step is to develop foam rolling-based interventions for different populations, looking to enhance performance, or living-well, for patients with chronic neurological conditions, infirm and disabled individuals.

**Lewis MacGregor** is currently a lecturer with the Physiology, Exercise & Nutrition Research Group within the Faculty of Health Sciences & Sport at the University of Stirling (Scotland), where he completed his PhD in 2016. He has worked in collaboration with SportScotland: Scottish Institute of Sport since 2013, providing athlete support to Commonwealth and Olympic athletes, primarily through application of tensiomyography and electromyography, in the sports of swimming and field hockey. His other research interests include muscle recruitment patterns in relation to exercise, and to ageing. He is currently researching the link between cognitive function and motor control in ageing populations.





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UNIVERSITY of  
STIRLING





# "Hot off the press": Free educational IPED booklets for Needle and Syringe Programme (NSP) staff

Working with IPED users in needle and syringe programmes? Don't miss the opportunity to have a look at these "hot off the press" IPED booklets!

They have been developed in collaboration with UK health professionals and focus on image and performance enhancing drugs (IPEDs).

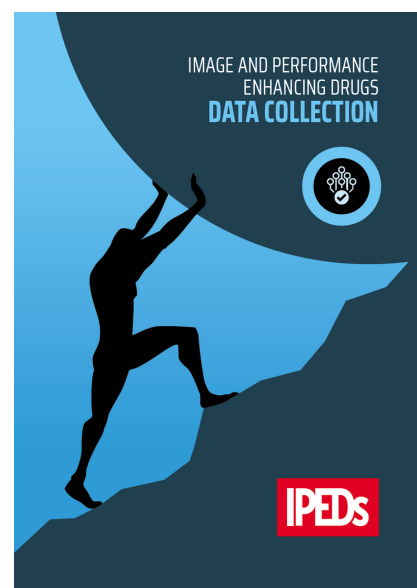
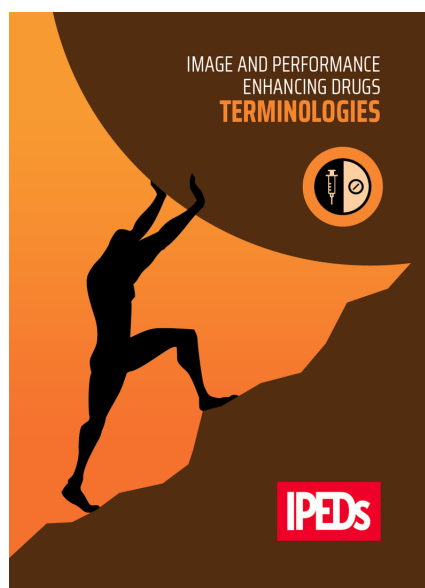
- Infographic 1 describes basic **terminologies** used within IPED communities
- Infographic 2 discusses how to improve **client engagement**
- Infographic 3 focuses on how to best collect IPED-related **data** for your service.

The infographics have been developed in partnership with:

- University of New South Wales
- University of Birmingham
- Human Enhancement Drugs Network
- University of New England.

The project was led by Dr Katinka van de Ven, Dr Ian Boardley and Martin Chandler. Feel free to contact Katinka for more information: [K.vandeVen@une.edu.au](mailto:K.vandeVen@une.edu.au).

Click on the images below to access each infographic!



# The Technological Imperative Within the Enhancement Debate

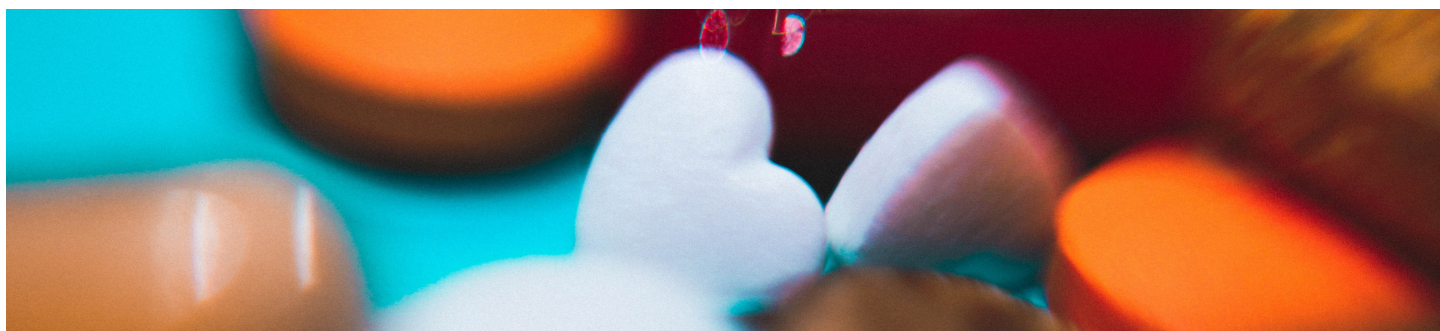
*By Andy Miah, Professor, School of Science, Engineering and Environment,  
University of Salford, Manchester, England*

## The London 2012 Olympic Games and human enhancement technologies

In 2006, the British Government opened an inquiry into the use of human enhancing technologies (HETs) in sport (British Government, 2007). This was not a complete surprise, as the UK was already in the throes of preparing to host the London 2012 Olympic Games and was under great scrutiny to evidence its commitment to the war on doping. However, the name given to the inquiry was surprising: human enhancement technologies; not drugs or doping, which are the words more commonly associated with troublesome enhancing practices in sport.

Understanding why this alternative phrase was chosen is found when examining the wider discussions taking place within bioethics at the time. Furthermore, this understanding reveals why we need to approach discussions about drugs from a perspective that makes sense of them as just one type of technology.

For the British Government, the inquiry used language that resonated with the terms being used in wider bioethical discussions about human enhancement at the time. These discussions were influenced significantly by the prospect of gene transfer, but also included wider technologies found within the anti-ageing and youth-promoting industries. It was a time when genetics was giving rise to many speculations about possible applications that could take people 'beyond therapy' (The President's Council on Bioethics, 2003), and where discussions about normality, health, and enhancement were rife within the field of health care.



*Photo by Anastasia Dulgier from Unsplash.*

## 'Better than well'

One of the classic quotes from the field of psychopharmacology which defined these debates is found in Peter Kramer's (1993) *Listening to Prozac*. In this text, the idea that restorative drugs led patients to feel 'better than well', came to characterise a pivotal problem with distinguishing between things that are therapeutic from things that are enhancing (Miah, 2010).

Even today, there is no consensus on what these distinctions should be, but it was apparent that there is no normal range we can identify, as a basis for determining what people should be allowed to do, in pursuit of greater well-being. Even if there are biostatistical norms for our species, or self-referential limits beyond which it is unsafe to go, the moral foundation for withholding access to enhancements that allow people to go beyond these boundaries was left wanting. At best, critics resorted to a principle of harm minimisation, as the basis for implementing a practical ethical limit to the boundaries of medical assistance.

Nevertheless, for over a decade, philosophers and health care policy analysts have examined whether human enhancement technologies were a reasonable extension of these practices, or whether it takes us beyond its moral boundaries. And we've achieved largely no consensus on this matter.

In the absence of clarity, analysts have appealed to such principles as the need for rationing – medical services are in short supply and only those in greatest need should receive them. Yet, the concept of need collapses as a useful distinction, when expanding the definition of suffering into mental wellness.

### **Sport and doping: approaching enhancement from a philosophy of technology perspective**

This wider context around sport's problem is a crucial consideration for why it is useful to approach the problem of enhancement from a philosophy of technology perspective, rather than drugs. Indeed, the American Academy of Pediatrics (2005) suggests that sports could not win their war on drugs without first coming to terms with the fact that we live in a world where enhancements are sought for a whole variety of reasons. Where people are comfortable with the morality of this practice outside of sport there is only a limited mandate for restricting access to enhancements, where the health risks can be reasonably managed.

For the American Academy of Pediatrics, this wider culture of use explains the situation in sport; it does not exist independent of sport. Furthermore, it must be understood as a function of a society where competition is the prevailing mode of human existence across all aspects of our lives. The pursuit of self-improvement – itself an ideology that draws from a very short period in human history – coupled with the desire to be better than average, compels people towards excess. In this respect, the logic of competitive sport cannot be isolated from the wider myth of social Darwinism, where competition for success within a population is considered to be the dominant characteristic of biological systems. Without changing this widespread belief, very little can be done to curtail the unbound pursuit of success.



*Photo by Giammarco Boscaro from Unsplash*





*Photo by Creators Collective from Unsplash*

## Doping practises go beyond just drugs

The language of HETs also resonated with the broader problem sports face around the growing dominance of technology. Why is it that doping technologies are banned, while many other forms of enhancement are not, especially when those technologies also imply the potential of harm? (Miah, 2005).

The inconsistency of this distinction was revealed at a similar time as the British Government's inquiry when the World Anti-Doping Agency found its newly formed Ethical Issues Review Panel tested by the case of hypoxic chambers. Such technologies could simulate different levels of altitude within an enclosed room to affect the production of red blood cells, thereby - potentially - improving endurance capacities.

In this case, the biological and ethical characteristics of the technology did not easily map from other doping methods calling for a different terminology to describe what was troubling about their use.

In this case, there was no easy way to assess the acceptability of these devices and certainly an approach that relied on references to drugs would not be sufficient. In fact, the sports world moved away from drugs as a locus of concern many years ago.

Indeed, growing awareness of such doping practices as autologous blood transfusions or the prospect of gene transfer were giving greater momentum to the idea that drugs were not broad enough to resolve the concerns people had about the use of enhancing technologies in sport. The war on drugs was seen, instead, as a war on artifice, the things that Francis Fukuyama (2002) described as undermining some 'Factor X', a crucial and essential quality of the human condition that we rather like to preserve.

In this sense, sport was a lens into which one could glimpse an even more complicated future of human enhancements, where the eradication of every aspect of human vulnerability was sought, even our vulnerability towards death. Such colleagues as Aubrey de Grey discuss the possibility of attending to this, ultimate disease by using science to slow down ageing to the point where it is negligible, ushering in an age of effective immortality.

Such ideas were invariably treated as either completely crazy or entirely prophetic in what they imagined for human life on earth. Either way, they reveal crucial insights into the reason why the doping war cannot be won without wholesale social change.

## How can this help future thinking?

How does this help us when thinking about human enhancing drugs? First, it tells us that the salient aspect of a drug is not its being characterized as a drug.



After all, a drug is simply a mechanism for delivering a modified physiological state, much like these many other technologies. It doesn't really matter how we do it, although there are certainly varying ethical issues that follow by something being defined as a drug rather than some other thing. For instance, a drug is developed, owned and sold by a company and its administration is governed by medical professionals. Not all technologies are like this.

Second, it reminds us also that a drug is not a concept that is fixed in time. Rather, what we consider to be a drug evolves in meaning politically, culturally, and economically. Even what WADA locates on its banned substance list changes, with some things – like marijuana – being sometimes on and sometimes off the list. Finally, it reminds us that the boundaries that exist around technologies are fluid. Such philosophers as Langdon Winner (1986) and Jacques Ellul (1964) understood this and, consequently, sought to describe technology in terms that encompass almost anything that is external to our human subjectivity.

While these authors focused often on the environment external to us, one might also consider that epigenetic, nano, or quantum phenomena are part of the technological world. Even the microbiome would be a reasonable distinction to make when seeking to explain the technologies that operate external to our human biological condition. These observations compel us to conclude that there are only very fuzzy distinctions between nature and technology and even fuzzier distinctions between human nature and other biological entities.

In this respect, the utility of the word drug may serve us well in devising principles and protocols in an era of the synthetic drug, but that era is likely to end quite soon, while the challenges of human enhancement technologies will remain. This is why we must approach an ethical foundation to establishing boundaries of human transformations through the concept of technology rather than the concept of a drug.



Professor **Andy Miah**, PhD, is Chair of Science Communication & Future Media, in the School of Science, Engineering and Environment at the University of Salford, Manchester. His research focuses on the promise and peril of new technologies and his career has spanned the areas science, technology, art, media, and culture. A passionate communicator, he believes that we need to unravel the future by examining the ethics and morality of our options. His interest in technology is born out of a desire to understand what happens to humanity in a world where digital and biotechnological innovations rapidly transform how we live. Author of 10 books and over 150 academic articles, he is also a frequent media commentator and has written for the Washington Post, Vogue, BBC, Wired, and many other outlets.

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# "Very human – with a dash of technology"

*By Deborah Trevallion, Lecturer, School of Education, The University of Newcastle, Australia*

## Introduction

To win Olympic gold is a lifelong dream for elite athletes. The desire to win Olympic gold has pushed some Olympians to their limits and beyond. The culmination of years of training and dedication means that sponsorship will be assured for these elite athletes. In Australia, to win Olympic gold in swimming is to become a celebrity, a superstar, an Australian hero. The sponsorships that accompany the glory of gold can provide lifelong financial stability, so the importance of wearing the best possible swimsuit, or fast tech suit as they are now known, cannot be underestimated.

Naturally the competitors want to use every advantage available to them. This includes the best coaches, the latest training techniques, the most efficient swim styles, the greatest fitness level, and the best equipment available, such as fast tech swimsuits. Some, desperate to win, take illegal performance enhancing drugs and supplements. The question is 'If performance enhancing drugs are illegal, should using technology to enhance performance then also be banned?'



*Photo by Gentril Sylejmani from Unsplash*

People have labelled fast suit use as 'technical doping'. In competitive elite swimming the difference between gold and silver is measured in one hundredth's of a second in electronic timing. With the international governing body for swimming, Federation Internationale de Nation (FINA), legalising the use of some fast swimsuits, all competitors world-wide must decide which suit they will use.

## Human enhancing technologies

Fast tech suits contain performance enhancing features. They contribute to faster swims by improving physical and psychological capabilities. They are constantly improving and enhancing performance but they don't create performance – you still need to train hard. Technologies surrounding racing swimsuits are aimed at:

- Creating fabrics that cause muscle compression that will enhance blood circulation at a higher rate. This blood will then resupply your muscles with oxygen and nutrients, while also removing lactic acid and other toxins. At the end of the day, this will allow you to swim at higher speeds for longer durations, ultimately allowing for faster swimming times.

- Reducing drag and friction in the water: Fast tech suits are engineered to decrease drag through the use of water-resistant fabrics and treatments stopping water from permeating the fabric and thereby increasing weight. Using ultra-lightweight fabrics and designs will ensure that you stay as light as possible while racing.
- Create an advanced second layer of skin by using bonded and welded seams: By removing seams or placing them in optimized areas, these designs ultimately keeping you smooth and fast in the water.
- Fast suits increase stroke rate and stroke length while swimming. They improve glide and reduce drag, creating conditions where swimmers produce faster stroke rates. This ultimately improves performance in the water because of the effect the suit has on buoyancy, passive torque, glide, and arm coordination.

### Do Fast Tech Suits make a difference?

A statistical study by Joel Stager in 2019 on swimming world records since the 1970s found the number of world records broken has gently curved upward and, as expected, is reaching a plateau. The year 2008 was a curve-cracking anomaly. More than 40 records were set in 2008, double the average for the last 30 years. Swimmers set significantly more records in February and March 2008 than during those months in the previous 30 years. These results cemented the dominance of fast suit maker Speedo who claimed their fast tech suit as worn by 98% of the swimmers who medalled that year.

Speedo's 2008 LZR (pronounced "laser") racer suit was a jet-black swimsuit that reached from the shoulders to the calves and hugged the skin like a vise grip. The LZR compressed its wearers' bodies into seamless, hydrodynamic tubes. That extreme compression came with a disadvantage, just putting on the suit was an ordeal that could take upward of 20 minutes and once a swimmer managed to squeeze in, it felt like paper, not cloth. After a few races it would tear or stretch beyond usefulness.

Suits were too expensive to be disposable but they became mandatory for world-class swimmers who wanted to win. In 2009, the world records set at the Beijing Olympics were blown to smithereens at the World Swimming Championships. Nearly every competitor wore some variation of a full-body polyurethane suit. Following these Championships, polyurethane suits were banned.

Since then competitors have shifted from the banned polyurethane to elastic suits that help conserve energy by compressing leg muscles and preventing unnecessary movement. It's worth noting that swimsuits aren't the only example of technological "doping" in the swimming world. Olympic pools, for instance, are now built to reduce the pushback from waves created by swimmers displacing water. Lane dividers divert the waves down and under athletes into the empty buffer lanes on either side of the pool.



*Photo by Marc Pascual from Pixabay*



*Photo by Linda Perez Johannesen from Unsplash*



## What does The Federation International Swimming Federation (FINA) have to say?

Leaders of the International Swimming Federation realized they had a problem: when swimmers dove underwater, they floated back to the surface. Tiny air pockets were getting trapped between their skin and the fabric of their suits. These air pockets allowed swimmers to float as if they were wearing a very thin life jacket. Because friction from water is so much greater than friction from air, even a small increase in a swimmer's surface area above water makes a huge difference in top-tier races.

Following the December 2008 European Short Course Championships in Croatia, where 17 world records fell, it was felt there was a need to modify the rules surrounding swimsuits. The combined effects of the LZR – both compressing the body and trapping air for buoyancy – led to many competitors who used the LZR wearing two or more suits for an increased effect.

This led to some claiming that the LZR was in effect "technological doping". The suits seemed to embody a competitive imbalance in a sport already dominated by athletes from wealthy countries. Those who could not afford the new swimsuits, or were sponsored by other brands, were racing at a disadvantage. They were deemed to provide an unfair advantage to the wearer by FINA, which led to a ban on all swimsuits of a similar nature.

At its meeting in Dubai in March 2009, FINA stipulated that swimsuits should not cover the neck, must not extend past the shoulders and ankles, and also limit the suits' thickness and buoyancy.

In a statement, FINA stated that by avoiding all questions of fabrics, permeability, and buoyancy, FINA chose to deal with this situation by simply ruling on the lengths of swimsuits.



*Photo by Highlight ID from Unsplash*

In a reversal of opinion, the FINA Congress, during the 2009 World Aquatics Championships, voted almost unanimously to revert its previous policy and ban all body-length swimsuits. The policy states that men's swimsuits may maximally cover the area from the waist to the knee, and women from the shoulder to the knee. Only swimsuits made out of permeable textiles that could not capture air bubbles would be legal. The fabric used must be a "textile" or a woven material and that a suit may not have any fastening devices such as a zipper.

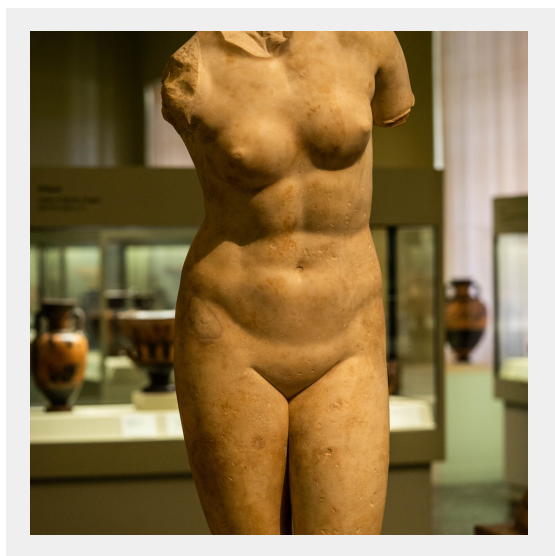
FINA did not specify what they meant by "textile". The new regulations took effect on 1 January 2010. It's only a matter of time before a new field of research (perhaps nanotechnology) is applied to swimsuits, leading to drastically improved performances without breaking the current rules. As for the original justification for the ban—accessibility and competitive balance—the swimming community just stopped talking about it. Inequality is a sad reality.

## Closing comments

The question remains: must we restrict our self to traditional methods of training or should be we use science and technology to enhance ourselves directly? Over the last decade, human enhancement has grown into a major topic of debate in applied ethics. Interest has been stimulated by advances in biomedical science. The question in competitive sports like swimming is where do you draw the line?

The answers to these questions might not only help us be better prepared when technology catches up with imagination, but they may be relevant to many decisions we make today, such as decisions about how much funding to give to various kinds of research.

Human enhancement technologies are opening up tremendous new possibilities. But they're also raising important questions about what it means to be human. These technologies are currently geared towards upgrading or restoring physical and psychological abilities, as well as embellishing performance. There remains obstructions to the widespread use of the fast tech suit, a human enhancement. When establishing ethical guidelines, it is crucial to clarify the perspective in order to understand the breadth of the ethical concern.



*Photo by Karim Ben Van from Unsplash*

**"The one thing that hasn't changed since the Olympics were first held in ancient Greece is human skin. If FINA really wants to maintain the integrity of the sport, perhaps they should have swimmers compete the same way the Greeks once did: in the nude."**

Perhaps the most pressing issue is the degree to which the use of human enhancements requires a global response. While such work has become a research priority in a number of countries around the world, there is still much more to achieve before a clear sense of the global implications of human enhancement is achieved. The ethics surrounding the fact that the use of an ingested chemical is considered cheating but wearing a chemical is 'good technology' require further investigation.

The one thing that hasn't changed since the Olympics were first held in ancient Greece is human skin. If FINA really wants to maintain the integrity of the sport, perhaps they should have swimmers compete the same way the Greeks once did: in the nude.

**Deborah Trevallion** is tenured at The University of Newcastle where she researches, teaches and coordinates under and postgraduate programs in Technology Education. She has many years of experience in the area of Design, Problem based learning and Technology Education. Deborah is a globally published author and a Fellow of the Australian Council of Research.



# Altered with carbon: On technology, fairness, and motivation in sport

*By Robert Page, General Practitioner and passionate runner, Sydney, Australia*

"In long-distance running the only opponent you have to beat is yourself, the way you used to be."

- Haruki Murakami



*Photo by skeeze from Pixabay*

Seeing Eliud Kipchoge run 42.195km in one hour, fifty-nine minutes and forty seconds astounded many. A fellow runner and I broke away from a house party to sit in a bedroom and watch live as the then 34-year-old Kenyan crossed the line – both of us with goose bumps, eyes glued to the screen, stunned at his achievement. Experts have spoken for years of their belief that someone would one day run a sub-two hour marathon (Joyner, 1991, Maffetone, 2014), however many doubted that we'd actually see someone do it, regardless of the conditions. Even before the event, though, rumours and criticisms were circulating about the shoes that Kipchoge was wearing at the time.

The Nike Vaporfly was released in 2016 with all the usual pseudo-scientific fanfare we've come to expect from the big shoe retailers, but soon after its release, results and research findings were indicating that the purported benefits of this shoe and its moulded carbon-fibre plates might be more than just hot air. Figures like "4% decreased energy use" were being reported through Nike-funded research (Hoogkamer et al., 2018), but results and tumbling records supported these claims. The five fastest official marathon times in history have been run in these shoes (Burfoot, 2019). There is something "different" about them compared to other shoes on the market, and criticisms have escalated, alongside calls for restrictions or bans on their use in competition.

These issues are not unique to running. "LZR Racer" is a name that may not be familiar to many, but show people a photo of Michael Phelps wearing this full-body swimsuit and most will know what you're talking about. 23 of the 25 new world records at the Beijing 2008 Olympics were established by swimmers in that suit (NASA, 2012). Those records still stand; Phelps' name is in the record books with 8 gold medals earned the Beijing 2008 Olympics (7 of those as world records). Given that this swimsuit has now been banned in competition, many argue that the records achieved during that time should be expunged. Some are saying the same about results achieved while wearing these shoes.



Most sports have rules or codes of conduct which regulate the equipment that can be used, whether that be the materials from which tennis racquets can be made; swimsuit materials or designs; or the types of spiked shoes a sprinter may employ. These regulations aim to level the metaphorical playing field and to ensure that things are “fair” between competitors. Many would consider using equipment that confers a significant improvement in performance to be unfair. But technology in sport is forever evolving, as demonstrated through the advantages modern athletes have over their predecessors in many disciplines (Stefani, 2012).

In running and in many other sports, record times have fallen dramatically over the past century, and while training methodologies and nutrition explain a large part of these improvements, much of the rest is likely attributable to technology. The measure of import is not that improvement through time, but the advantage that technology gives some sportspeople compared with their contemporary competitors who may not be able to access it.

An interesting and comparable issue is to consider Oscar Pistorius (rightly, to this author’s mind – other issues notwithstanding) permitted to compete in the 2012 Olympics on carbon-fibre prostheses, custom-fit to his body – technology no-one else could benefit from, yet which put him on a relatively even playing field. If Pistorius had won, though, there would almost certainly have been criticisms that his technology was overpowered.

Or compare this again with the travails of Caster Semenya, whose ability to participate is restricted as a result of the questionable advantage conferred by her natural physiology. Semenya has gone through tremendous criticism and struggle in her battle to compete against other women (Cooky and Dworkin, 2013), despite never doping or doing anything except run in her own body.

In the matter of the Nike Vaporfly, World Athletics (formerly known as the International Association of Athletics Federations, or IAAF) has responded in an attempt to ensure that a runner’s success is determined by naturally-occurring traits such as skill, fitness, power, endurance, tactical ability and mental focus, not through technological advantage.



*Photo by Pexels from Pixabay*

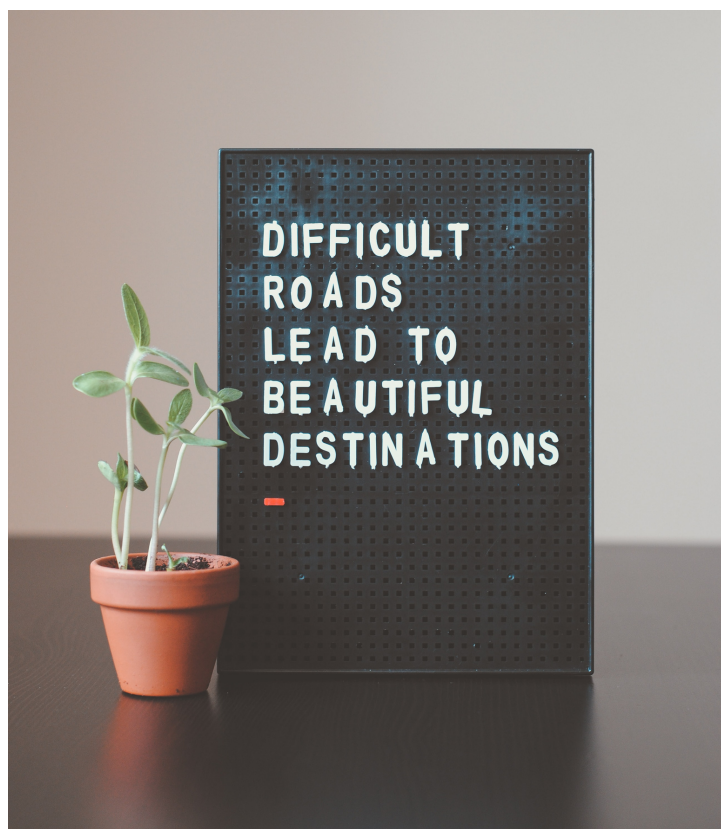
They have regulated that, among other factors, athletes may not compete in prototypes nor in shoes that have not been on the open market for at least four months (O’Grady and Gracey, 2020).

The implication is that this will allow other novel technology to quickly disseminate to other shoe manufacturers, removing any company-specific advantage. Until other companies catch up, though, Nike-sponsored athletes stand to benefit, so this response has been criticised as pandering to Nike (who have also taken out patents on many included technologies, which may limit other companies’ abilities to engineer comparable technologies); ongoing discussions and controversy on this topic are likely to continue.

The above issues will work themselves out in time, one way or another; will be seen again in some form in future; and are mainly important to the pointy end of the field – those elite few who, if given a technological advantage, may win more prize money or be able to broach as-yet-unreached barriers in sports. What of the rest of us, the “casual” runners (including this author) who run for a myriad other reasons, and are considering our next shoe purchase? Why wouldn’t we want to run faster or achieve a new personal best?

Many of those who are bordering on achieving their goals may find that this novel technology helps them to get there. But as thoughtful humans we should consider why we do what we do. Why do we run, or exercise, or swim, or take part in sport? Are we motivated by becoming faster or stronger or bigger or by beating others? And does harnessing technology to reach those goals take away from our achievements?

I have run in many events and races, from Parkruns to ultramarathons, and my motivations and aspirations have varied through the years and between disciplines. In 2018 I set myself the goal of a personal best time in the half marathon, and trained for six months, as hard as I’ve ever trained. And the feeling of crossing the finish line in Paris, in sight of the Arc de Triomphe, to the cheers of the crowd and my partner and friends, breaking my personal best time by just five seconds – I was filled with joy and satisfaction at my hard work having paid off. Would that achievement have meant less to me if I was wearing flash new shoes that had made me faster?



*Photo by Hello I'm Nik from Unsplash*

I believe that it would have – my ability to purchase, rather than my hard work, may then have been the deciding factor in my success (which is really quite fitting for this modern society). I was proud to have worked hard and to have suffered in order to achieve my goals.

If I had been pushing for a top three position, and other runners were wearing shoes which conferred an advantage, I can imagine making a different decision. But our values and motivations vary, and we must all decide for ourselves what we do and why we do it.

Much about sport is unfair. Some will forever be unable, whether through social disadvantage or discrimination or other factors, to participate in certain sports or games. Others of us will be limited or benefited by our physiology – our physical attributes; our hormone levels; our innate coordination and reflexes.

And the overwhelming majority of us will never have the talent, or the drive, or the social advantage, or the genetic predisposition to be able to stand at those highest levels. But I think that most of us would consider it fair that those who do, do so without technological advantage over their competitors. For those of us who move for other reasons, we must look inwards at our motivations, examine them, and ensure that we are satisfied.

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You can find more information about Robert [here](#).



# Drug as pharmacological neurotechnologies - from modes of action to social effects

*By Aleksi Hupli, PhD student, University of Tampere, Finland*

## Introduction

Framing drugs, both pharmaceutically produced and others, “neutrally” as pharmacological neurotechnologies can help approach various pharmacological and social effects without relying on pre-existing dichotomies (i.e. therapeutic vs. enhancing, legal vs. illegal, beneficial vs. harmful). This technological framing can also diminish negative and biased attitudes towards certain groups of drugs and their users.

By moving beyond a blurred boundary between therapy and enhancement we can recognise that the effects of drugs far exceed their pharmacology and that individual and social perceptions, together with the immediate and social environment where these technologies are used, create complex networks regarding modes of action.

## The modes of action of pharmacological neurotechnologies

There are several things one should consider when talking about the effects of drugs as pharmacological neurotechnologies: firstly, what is the specific ‘chemical compound’ or molecule in question and its structure, roughly whether it comes in a “natural form”, like plants and fungi, or whether it’s synthetically produced in a crystallised or liquid form; secondly, pharmacokinetics, which means briefly put what does your physiology do to the neurotechnology; thirdly, pharmacodynamics, meaning what does the neurotechnology do to your physiology; fourthly, the way the neurotechnology enters your physiology, and from which part, which is often referred to as the “route of administration”, and can be, for instance, oral, intravenous, nasal, rectal, topical or via inhalation; and lastly, but importantly, dosing.



*Photo by Halacious from Unsplash*

All of these factors, and some of the more social ones described below, are at play when our human physiology is interacting with an ‘exogenous’ molecule in the form of a pharmacological neurotechnology. Important to note, is that these interactions on a pharmacological scale cause mostly temporary effects, that can last from minutes to days, depending again on the dose and the “half-time” of the neurotechnology in question. On a social scale these effects can last significantly longer, for instance in the form of social stigma, imprisonment and/or individual habit formation, even dependence, on the use of the technology.



## Set, setting and the social effects of drugs

To turn more to the social factors in relation to effects, according to Whyte et al (2002, p. 15, italics added) “efficacy relates to perceptions of the powers of medicinal substances”. In other words, the effects of pharmacological neurotechnologies are not solely resulting from the pharmacological properties of the technology, but also based on perceptions, both individual and social. As DeGranpre (2006) writes in his book *The Cult of Pharmacology*, pharmacological properties of drugs were greatly overemphasized during the last century, especially in the North American context, as “drugs powers were still viewed as capable of bypassing all the social conditioning of the mind, directly transforming the drug users thoughts and actions.”



*Photo by Goashape from Unsplash*

Effects are not only linked to how they are perceived, but also the immediate environment where they are used contributes to the overall global effect. Especially the effects of psychedelics seem to be linked to, among other things, to the specific physical and social environment where they are taken in: “[t]he effects of hallucinogens vary markedly from individual to individual and from session to session, depending on the context, expectations, and environment of the session” (Bogenschutz 2013, p. 19).

This contextuality in relation to the environment, and its ability to have an impact on especially psychedelic effects in clinical settings, is further explained by James Rucker, another psychiatrist who has been part of the recent psychiatric psychedelic research in the UK. Rucker (2016) writes that “this inextricably interactive effect is problematic for modern trial designs, which seek to isolate a drug and test it solely for its therapeutic effect. With psychedelics you cannot do this. You have to consider the drug and the context together, or you miss the point”. In other words, “what is really being measured is the combined effect of the drug-psychosocial treatment combination (Bogenschutz 2013, p. 19; Langlitz 2010).

## Mind you why social effects matter

This role of so-called ‘set and setting’ (Hartoghsohn 2017) has indeed been mostly ignored in modern pharmaceutical drug trials, which have focused on very limited outcomes, often only measuring whether the drug shows more efficacy than a placebo, or an existing drug treatment (Healy 2004; Moncrieff 2009). And this is one of the most impactful social effects of drugs, perhaps when not including the on-going war on drug users, “which is responsible for thousands of deaths a year globally, and the social and political death or exclusion of thousands more” (Zigon 2015).

Nevertheless, this focus on single molecule drug trial designs in especially psychiatric medicine has reduced mental illness into imbalances of various neurotransmitters which are then increased or decreased with drug treatment according to the latest neuropharmacological theory of that specific illness (Moncrieff 2009). The dopamine-theory of schizophrenia and the monoamine-theory of depression are prime examples of framing certain mental illness as having a biological basis, for which then pharmaceutical companies claim to have a patented biological solution in a form of drug treatment, often with weak evidence for either case (Moncrieff 2009; also Healy 2004).

Another issue of what Joanna Moncrieff (2009) calls “disease-centered model of drug action” has been that the knowledge about the underlying pathology of a mental disorder often comes from the same source as the products that are then claimed to return that dis-order back to order, namely the pharmaceutical companies and their sponsored research. Sometimes the biological solutions even exceed the disease, as Dees (2007 p. 377) writes: “What often occurs is a “diagnostic creep” in which a condition is defined as a disease because an intervention exists to ameliorate it.

So what was once considered an enhancement is redefined as a therapy for a newly-characterized disease. Anything that makes us feel better thereby becomes a therapy. At that point, the boundary between what is a therapy and what is an enhancement is completely blurred to the point of uselessness.”

### To be concluded?

Thus, by framing both pharmaceuticals and other drugs “neutrally” as pharmacological neurotechnologies, we can try and move beyond these blurred boundaries (Hupli et al 2019), between bad drugs vs. good medicines, therapy vs. enhancement, controlled vs. uncontrolled, legalised vs. illegalised, users vs. non-users, etc.

We need to recognise that the effects of any pharmacological neurotechnology far exceeds their pharmacology, and that individual and social perceptions, together with the immediate and social environment where these technologies are used in, create complex networks regarding their modes of action. And of course, technologies in general are not value-free, and the more general “human enhancement” discussion has various examples of other neurotechnologies with their unique ethical and other challenges, from transcranial magnetic stimulation to deep brain stimulation (see Warso et al 2019).

But even compared to invasive deep brain stimulation which requires neurosurgery, literally opening up one's skull and poking their brain with a surgical knife to implant a device which is then controlled outside of that skull, there is something about the inner workings of “drugs”, and our modern moralistic approach to them, that calls for closer inspection in the debate and discussion about human enhancement technologies and especially in the way drugs and their users are policed.



*Photo by Vinicius "amnx" Amano from Unsplash*



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# Upcoming Events and Conferences



*Photo by Queven from Unsplash*

Unsurprisingly, many planned conferences in 2020 have been cancelled due to the global COVID-19 crisis. The following list of upcoming events and conferences is therefore remarkably brief.

Instead, we would like to bring our readers' attention to the weekly Zoom meetings of the Psychedelic and Entheogen Academic Council (PEAC) organised by Dr Larissa Maier. The purpose of these online sessions **is to connect:** *"UCSF researchers, clinicians, and students interested in psychedelic science with each other and with the international community to socialize on individual, cultural, creative, and intellectual levels while creating a sense of belonging and community."*

Find more information and join the meetings here: [https://www.facebook.com/events/182301749758902/?event\\_time\\_id=182301723092238](https://www.facebook.com/events/182301749758902/?event_time_id=182301723092238)

## Conferences:

### 15-18 October 2020:

13th National Harm Reduction Conference (San Juan, Puerto Rico):

<https://harmreduction.org/conference/>

### Postponed until further notice:

The International Society for the Study of Drug Policy (Aguascalientes, Mexico):

<http://www.issdp.org/conferences-and-events/>

## Let us know!

... if you are aware of any upcoming conferences and events



# Publications by HEDN members



*The human enhancement drugs network represents a diverse group of productive scholars from different academic disciplines. Below you can find the most recent work published by the members of the network.*

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## Peer-reviewed journals

Didymus, F.F., & **Backhouse, S.H.** (2020). Coping by doping? A qualitative inquiry into permitted and prohibited substance use in competitive rugby. *Psychology of Sport and Exercise*: <https://doi.org/10.1016/j.psychsport.2020.101680>.

**Dunn, M.**, Dawson, P., Bearman, M. & Tai, J. (In Press). "I'd struggle to see it as cheating": the policy and regulatory environments of study drug use at universities. *Higher Education Research & Development*: <https://doi.org/10.1080/07294360.2020.1738351>

**Erickson, K.**, Stanger, N., **Patterson, L.**, & **Backhouse, S. H.** (2019). Substance use in university sport: A cross-national study of student-athlete substance use behaviors and perceived responses to witnessing substance use. *Performance Enhancement and Health*: <https://doi.org/10.1016/j.peh.2019.100151>.

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**Zahnow, R., McVeigh, J., Bates, G., & Winstock, A.R.** (2020). Motives and Correlates of Anabolic-Androgenic Steroid Use With Stimulant Polypharmacy. Contemporary Drug Problems: <https://doi.org/10.1177/0091450920919456>.

### **Books**

**Christiansen, A.V.** (2020). Gym Culture, Identity and Performance-Enhancing Drugs: Tracing a Typology of Steroid Use. UK: Routledge.

### **Other published articles**

**Van de ven, K., Dunn, M., & Mulrooney, K.J.D.** (2020). Human enhancement drugs and new(?) research directions. Performance Enhancement & Health, 7(3-4): <https://doi.org/10.1016/j.peh.2020.100160>.

### **Other achievements**

- HEDN Member **Jeanett Bjønness**, together with Catherine Coveney, has organised a special issue in Drugs: Education, Prevention and Policy (DEPP) entitled, 'Pharmaceutical Cognitive Enhancement'. It is a great collection on the motivations for, experiences of and responses to pharmaceutical cognitive enhancing drugs, with contributions of many HEDN members. Make sure to check it out: <https://www.tandfonline.com/toc/idep20/26/4?nav=tocList>
- **Sue Backhouse** and colleagues at the Leeds Beckett University have produced a video which details the lived experiences of three individuals who blew the whistle on doping. Watch the videos here: <https://www.youtube.com/watch?v=aSONTXukwXw>
- Workshop: **van de Ven, K. & Wood, W.** (2020, February). PIEDs and Harm Reduction: A Training Workshop for Needle and Syringe Program staff. Needle and Syringe Program, Drug Health Services, Western Sydney Local Health District, Australia
- IPED booklets for needle and syringe program (NSP) staff: **Katinka van de Ven, Ian Boardley** and Martin Chandler have designed new IPED booklets aimed to improve the knowledge of NSP staff and other health professionals. You can access them here: <https://humanenhancementdrugs.com/events-and-projects/free-iped-infographics/>.

# Want to become involved?

## Membership

HEDN is an international group of multi-disciplinary researchers with an interest in human enhancement drugs from various universities. We seek to strengthen working relationships between academic sectors, governmental agencies, NGOs, users groups and others interested in human enhancement drugs, performance and image enhancing drugs, and doping substances.

You can find the entire Human Enhancement Drugs Network on our website, where you can apply for membership: <https://humanenhancementdrugs.com/members/become-a-hedn-member/>

## Follow us on social media to stay up-to-date!

Follow us via social media to stay up-to-date about the latest developments in the field of human enhancement drugs.

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