

# Towards A Natural for Life Movement in Sport: Health Implications, Cheating, And Why Anabolic Steroid Users Should Be Banned for Life

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## ABSTRACT

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## Opinion

It is not unreasonable to state that sport plays a significant part in modern life. Indeed, sport has now positioned itself as a noteworthy cultural framework that, through professional sport and various international sport competitions, is firmly entrenched in global economic, societal, and political systems [1]. Much of this positioning of contemporary sport revolves around the premise of excellence, within which there continue to be a high number of incidences and stories related to the use of anabolic androgenic steroids (AAS) and performance enhancing drugs (PED) and subsequent bans within performance sport. Examples of these exist since testing procedures, regulations, and policy came into being in the 1980's (notably with Ben Johnson failing a test at the 1988 Seoul Olympics) and persist to today, with numerous redistributions of medals and placings from the 2008 and 2012 Olympic Games due to more sophisticated testing procedures and the retesting of older samples. In particular, the drug testing discourse has been illuminated in very recent times with the continuing controversy underpinning what has been seen to be a systematic manipulation and explicit use of doping (for instance, by fabricating evidence to conceal the use of banned substances) by the Russian state sport system. Clearly, we understand that AAS use 'works', given that a variety of studies support this [2,3], and that many consider their use (and other PEDs) a justifiable means of improving performance in order to accrue the potential benefits.

There is then, and as this opinion piece positions somewhat unfortunately, a ubiquitousness related to the availability, justification, and eventual use of AAS and PEDs within sport. For some, this is not 'unfortunate' and instead amounts to a strong reason to call for the regulation of these type of drugs within the realm of sport. Savalescu et al. [4], for instance, have called for the legalisation of PED use given the following five postulates; first, that classical music and other performance type 'art' allows drugs (creativity etc.); second, that the 'spirit' of sport would be enhanced by allowing drug use and other factors that lead to success in sport; third, that allowing drugs would create an even playing field; fourth, that permitted drug use would be safer – if they allowed 'safe' drugs; and lastly, that given the current climate and attainability of drugs (and the pressure of 'strict liability') then drug use within sport and, concurrently wider society, is inevitable. There are, of course, arguments that rally against drug use. For instance, Devine's [5] outlook is noteworthy in that he argues that drug use should be discouraged because it can unsettle what he terms the 'balance of excellences' in sport.

The example used is tennis, whereby a power game – facilitated by drugs – could 'overpower' the other elements within the game that spectators enjoy (i.e., rallies, returns, trick shots, etc.). Yet overall Devine's (2010) article is limited in terms of developing a

holistic defence of drug free sport. It is but one more opinion piece, albeit one that grapples with elements of philosophy and what sport might actually 'be'. We have previously argued against the position of drug use within sport beyond an opinion piece with a historical study that explored the recollections and stories of some of the key administrators of strength sports in the UK. Here, their approach to lifelong drug free sport was underpinned by long term (20+ years) observations of what they felt were the unfair, permanent (in the sense that even once PED users discontinued their use) advantages that drug use could confer [6].

We have also extended this argument [7] by building on Egner et al. [8] work on testosterone exposure on mice and more explicitly questioning how their findings might relate to human performance. In their study, female mice who were subjected to testosterone exposure for 14 days had an increased myonuclei of 66%, alongside an increase in fibre cross-sectional fibre area (CSA) of 77%. Of particular note here, while this fibre size decreased to baseline levels three weeks after cessation of testosterone exposure, after three months the increase in myonuclei was still observed and on reintroduction of overload-exercise, fibre CSA areas grew by 31% in comparison to the control group's 6%. Notably, the relative increase in myonuclei persisted long after the administration of the drug, indicating permanent change. In the context of human performance this is particularly interesting, given that if we follow standard understanding of mammalian functions [9,10] then we can surmise that the benefits accrued from AAS usage are likely to persist in humans. Of note, Eriksson's [11] study of nine competitive powerlifters who were using PEDs users, ten who had never used PEDs, and seven that had previously used PEDs, showed (from muscle biopsies) that AAS use resulted in increased fibre areas and myonuclei; meaning that existing and legacy exposure produced change relative to non-user baselines. From this, we can deduce that AAS use results in retained benefits even once AAS use has stopped.

The above evidence informed the premise of our argument that PED users should be banned for life [7]. Importantly, WADA are currently funding at least one study in this field in order to explore the possibility of developing enhanced AAS detection systems [12]. Efforts are being made to prohibit PED use and support a philosophy of clean sport at performance levels. The hope here then, is that increased bans and a less tolerant approach to PED use would help reduce some of the worrying implications related to PED use within youth and participation sports by sending a clear message regarding issues of fairness. There remains, however, a substantial area of work needing to be further highlighted. Specifically, whilst there are numerous studies that outline the performance enhancing effects of AAS use [e.g. 2-3] as well as specific health risks associated with AAS and other PEDs [13], no figures related to mortality or morbidity exist, most specifically subsequent to liver failure and acute cardiovascular events. First and foremost, whilst many side effects for AAS use may well have been overstated (e.g. in the sense that acne, testicular atrophy, and gynaecomastia whilst all evidence

of adverse consequences are not necessarily life threatening [14], there still remain worrying signs that PED use has increased. This is important in that whilst we know AAS are bad for health, we also know that there are significant levels of recreational use across many countries [14,15]. As alluded to, however, the difficulty lies in showing just how many people suffer additional years of illness and reduced life expectancy subsequent to use. This is because the data do not necessarily exist at a 'national' (for instance, the NHS in the UK) or population level; implicating steroids in cause of death from post mortem and wider health data is inconsistent and unreliable as they tend to focus on acute causation. In sum, there is a low likelihood that PED use will appear on death certificates (certainly within the UK context) as either a primary or secondary cause. Instead the cause of death will likely refer only to the acute cause, such as myocardial infarction (MI) or cerebrovascular accident (CVA). What is needed is far more information at a population level instead of a reliance on case-studies, small (mainly qualitative) cohorts, or cross-sectional data. We have no reliable epidemiological evidence by which to inform a conscious choice for either athletes or regulatory or enforcement bodies.

Put simply and using the NHS and the British context as an example, we understand a variety of conditions that contribute to increased mortality rates, but not necessarily from the explicit use of AAS and similar hormones at a wider level. There is evidence, of course, to show just how damaging they are (it is easy enough to think about the old East Germany and the legacy of their systemic doping programmes within sport [16]), but it is difficult to conduct large-scale longitudinal studies on PED use due to ethical and financial considerations. Ideally, what is needed is both an analysis of dose-response, and a population attributable fraction, beginning with a comprehensive assessment of how many people used AAS, and how often, in their life. From these data it would be possible to calculate the additional risk of disease outcomes for those who have used versus those who have never used (this comparison could be a broadly equivalent population of clean lifters) or at least population controls (although then you are losing the potential difference between the general population and 'lifters'). The first step then, would be to follow a cohort of transparent lifters (AAS and clean) over a period of time and monitor biomarkers and health outcomes one a regular basis. Among the very limited body of evidence on clean and 'non-clean' lifters Pärssinen et al. [17] studied 62 Finnish powerlifters who competed between 1977-1982 in order to explore the mortality and rate of premature deaths of AAS users. Results showed that in comparison to the 1094 population controls group, over a 12-year time period the risk of death was 4.6 times higher for the powerlifters and that this suggested that AAS use can contribute to premature death.

Given the above data, and as the interest in sport, physical activity, and muscular body image grows, the use of AAS and PEDS needs to be fully appreciated and mitigated for in terms of longer-term effects. This is in the two ways/areas that this opinion

piece has sought to highlight. The first, that AAS use likely confers permanent physiological advantages to those who have used them even the once. This is problematic in that it sits at odds with any type of 'spirit of sport' criterion and fundamentally shifts the way that we can define participation in regulated games and sport [18]. The second area is the fact that more should be done to highlight the very real health implications that are associated with the use of AAS and associated compounds. Here, a variety of studies are emerging that build upon the findings of Pärssinen et al. [17]. Horwitz et al. [19], for instance, found that AAS use led to higher mortality rates and more hospital admissions in a sample of 545 male subjects between 2006 and 2018. Additionally, Liljeqvist et al. [20] showed a clear link between AAS use and an incident of pulmonary embolism. Considering that these are areas of continuing, emerging research, it is difficult to appreciate the full consequences of PED use that users are accruing. The potentially huge health and associated costs implications related to PED use given the additional burden (certainly within the UK) on the ever-underfunded health system, allied to the premise we have outlined that indicates that permanent advantages may be accrued from their use, are the main factors that underline our call for a 'natural for life' discourse to be more fully realised.

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