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Article

Testosterone: 'the Best Discriminating Factor'

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Abstract: In 2011 the IAAF introduced the Hyperandrogenism Regulations in an attempt to deal with a difficult problem; that of ensuring 'fair' competition in female athletics as a result of athletes with differences in sexual development competing against women without such conditions. In 2015, following a challenge to those regulations by Indian athlete, Dutee Chand, The Court of Arbitration for Sport (CAS) considered the merit of the regulations and determined that there was insufficient scientific evidence to justify their imposition. The regulations were suspended by the CAS, until more convincing evidence could be provided (CAS 2014/A/3759 *Chand v AFI and IAAF*). The IAAF duly commissioned further research (Bermon and Garnier, 2017) and introduced amended regulations (the Eligibility Regulations for Female Classification (the DSD Regulations)). Although not universal, the IAAF has faced significant criticism from several angles about its approach to the problem. In particular, there has been criticism of the value of the scientific research on which the regulations are based (Franklin et al., 2018; Karkazis et al., 2012; Koh et al., 2018; Sőnksen et al., 2018; Tucker, 2017, Pielke, Tucker & Boye 2019) and also from those in the ethical and human rights fields seeking to ensure that the rights of individual athletes are protected (Adair, 2011; Buzuvis, 2016; Koh et al., 2018). In light of such criticism, this paper considers the IAAF's approach in dealing with the perceived problem and considers its conduct against an objective framework of 'good sporting governance' (Geeraert, 2013; Henry and Lee 2004). It is this paper's contention that the IAAF's approach to rule creation in this area demonstrates less than ideal governance practice and, in doing so, notes the role of historical, cultural and institutional barriers as well as an over-reliance on insufficiently conclusive scientific evidence to provide a seemingly objective solution to a fundamentally more complex problem.

Keywords: governance; ethics; testosterone; discrimination; integrity; science; fair-play; sport; athletics

1. Introduction

1.1. Background and Aims

That compelling sport requires a level playing field is a well-used metaphor and one that is often taken to be the cornerstone of competitive sport. In short, the metaphor expresses the idea that competitors are required to follow the same rules and are given the same opportunity to compete. Of course, sport does not require complete equality between competitors. As a meritocracy, compelling sport actually requires inequality; it requires that individuals or teams can be ranked by reference to how they make use of their natural biological advantages (both physiological and psychological) or to find advantages through strategy or, in some cases, even through technology and financial power. Sport, therefore, requires merely an approximation of equality between competitors; enough equality to make it interesting but not so much that it makes it impossible to determine winners and losers. However, it is important to emphasise that the notion of a level playing field represents only part of a wider notion of sporting 'fair play' (Loland, 2002 [1]), an important point that will be returned to.

As quasi-monopolies (Geeraert, 2015 [2]) International Sporting Federations (ISFs) have the power and authority to create and maintain 'the rules of the game' and, therefore, to determine how level the

playing field is and which advantages are fair and which are unfair. Inevitably, in determining what is fair and what is not, ethical issues should be central.

Justifying the limits of fair advantage in sport is easier when the advantage in question is clearly separable from the qualities that are being ranked. For example, it is easier to justify regulating against the wearing of swimsuits that provide a performance advantage because swimming as a sport does not seek to rank competitors by how good their equipment is. However, when the advantage in question is genetic and directly influences the qualities that are being ranked, such as a competitors ability to generate speed, power and demonstrate endurance in athletics, the decision to regulate and limit specific advantages and not others, raises difficult ethical questions about fairness, discrimination and the role of sport in society. When, in 2011, the International Association of Athletics (IAAF) introduced the Hyperandrogenism Regulations, thereby limiting eligibility to compete in female events by reference to naturally occurring (endogenous) levels of testosterone, the IAAF seemingly became the first international sporting federation to *exclude* athletes from competing on the basis of a natural genetic trait due to the 'unfair' competitive advantage it was perceived to provide (Professors Sonksen and Holt in *Chand v AFI & IAAF* [3]).

To emphasise the underlying issues surrounding fairness and discrimination, the situations of Caster Semenya and Usain Bolt are worth considering. Both athletes have dominated their respective athletic events for a substantial period of recent history. Whilst dedication and training was, of course, part of Usain Bolt's success, it would be hard to maintain that his recent domination of sprinting was not due, in part, to natural genetic advantages he enjoyed over his competitors. It has been suggested that Bolt, like many other top sprinters, has the 'sprinting gene', meaning he may have particularly fast-twitch muscle reflexes and longer muscle fibers than most. Unlike a lot of sprinters, however, he is 6ft 5 inches tall (Thomas, 2016 [4]). These genetic advantages almost certainly contributed to what makes him especially adept at sprinting. Yet there appears to have been no consideration of whether he had an unfair advantage from one, or indeed, a combination of these genetic factors or the size of advantage that such genetic factors might play. Instead, his success is simply ascribed to 'talent', with the incumbent suggestion of a 'positive' and fair advantage.

In contrast, the perceived increased lean body mass (and the additional strength and power that is said to come from it) that Caster Semenya has over other female middle distance runners has been the subject of significant IAAF attention in order to quantify the performance advantage and regulate the genetic advantage said to be behind it.

Outside of athletics, there are plenty of other examples of natural genetic advantage leading to domination of sport which have not raised the concerns of relevant ISFs or lead to regulation. Two of the most obvious being Eero Mäntyranta's domination of cross country skiing in the 1960's (genetic mutation that increased his red blood cell concentration) and Michael Phelps, the most decorated Olympian in history, who dominated several swimming events intermittently from 2000-2016 (arm length, hand and relative torso size). They, like Usain Bolt, just won the genetic lottery.

The comparison made is not to suggest it is inherently wrong to treat what are, after all, different natural advantages in a different way, it is merely to observe from a reductionist standpoint, that when the aim of a sport is to rank individuals using criteria that that are strongly influenced by natural genetic advantages, it is hard to see a rationale and ethical justification for focusing solely on one natural advantage and ignoring others. In Bolt's case, it might prove difficult to pinpoint and attribute specific performance advantages to specific genetic factors, but it does not follow that this should be ignored, especially if you have already identified genetic traits resulting in increased speed and power as fair game for regulation; it smacks of discrimination.

The difference in approach is, of course, possible to justify, but the tenor of this paper is that the justification for focusing *only* on testosterone needs to be 'good' and, to do so, it should be grounded on principles of good sporting governance, having considered fully all relevant ethical, legal and scientific factors as well as the stated purposes of the IAAF. The aim of this paper, therefore, is to scrutinize, by reference to good governance principles by which the IAAF strives to adhere, the approach of

the IAAF to the introduction and implementation of regulations limiting the eligibility of female athletes based on a perceived unfair advantage resulting from naturally high levels of testosterone (the Testosterone Regulations).

Before turning to principles of good governance, it is necessary to briefly consider the background to the IAAF's introduction of the Hyperandrogenism Regulations and their successor, the DSD Regulations.

1.2. Classification by Sex and Regulation of Eligibility to Compete in Female Category

For virtually as long as women have been allowed to compete in Athletics (and indeed other sports), there have been rules to segregate competition into male and female categories, a distinction that has historically been made by reference to biological sex. The rational for segregation was, no doubt, initially based on observations, assumptions and generalizations about the athletic ability of men and women, the perceived 'weakness' of the feminine form and cultural stereotypes about the role of women (Adair, 2011; McDonagh and Pappano, 2008 [5,6]). Over time there has been scientific flesh added to the assumption of 'male athletic advantage'; the often quoted statistic is that an average male has a 10–12% athletic advantage over an average female (IAAF DSD Regulations, 2019, IAAF Explanatory Notes [7,8]). According to medical experts relied on by the IAAF, the advantage is due to the significantly increased Lean Body Mass (LBM) of average males when compared to average females as well as other athletic advantages that are likely to stem from testosterone, such as larger bones, numbers of red blood cells and 'possible' psychological advantages through increased aggression (Professors Ritzen and Hirschberg in *Chand;* Auchus, 2018; Handelsman et al., 2018 [3,9,10]). There also seems to have been increasing recognition of ethical arguments surrounding equality of opportunity for women. As a result, there seems to be little dispute about the justification of classification by sex in most sports, particularly where natural biological advantages play a significant role and where there is a perceived risk of injury to female athletes if competition was not segregated (Adair, 2011; McDonagh and Pappano, 2008 [5,6]). In the context of athletics, where success depends heavily on maximization of natural biological advantages linked to strength, power and endurance, the rationale is largely undisputed (Krech, 2017; McDonagh and Pappano, 2008 [6,11]) and seems to underpin the ongoing use of classification by sex, despite the risk of injury not being a concern.

Prompted, primarily, by fears of men posing as women to gain an unfair advantage, screening of athletes to ensure only biologically female athletes compete against each other has been embedded in the governance of athletics for over 50 years (Krech, 2017; Xavier and McGill, 2012 [11,12]). Various methods of seeking to determine the biological sex of athletes have come and gone over the years, including 'nude parades', chromosomal testing of saliva and briefly, full medical examinations (Ha et al., 2014; Krech, 2017 [11,13]). The decision of the IAAF to abandon screening based on chromosomal tests reflected the dawning scientific realization that biological sex is not binary; that there are several different indicators of biological sex in addition to chromosomal sex and that in some individuals not all of them necessarily point in the same direction towards traditional conceptions of male and female.

Prior to the 2009 World Athletic Championships, there was a growing concern that athletes with 'differences in sexual development' (DSDs) might have an unfair advantage by competing in the female classification. Between the jettisoning of chromosomal testing and Caster Semenya's victory in the 800m at the 2009 World Championship, the IAAF's policy for dealing with athletes with suspected DSDs is probably best described as 'ad-hoc', with testing to determine the biological sex of individuals taking place following the recommendation of a medical director of a relevant athletics meeting, which could be on the basis of observations or 'tip offs' (Ha et al., 2014 [13]). It was, no doubt, the mess of the Semenya investigation and catalogue of potential ethical and human rights violations that finally prompted the IAAF to seek a different approach.

Accordingly, in 2011, the IAAF introduced the Hyperandrogenism Regulations. Ostensibly, the regulations recognized competition is built around the division of athletes by their legal status as male or female (now Rule 141.3, IAAF Competition Rules 2018–2019 [14]). However, the Hyperandrogenism Regulations made an athlete ineligible for the female category if she had endogenous testosterone

levels above 10 nmol/L, a figure that was reached by virtue of the fact it would not exclude women with polycystic ovary syndrome (PCOS), which also accounts for elevated levels of testosterone (at an average level of 4.5 nmol/L) (Professor Ritzen in *Chand* [3]).

The change of tack came in the fact that the Hyperandrogenism Regulations sought to avoid external classification of athletes by biological sex, a point stressed by professors Ritzen and Hirschberg in giving evidence for the IAAF in *Chand* [3]. Instead, the purpose of the Hyperandrogenism Regulations was, apparently, 'to address the position of female athletes who, due to a special condition, have functional levels of testosterone that are usually only seen in males' (*Chand* [3]). At least on the face of it, by focusing on testosterone levels, the regulations focused instead on the underlying reasons for the 'male performance advantage' and in so doing, presented an objectively measurable variable as a determiner of eligibility (Handelsman et al., 2018 [10]), rather than eligibility being based on the assignment of biological sex as determined by a third party. However, as several commentators have observed, the actual effect, inevitably, was still to assign athletes as male or female (Krech, 2017 [11]). The fact that this assignment is 'only' supposed to be for the purpose of athletics is unlikely, it is suggested, to reduce the magnitude of the effect of being told your understanding of your own sexual and gender identity is wrong in the context of an activity that is central to your life.

In 2015 the Indian athlete Dutee Chand challenged the validity of the Hyperandrogenism Regulations at the CAS on the grounds of discrimination as to sex and/or gender and in relation to individual physiological traits. In *Chand* the CAS accepted the IAAF's stated justification for the rule, and in doing so, tacitly acknowledged that creating a 'level playing field' in female athletics could be legitimately achieved by the exclusion of female athletes based on levels of testosterone, even though this approach was discriminatory. The problem was that the CAS was not satisfied that there was sufficient evidence that female athletes with levels of testosterone above the IAAF's cut-off point (10 nmol/L) did, in fact, have a competitive advantage 'of the same order' as male athletes (*Chand*; Pielke et al., 2019 [3,15]). Accordingly, the CAS suspended the Hyperandrogenism Regulations but provided an opportunity for the IAAF to furnish further evidence.

The IAAF duly commissioned further research (Bermon et al., 2018; Bermon and Garnier, 2017 [16,17]) the results of which were clearly insufficient, even on the IAAF's own interpretation, to convince the CAS that the performance advantage was of the same magnitude as male athletes or significant across all athletic events. Accordingly, the Hyperandrogenism Regulations were dropped and a variation was introduced that was drafted to focus on certain events where the evidence of performance advantage was deemed by the IAAF to be significant. The 'restricted' events are the 400 m, 800 m, 1500 m, and the mile (DSD Regulations 2018 [7]). Furthermore, the serum levels of testosterone at which an athlete becomes ineligible was reduced to 5 nmol/L and the regulations only apply to athletes with XY chromosomes. The IAAF's stated reason for the focus on particular events is due to the over-representation of DSD athletes in those events and their relative success in those events (IAAF, Explanatory Notes, 2019 [8]). In terms of the reduction in serum level, the justification was that 'absent a DSD or a tumor no female would have serum levels of testosterone of 5 nmol/L' (IAAF Explanatory Notes, 2019 [8]).

Before the regulations were introduced, Caster Semenya challenged the validity of the DSD regulations at the CAS, which left the imposition of the regulations in suspense until the outcome of the CAS decision. The CAS eventually upheld the validity of the regulations, albeit with some reservations concerning the practical application of the regulations and the paucity of evidence relating to some of the events (*Semenya v IAAF*, Court of Arbitration for Sport, 2019 [18]). Despite those reservations, the DSD Regulations came into force on 8 May 2019. The full decision of the CAS has not been published, and detailed scrutiny of this decision is, therefore, not possible at present. At the time of writing, it should be noted that the Swiss Federal Court has suspended the application of the regulations in respect of Caster Semenya (but not other athletes) whilst her appeal of the CAS decision is ongoing.

2. Methodology

2.1. A Question of Good Governance

Unfortunately, despite being recognized as a key ingredient for good governance, full transparency in the decision making of International Sporting Federations (ISFs) is not the norm (Geeraert, 2015 [2]) and the IAAF is no exception. The IAAF's constitution, for example, gives the power of adopting and amending rules and regulations to the IAAF Council (IAAF Constitution, Article 47.2 (d) [19]) but there is no requirement to publish the minutes or a summary of them and the IAAF does not appear to do so on its website. Accordingly, stakeholders are left to scrutinize that which the IAAF is prepared to provide. In that regard, the IAAF has set out the key aspects of its rationale for introducing the Testosterone Regulations both in the regulations themselves and in explanatory notes which accompany them. However, the rationale provides little more than a self-justifying summary of the decision and, it is hoped, only reveals the tip of the iceberg in terms of the ethical, legal and scientific considerations that were taken into account when deciding to adopt the policy. Some further detail was revealed following publication of the judgment of the CAS in *Chand* and in the executive summary of *Semenya*. However, this is far from full transparency, and without this stakeholders must either take it on trust or look to legal accountability to ensure that the IAAF Council has considered and given appropriate weight to all of the relevant factors, and did not take into account, or give inappropriate weight to, irrelevant or less relevant factors.

Given this lack of transparency, this article attempts to clarify some of the important considerations that *ought* to have been taken into account and uses inference to consider the weight that they seem to have been given. However, it attempts to do so not by applying the author's own moral framework, but by reference to generally accepted notions of good governance in sport, which provides a practical normative framework about how ISFs ought to behave (Ryall et al., 2019 [20]). These are notions which have been tacitly and overtly approved by the IAAF as a member of Association of Summer Olympic International Federations (ASOIF), and in the IAAF's own stated aims and purposes.

To emphasise the importance of such scrutiny, it is important to recognise the limitations of legal accountability demonstrated by the recent decision in *Semenya*.

2.2. Limits of Legal Accountability

As in *Chand*, the CAS determined that the DSD Regulations were discriminatory on the basis of sex and/or gender and towards individuals with certain physiological traits. However, as it was accepted that the IAAF was pursuing a legitimate aim, the key question was whether the regulations were necessary and proportionate to achieve that aim (CAS, 2019 [18]). By a majority, the CAS panel determined that they were.

The decision (or at least the executive summary of it), highlights that legal accountability of ISFs is limited both by the terms of reference to the CAS (i.e., what the CAS is asked to determine) and the reality that sport has a large degree of autonomy in which to shape its own legal norms (Ryall et al., 2019 [20]; Gardiner, 2012 [21]).

With regard to terms of reference, the executive summary makes it clear (just as in *Chand*) that CAS was not asked to consider the validity of segregation between male and female athletics in the context of its stated purposes as it was accepted (without argument) to be a 'legitimate aim' of the IAAF. For reasons explained more fully below, this means that when it comes to scrutinising the approach of the IAAF, the fundamental basis of rules for policing the male/female divide and its relevance to the Testosterone Regulations avoids examination.

Second, that its decisions are constrained by its 'judicial function'. In other words, the framework of legal reasoning dictates that the CAS is not free to substitute what it would have done for the decision of the IAAF or what it thinks is 'fair' or appropriate (Ryall et al., 2019 [20]). In doing so the CAS is both explaining the limits of its powers and function and providing an example of the limit of legal accountability for the decisions of ISFs in general and the IAAF in particular.

Further consideration of the limits of legal accountability are beyond the scope of this paper; but the recognition that there *are* limits in legal accountability of the decisions of ISFs is important in highlighting the need for other forms of scrutiny and accountability. The key point being that, even though the decision of the IAAF has been legally 'vindicated' (albeit with some reservation), this does not mean that it is necessarily a 'good' decision from a wider governance perspective (a point which, it is suggested, the executive summary alludes to in noting the reservations). Accordingly, outside the narrow legal sphere, there is room (and a need) for wider scrutiny of the decision making process of the IAAF. ISFs enjoy monopolistic type powers (Geeraert, 2015 [2]) over a large number of participants in sport and over a social activity that is undoubtedly seen as a 'public good'. As such, ISFs have obligations not only to the majority of athletes, but also to protect minorities within the sports community and, more widely, to the societies they operate within. As such they should also have to meet demanding procedural and performance requirements or they risk losing legitimacy (Tallberg and Zürn, 2019 [22]).

2.3. Principles of Good Sporting Governance

Over recent years there have been an increasing number of studies on what 'good governance' means in a sporting context and there are now well-established sets of good governance principles in sport utilised in both literature and policy (Chappelet and Mrkonjic, 2013; Mrkonjic, 2016 [23,24]). Despite variations, they generally reflect a core of well accepted aspirational principles about the processes and policies of ISFs that revolve around accountability, transparency, democracy, treating stakeholders fairly and equally and ensuring there are control mechanisms on those wielding power (Ryall et al., 2019 [20]).

Given this paper's concern is scrutinising governance decisions of the IAAF, it seems appropriate to take the principles of good governance as espoused by ASOIF (of which the IAAF is a member) as the starting point from which to evaluate its decision making and general approach to the introduction of the Testosterone Regulations.

The ASOIF Governance Task Force Report (ASOIF, 2016 [25]) recommends five key principles that should be included by their member federations in their statutes and should be embraced in all of their activities, decisions, processes and regulations. The principles being integrity, transparency, democracy, sports development & solidarity, and control mechanisms.

To carry out the analysis, this paper will consider the principles of good governance in turn, the extent to which they are reflected in the IAAF's constitution and, importantly, the extent to which they appear to have been translated into the individual decision making of the IAAF concerning the Testosterone Regulations. However, also included in the analysis of good governance is a principle related to 'effectiveness', which allows consideration of the quality of individual decisions in terms of furtherance of the IAAF's *own* constitutional purposes. Although there will be an inevitable overlap in the analysis of the IAAF's adherence to ASOIF's principles and its own stated purposes, evaluation against its own internally set purposes provides an additional level of scrutiny about the appropriateness and legitimacy of the decision making. Whilst not adhering to generally accepted external standards of governance practice clearly raises legitimacy and governance concerns, failing to fulfill the purposes that an organization states it is in existence to achieve raises an even more fundamental concern.

It should be noted that as considerations about transparency have been discussed above, they will only be touched on again in context the other principles of good governance.

3. Discussion

3.1. Integrity & Solidarity

The relevant ASOIF guidelines on implementing integrity primarily rest on the ethical principles set out in the IOC Code of ethics (ASOIF, 2016 [25]). Article 1 of the IOC code sets out fundamental principles

and states that ISFs should have respect for the Olympic spirit, requiring mutual understanding with a spirit of friendship, solidarity and fair play (International Olympic Committee, 2016, Code of Ethics, Article 1.1. [26]).

The Sports Governance Observer explains solidarity as recognizing responsibility towards internal and external stakeholders (Geeraert, 2015 [2]) and, it is suggested, encapsulates the need to support all internal stakeholders (including athletes), to promote inclusivity as well as recognition of a wider obligation towards society. As such it makes sense to consider the principle of solidarity together with integrity as they raise similar concerns in the context of the Testosterone Regulations.

Article 1 states that ISFs should have respect for international conventions protecting human rights which ensure, in particular, respect for human dignity and the rejection of discrimination of any kind on whatever ground (Art. 1.4). It is worth emphasizing that the wording is unequivocal and there is no qualification to the objective of rejecting discrimination; there is nothing to suggest that discrimination is acceptable in some circumstances or in relation to some characteristics.

The IAAF's has, to some extent, embedded these principles in its constitution, the current version of which recognizes that one of its purposes is to 'preserve the right of every individual to participate in Athletics, without unlawful discrimination of any kind undertaken in the spirit of friendship, solidarity and fair play' (IAAF Constitution, 2019) Art 4.1 (j) [19]).

As such, there is a slight mismatch between the more complete statement of IOC Code of ethics and the IAAF's recognition of its constitutional obligations to ensure integrity.

In identifying potential human rights concerns raised by the Testosterone Regulations the Universal Declaration of Human Rights (UDHR) provides an obvious and extremely useful framework against which to identify such concerns (Larson, 2011 [27]). Of particular relevance are Articles 1, 7, 12, 22 and 29 of the UDHR [28].

Article 1 makes an explicit acknowledgement that 'all human beings are born free and equal in dignity and rights and should act towards one another in a spirit of brotherhood'. Article 22 recognizes that everyone is entitled to realize their economic, social and cultural rights *indispensable for their dignity and the free development of their personality* (emphasis added).

Article 12 expressly protects an individual's rights to privacy and from suffering attacks on their reputation.

Article 7 and 22 both recognize that individuals should not be discriminated against. Article 22 makes specific reference to the need to ensure that individuals have their rights and freedoms protected without distinction of any kind, such as race, colour, sex . . . birth or other status.

Article 23 protects the right to work and free choice of employment

Article 29 recognizes the possibility of limitations on these freedoms, but only lawful limitations 'solely for the purpose of securing due recognition and respect for the rights and freedoms of others and of meeting the just requirements or morality, public order and the general welfare in a democratic society'.

This is far from the only relevant international convention relating to the protection of Human Rights. The UNESCO International Charter of Physical Education, Physical Activity and Sport recognizes as a fundamental principle that access to sport should be without discrimination and that sport should be inclusive and promote equal opportunities for all. The International Covenant on Civil and Political Rights and the European Convention on Human Rights also protect against non-discrimination. Beyond embedding these commitments in their constitutions, Schwab makes the point that ISFs need to translate the general commitments into actions and decisions taken by conducting due diligence in assessing and mitigating against human rights risks; and dealing with human rights issues transparently (Schwab, 2017 [29]).

Thus, if the IAAF is to adhere to ASOIF principles of integrity and solidarity, it has an obligation to ensure protection of every individual's rights to dignity, privacy, non-discrimination and the development of their personality not only in the creation and implementation of regulations and policies, but also in their application and implementation on a day to day basis. According to the

UDHR, failure to adhere to this obligation is only be permissible if it is to secure the rights and freedoms of others.

The historic treatment of Caster Semenya (and other athletes with DSDs) resulting from the introduction and implementation of policies and regulations designed to police female eligibility raised serious concerns about human rights violations. Using Semenya's case as an example, specific potential violations by the IAAF might have included: restricting the free development of her personality by the assignment of biological sex (against her own perceptions), which would also likely interfere with her dignity; being forced to undergo invasive assessment to verify biological sex (dignity, privacy), having no control over information about your own medical conditions (dignity, privacy), being forced to divulge information about extremely personal medical issues that go to a sense of identity (dignity, privacy), being prevented from competing without taking medication (expression of personality, dignity, freedom to work); having the whole issue played out in public (privacy); being required to undertake the process of sex verification when others are not (discrimination); having your reputation muddied by being labelled a cheat (reputation). Add to this the potential psychological damage resulting from such violations and the fact that the verification only applies to selected women (and no men) and you have a lengthy list of human rights concerns.

Of course, the IAAF sought to address some of these concerns through the use of testosterone levels to determine eligibility for competing in female events rather than testing for biological sex per se. However, as already discussed, it is difficult to distinguish the effect. From the perspective of an athlete with a DSD, the distinction between being told you are not biologically female and being told you are not 'athletically' female is one that is likely to get lost in explanation.

The Testosterone Regulations have explicitly recognized the need to protect the dignity and privacy of relevant athletes (DSD Regulations, Art 3.4 [7]) and the process of investigation has been made clearer, including an attempt to define the basis on which an investigation would begin (DSD Regulations, Art 3.3 [7]). However, this does not change the fact that the substance of the regulations mean that there will always be significant interference with the athlete's right to express her personality, her dignity, her right to privacy, her right to not be discriminated against and her right to realize her economic potential. For example, an athlete is still required to report sensitive, private medical information to the IAAF and, although 'reasonable grounds' are required, an investigation can still be undertaken on the instigation of the IAAF, provided it has a 'reliable source' (leaving plenty of scope for subjective selection of athletes and influence from those with their own motives).

The IAAF constitution recognizes that discrimination might be 'lawful'. As illustrated in *Semenya*, lawfulness of discrimination is considered a question of 'proportionality' and is limited to considering whether the regulations are necessary and proportionate to the legitimate aim to be achieved. In *Semenya*, the CAS, starting from an assumption about the legitimacy of the aim, found that it was proportionate. Whilst the legal principle recognizes that there is a 'margin of appreciation' for rule creators to determine both what is a legitimate aim and what is necessary to achieve that aim, that freedom is not absolute (Rivers, 2006 [30]) and the appropriate exercise of that freedom was not considered in *Semenya*. Outside the narrower question of lawfulness of the discrimination, there is also a wider 'good governance' question posed by the UDHR, which acknowledges that an individual's rights and freedoms should *only* be infringed in the interests of protecting the rights and freedoms of others. In other words, the fundamental question is whether the Testosterone Regulations strike an appropriate balance between protecting the rights of athletes to whom the regulations will be applied and protecting the rights and freedoms of others. The difficulty of the balancing exercise for the IAAF, which was not considered in *Semenya*, is that it is not immediately obvious which UDHR rights and freedoms are being infringed by DSD athletes being allowed to compete. Presumably the IAAF would consider that the right of others (i.e., 'normal' females) to compete on a 'level playing field' trumped the various infringements of the rights of athletes with DSDs and is necessary to ensure 'fair play' (Krech, 2017 [11]). However, referring to the IAAF's own scientific evidence and considering what 'normal females' would be losing by competing against athletes with DSDs, it is far from clear that it would be much more than a

reduced opportunity of winning. As a pure human rights question, it seems difficult to justify, that a reduced opportunity of winning should outweigh the potential serious infringements of the rights and freedoms of individual DSD athletes, a task made even harder when you consider more fully the whole notion of fair play in sport.

3.1.1. The Meaning of Fair Play

Whilst it is not the purpose of this article to re-enter the debate about the concept of 'fair-play', it is important to make some observations about key aspects of it. First and foremost, fair play incorporates the requirement to play by the rules, at least in terms of the spirit or ethos of them, if not always the 'letter' of them (Butcher and Scheider, 2003 [31]). Secondly, and importantly in the context of the Testosterone Regulations, it would also seem to import an idea of equality of opportunity. This is, of course, at the heart of the IAAF's reasoning for pursuing both the retention of the male/female classification and the imposition of the Testosterone Regulations. However, it is important to recognize that equal opportunity does not *require* segregation of events into male and female classifications and that doing so is an ongoing choice by the IAAF and a means to achieve the wider aim of fair play. That choice of means may be justified when considered against other possible means of achieving the aim and against the other aims and purposes of the IAAF (such as development of the sport), but it is an ongoing value judgement that needs to be recognized as such and re-evaluated from time to time.

Third, fair play encapsulate abstract, non-sport specific values that are seen by society, generally, as positive; the types of values that have historically been used to justify playing and watching sport as a social or public good, such as understanding and empathy for others (Butcher and Scheider, 2003 [31]) and an appreciation that winning is not everything. Embracing such values is important in demonstrating solidarity by promoting values and practices that contribute towards a better society (Geeraert, 2015 [2]). Although these values are not always present in sport there are enough examples of conduct which is rightly lauded for demonstrating 'fair play' and which have the power to showcase and encourage positive social values (the memory of Paulo Di Canio playing for West Ham and catching the ball when the opposition goalkeeper collapsed to the turf instead of heading the ball into an empty net sticks in the author's mind).

Accordingly, when ISFs are considering how to promote and achieve 'fair play', it should be appreciated that the concept itself encapsulates more than ensuring approximate equality of opportunity and playing by the rules and, as such, there is an inherent difficulty in using 'fair play' to justify infringements of human rights and human dignity before you even consider wider purposes such as ensuring solidarity and integrity.

3.1.2. Medical Care and Solidarity

It should be appreciated that, as a matter of solidarity, the IAAF have stressed that the Testosterone Regulations will help athletes receive medical care for conditions of which they were unaware (*Chand*, DSD Regulations, 2018 [3,7]). However, it is submitted that this justification does not really support the need for testosterone based regulations that exclude athletes from competition. Medical diagnosis and support could clearly be provided without the need to determine eligibility based on testosterone levels.

3.2. Democracy

The ASOIF's governance task force report focusses on democracy in terms of the process of electing members to executive bodies and in ensuring representation of key stakeholders in the governing body. However, it is suggested that democracy goes further than this and should include wider participation by both internal stakeholders (such as athletes and national federations, clubs etc.) and external stakeholders (the public, governments, NGOs and those interest in human rights) in the creation and development of specific policies (Geeraert, 2015 [2]).

Given the lack of full transparency concerning the rationale and processes for the adoption of the Testosterone Regulations, it is difficult to comment fully on the extent to which the voices

of all stakeholders were considered. Karkazis et al. have shed some light on the evolution of the Hyperandrogenism Regulations highlighting that a range of stakeholders were consulted (including human rights experts, female athletes and a representative of the intersex community), but also pointing out obvious limitations (in terms of the composition of the IAAF's working group, the selection of stakeholders asked to input in to the decision making process and the clarity of the goal to be achieved) (Karkazis et al., 2017 [32]). What input athletes with DSDs had into the continuing process up to the introduction of the DSD Regulations is not entirely clear.

Of course, the input of voices from stakeholders is important, but as they are not the decision makers, we can only speculate as to the impact and the weight that different stakeholder's views were given. However, it might be noted that there was, apparently, only one representative of the intersex community (a non-athlete) (Karkazis et al., 2017 [32]), which, given the potentially disproportionate effect on athletes with a DSD, might be considered somewhat of an underrepresentation. As alluded to above (as a matter of solidarity), ISFs should be alert to the need to protect minorities as well as listening to the interests of majorities, a point underlined by Madeleine Pape, a former competitor of Semenya who moved from being a supporter of testosterone based regulations as an athlete to a critic of them once the 'bigger picture' became clearer to her (Pape, 2019 [33]).

3.3. Sports Development

The development of individual sports and sports in general, in terms of participation, attention and securing resources are reflected in the ASOIFs principles and in the IAAF's constitution (IAAF Constitution, 2019, Art 4.1 (b) and (l)).

In the context of the Testosterone Regulations, the potential development effect on participation of females in elite athletics if they were required to compete against men has always formed an important part of the rationale for segregation by sex (IAAF Explanatory Notes 2019; *Chand*; *Semenya* [3,8,18]). However, it is difficult to see how that rationale supports the Testosterone Regulations themselves, *unless* it is backed up by evidence that athletes with DSDs enjoy such an advantage that normal female athletes could not and would not compete at all or, at least, that there would be a significant reduction in participation. Whilst it may be plausible to accept (without any empirical evidence) that few, if any, females would be seen in the majority of elite athletic events if they had to compete against men it does not follow that we should accept, without evidence, that there is or would be an significant effect on participation in elite female athletics if athletes with DSDs were allowed to compete without restriction. Without such evidence, the justification is no more than a hunch, raising an important question about the role of factual evidence in the IAAF's decision making. This concern is particularly warranted given that the IAAF's evidence about performance advantage of females with high levels of testosterone does not seem to suggest, from what we have seen at present, that athletes with high levels of testosterone benefit from close to the 10–12% 'male' performance advantage.

Whilst the 'development' of athletics might have been a relevant factor justifying the segregation of male and female athletes historically, it should not be confused with a relevant justification for the Testosterone Regulations, which it is suggested can, at present, only be justified by reference to the notion of fair play. In using the 'sports development' or 'protection of female athletes' argument as a justification for the Testosterone Regulations, the IAAF is conflating two different issues.

3.4. Control Mechanisms

The ASOIF principles on control mechanisms focus heavily on financial irregularity and the danger of corruption, rather than wider ethical considerations. This is also reflected in the IAAF code of conduct and remit of its ethics panel, which seems to focus on corruption, rather than having a wider ethical due diligence remit (IAAF Integrity Code of Conduct, 2019 [34]). Although ethical issues may be picked up in the decision making process as a matter of 'democratic' input (discussed above), perhaps the input of a formal ethics committee into a wider range of decisions might be a step forward in ensuring ethical due diligence in governance decisions.

3.5. Good Governance and Effectiveness

Some sets of good governance principles also incorporate notions of performance or effectiveness (Henry and Lee, 2004; Parent, Naraine & Hoye, 2018 [35,36]) and therefore extend the ambit of good governance to include an assessment of whether the *implementation* of processes and individual decisions achieve (or at least advance) the ISFs stated aims and purpose. There has been some implicit criticism of the inclusion of performance as a measure of good governance in that it confuses governance and management (Chappelet and Mrkonjic, 2013 [23]). However, it is submitted that this is an artificial distinction. Consideration of the 'quality' of individual decisions made by ISFs by reference to internal stated purposes is important in considering issues of legitimacy and accountability and therefore plays a central role in any assessment of good governance (Tallberg and Zürn, 2019 [22]). As such this paper will also consider how well the IAAFs approach to adopting the Testosterone Regulations accords with its own constitutional purposes before commenting further on any additional observations about complying with a wider sense of good governance.

3.6. Testosterone Based Regulations; an Appropriate Policy to Further the IAAF's Stated Purposes?

In the DSD Regulations and the explanatory notes that accompany them (IAAF, 2019 [7,8]) the primary reasons for adopting the policy were (1) to ensure 'fair competition in female athletics' and (2) to protect 'the protected class' of female athletes. These reasons were also highlighted by the CAS in *Semenya* as the legitimate objective that the IAAF was pursuing (CAS, 2019 [18]).

However, it should be appreciated that the IAAF constitution contains no specific purposes which relate to ensuring fair competition in *only* female athletics or to ensuring a male/female categorisation is retained in order to protect female athletes. The relevant provision would seem to be Article 4.1(j) which illustrates that the purpose that the IAAF should be seeking to achieve is to (1) 'to preserve the right of every individual to participate in Athletics without unlawful discrimination of any kind', and (2) to ensure that athletics is 'undertaken in a spirit of friendship, solidarity and fair play' (IAAF Constitution, 2019 [19]). This is important as it clarifies that both the decision to retain separate male/female categories and to pursue the Testosterone Regulations are merely *possible* means towards achieving the IAAF's wider purposes. Whether they are an appropriate means requires a value judgement based on a proper consideration of all of the IAAF's stated purposes (including adherence with external principles of good governance) and the impact of the means on achieving its stated purposes. That judgement requires full consideration of other possible means of achieving those purposes, and particularly, any means that might cause less conflict with other purposes such as non-discrimination, integrity, solidarity and which also underpin (the wider notion of) fair play.

Other possible means of achieving those purposes might have been: classifying by legal gender; classifying by lean body mass; classifying by testosterone levels alone; introducing a handicap system within sub-categories or a handicap system that applies to all athletes regardless of sex or gender. From the decisions in *Chand* and *Semenya*, we can observe that the IAAF rejected classification by legal gender on the basis of potential for unfair advantage. However, due to a lack of transparency about the decision making process, it is impossible to know what other possibilities have received serious consideration as a potentially 'better' means of advancing the IAAF's purposes as a whole and the reasons for their rejection. Inevitably, this raises questions about the quality of decision making and whether 'external' motivations are driving the policy. This is particularly so given the evident conflicts of purpose and principles of good governance that the current policy creates with regard to integrity, solidarity, non-discrimination and fair play.

Furthermore, as already pointed out, the protection of the female athletes cannot form the basis of a justification for the testosterone regulations unless there is reliable evidence that the unrestricted participation of athletes with DSDs would result in reduced participation and interest in athletics. It is possible that such evidence exists, but it does not seem to have been referred to in any rationale that the IAAF has put forward. As such the only plausible justification has to rest on the notion of fair play.

3.7. The Problem with Integrity, Solidarity and Fair Play

As already alluded to, it is difficult to see how the possible reduction in the likelihood of 'normal' female athletes winning could ever be appropriately balanced against the consequential interferences of human rights associated with the application of the Testosterone Regulations. This is so even if you accept the argument that the medical intervention required to reduce testosterone to eligible levels will amount to no more than taking oral contraceptives (something that seems to have been accepted by the CAS in *Semenya*). This balancing exercise becomes even harder still when you consider the evidence that the IAAF has relied on seems to demonstrate, at best, a relatively small performance advantage (0.3–3.1%) for women in the highest tertile of testosterone levels over those in lowest tertile of testosterone levels, and then only in the handful of events to which the regulations apply (Bermon et al., 2018; Bermon and Garnier, 2017). It is suggested that, in order to 'warrant' the discrimination and other human rights interferences, it would be necessary to demonstrate the advantage that females with DSDs enjoy is so large that 'normal females' cannot compete at all. Only then will 'normal' female athletes be losing something that could be recognisable as a human right or freedom.

At the very least, forced medication (even if it is 'only' oral contraceptives) with, presumably, unknown effects on individual athletes, seems an odd way of balancing human rights issues. If the effect of testosterone is to provide a quantifiable performance advantage; wouldn't a less invasive solution be to compensate by reference to time? The IAAF has referred to evidence that female athletes who took medication to suppress testosterone levels from 21–25 nmol/L to 2 nmol/L had a reduced performance of 5.7% (IAAF Explanatory Notes, 2019 [5]). If that evidence is scientifically reliable, then why not require a percentage time handicap?

A particular concern is that historical, cultural and institutional barriers are unduly influencing the approach that is now being taken. When little was known about either the underlying reasons for the 'male advantage', or the complexities of biological sex, categorisation by biological sex may well have been appropriate (or at least practical) as a proxy for ensuring both fair play and the protection of female athletes, but that does not necessarily make it so now. If, as the IAAF suggests, testosterone levels are the primary reason for the 'male advantage' and seemingly, provide a measurable and quantifiable advantage (key to the reasoning of the IAAF and the decisions in the CAS (Pielke et al., 2019 [15]) then we have gone beyond crude observations about men being faster than women and the consequence would seem to be that segregation by sex is no longer needed as a proxy means of ensuring fair play or 'protecting' female athletes. Segregation by sex is, therefore, more clearly shown for what it is, a policy *choice* of the IAAF. If that choice creates significant conflicts with the IAAF's stated purposes then other options that better reflect its purposes (and good governance principles), should be considered. Perhaps the prospect of men and women competing against each other is too radical, but why that is a problem and the basis of the decision ought to be properly justified in a transparent and democratic way.

Furthermore, to reflect its stated purposes, the IAAF's wider policy should be about protecting against 'unfair' advantages regardless of sex or gender. The concern should not be about protecting only female athletes, it should be about protecting *all* athletes from those that might have an unfair advantage. It is that purpose which should inform a search for scientific evidence to determine the size of the advantage enjoyed and, only then, regulation to address any significant unfairness. If the scientific evidence supports the conclusion that testosterone (or indeed any other genetic factor) provides a sufficiently large advantage and possibly affects women and men significantly differently, then subsequent regulation may be necessary and might need to reflect that. However, from the historical background to the Testosterone Regulations and from the scientific evidence on which the IAAF purports to rely, that does not appear to be the approach that has been taken. For example, in the Bermon and Garnier studies (Bermon et al., 2018; Bermon and Garnier, 2017 [16,17]) on which heavy reliance is placed, the data in relation to male performance differences based on testosterone levels is far less than the female data (the female data is taken from both the Daegu and Moscow IAAF world championships, but the Daegu world championships is not used in relation to male athletes)

and there is a fairly blunt conclusion that there is no significant performance difference between the males with low testosterone levels and those with high levels. Since the whole basis of the Testosterone Regulations is that increased testosterone *does* provide a performance advantage, it seems strange that the IAAF have not sought to explain or investigate this further, especially given that other academic evidence relied on by the IAAF suggests increases in testosterone in healthy adult males increases muscle strength and size in a linear fashion (Auchus, 2018 [9]). When you also take into account that the revised figures produced by the amended Bermon & Garnier 2018 study suggest that there is no statistically significant performance advantage for females in the higher tertile of testosterone in three of the four events that are now regulated (Pielke et al., 2019 [15]), this seems to suggest a blinkered agenda. Quite why the cut-off point for eligibility is 5 nmol/L to ensure that women with PCOS are not caught is not fully explained (despite noting the higher level of testosterone and the disproportionate numbers in elite athletics) and again is suggestive of an agenda beyond simply levelling out unfair performance advantages.

Finally, if the Testosterone Regulations are to be ultimately justified by the level playing field argument it is difficult to see why one natural biological advantage is unfair without having evidence of the advantage that other natural biological advantages actually play. The answer seems to be to refer to the fact that 'the male advantage' is the single most significant biological factor in determining athletic performance and testosterone is the primary cause of that advantage. However, if ensuring fairness is the aim, the only question should be whether the performance enhancing effects of testosterone provide a significant advantage beyond other genetic advantages. It is totally irrelevant whether testosterone is the primary reason for the 'male advantage'; the only question should be what performance advantage it provides and whether it is out of sync with other genetic advantages. So if, as the IAAF evidence suggests, a female with high testosterone levels has a 5.7% performance advantage (IAAF Explanatory Notes, 2019 [8]), surely the question should be how that compares against other genetic advantages, such as having the 'sprinting' gene for example.

4. Conclusions

The above discussion suggests that, in pursuing the adoption and implementation of the Testosterone Regulations, the IAAF has not necessarily advanced their own stated purposes or adhered to the principles of good governance to which it aspires. There are particular concerns about upholding and promoting principles of integrity, solidarity and fair play stemming from human rights interferences that necessarily result from implementation of the regulations. There are also concerns in terms of transparency and democracy in the decision making.

However, there is also an additional concern raised about how the IAAF has made use of scientific evidence as a basis for justifying the Testosterone Regulations. Most obviously, there are compelling arguments that the central plank of the IAAF's evidence (Bermon et al., 2018; Bermon and Garnier, 2017 [16,17]) may be scientifically flawed, both in terms of what it is capable of showing (only correlation not cause) and in terms of the data resulting in a lack of scientific integrity (Karkazis et al., 2017; Franklin et al., 2018; Pielke et al., 2019 [15,32,37]). In particular, the Pielke study highlighted real concerns about the independence of the Bermon and Garnier studies, the ability of other scientists to re-create and verify the results and, from an evaluation of the revised data in the 2018 Bermon et al. study, the statistical significance of almost all of the observed performance advantages (it was suggested that there was only one event where the performance advantage of female athletes with higher testosterone levels was statistically significant (Pielke et al., 2019 [15]). The concern about independent verification and external scientists not having access to the same data to reproduce results clearly reinforces concerns about transparency.

Even taken at face value, the Bermon and Garnier studies suggest that there was zero advantage in several events, and even a disadvantage in events such as the 100m (where the power advantage of increased lean muscle mass associated with higher testosterone levels might be expected to provide a benefit) (Bermon et al., 2018; Bermon and Garnier, 2017 [16,17]). In other events, where a performance

advantage was observed for female athletes (hammer and pole vault) no restrictions have been introduced, and there does not appear to be an explanation for this in the DSD Regulations or the explanatory notes to them (IAAF, 2019, IAAF Explanatory Notes, 2019 [7,8]). There is an inference from the 2017 Bermon and Garnier study that there are outliers within the highest tertile of female athletes that would have a much greater performance advantage (Bermon and Garnier, 2017 [17]). However, no direct evidence is provided of the performance advantage actually enjoyed by these outliers and as such there is a concern that it is the inference, more than the empirical evidence, which is influencing the policy.

These observations on the use of scientific evidence tend to suggest that the IAAF has sought the scientific evidence to justify the evolving policy, rather than approaching the scientific evidence with an open mind and deciding the policy based on that evidence. It was suggested earlier in this paper that for the IAAF to limit specific genetic advantages it needed a good justification for doing so. However, taking into account principles of good governance reflected in the IAAFs stated purposes and the criticsms of the scientific evidence, it is difficult to agree that the policy is currently justified.

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