
TARGET ARTICLE

Policing the Boundaries of Sex: A Critical Examination of Gender Verification and the Caster Semenya Controversy

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On August 19, 2009, Caster Semenya, South African track star, won a gold medal in the women's 800-meter event. According to media reports, on the same day, the International Association of Athletics Federations (IAAF) ordered Semenya to undergo gender verification testing. This article critically assesses the main concepts and claims that undergird international sport organizations' policies regarding "gender verification" or "sex testing." We examine the ways in which these policies operate through several highly contested assumptions, including that (a) sex exists as a binary; (b) sport is a level playing field for competitors; and (c) some intersex athletes have an unfair advantage over women who are not intersex and, as such, they should be banned from competition to ensure that sport is a level playing field. To conclude, we make three recommendations that are consistent with the attainment of sex and gender justice in sport, which include acknowledging that myriad physical advantages are accepted in sport, recognizing that sport as a level playing field is a myth, and eliminating sex testing in sport.

Caster Semenya, an 18-year-old track star from rural Limpopo, South Africa, won the gold medal in the women's 800 meters at the World Championships in Athletics in Berlin on August 19, 2009. Semenya won the event in 1:55:45, 2 seconds slower than the world record, yet 7.5 seconds faster than her previous times in this event. Media accounts noted that the silver medalist, Kenyan Janeth Jepkosgei, finished a full 2.45 seconds behind her. On the same day that Semenya won gold, gender verification tests were requested by the International Association of Athletics Federations (IAAF) to determine whether she was "eligible" to compete in women's sport. Media reports stated that the IAAF requested the tests because of Semenya's "deep voice, muscular build and rapid improvement in times" ("IAAF: Semenya decision in November," 2009). The general secretary of the IAAF stated that Semenya

underwent gender verification testing because of "ambiguity" regarding her sex.

On July 6, 2010, the IAAF "accepted the conclusion of a panel of medical experts that Semenya can compete with immediate effect" ("Athlete Caster Semenya free to compete," 2010). She returned to competition at a low-profile track-and-field event in Finland on July 15, 2010. Semenya competed in the 800-meter event at the 2012 Olympic Games in London, winning the silver medal. The results of her 2009 gender verification test were not released to the public, and the IAAF stated that Semenya's medical test results would remain confidential.

Semenya identifies as a woman. Family members, friends, South African stakeholders, and leaders in both sport and government have insisted that Semenya is indeed a woman, regardless of what scientific testing may determine (for a discussion, see Cooky, Dycus, & Dworkin, 2012; Dworkin, Swarr, & Cooky, in press). Despite Semenya's performance at the 2009 World Championships, the subsequent controversy regarding her "gender verification" raised issues regarding the

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eligibility of nonnormatively sexed/gendered bodies to participate in international sporting competition.

It is difficult to ascertain the prevalence of intersexed individuals given a lack of consensus among biomedical scientists regarding what conditions constitute intersexuality (Karkazis, 2008). Some individuals may be born with ambiguous genitalia; in other cases, individuals are born with “normative” genitalia. Moreover, although the incidence of various conditions will vary, estimates are often reported in aggregate. Given a lack of consensus regarding which conditions constitute intersexuality, estimates range based on which conditions are included or excluded from the estimate (Karkazis, 2008).

Adding further complexity to the task of quantifying such conditions is the fact that these often exist on a continuum. For example, the incidence of classical congenital adrenal hyperplasia (CAH), where individuals have variable degrees of genital ambiguity and the most common intersex diagnosis, is estimated at one in 15,000 births. For nonclassical CAH, estimates vary between 1 in 100 to 1 in 1000 births (Karkazis, 2008). Yet there are also a multitude of “disorders” that scientists include under the umbrella term *disorders of sex development* (DSDs), including androgen insensitivity syndrome, Klinefelter syndrome, and Turner syndrome. Despite the lack of consensus on how intersexuality is defined and whether certain DSDs are included under the broader term (see Dreger, 1998; Fausto-Sterling, 2000), within the popular literature and much of the academic literature the estimate of approximately 1.7% (individuals who can be classified as intersex) is frequently reported (Blackless et al., 2000; Dreger, 1998; Fausto-Sterling, 2000).

Regardless of the challenges of assessing incidence, it is not surprising that a certain number of individuals with DSDs, or intersex athletes, compete in sport. However, the institution of sport is formally organized around the notion that there are only two sexes—male and female—and sport is largely segregated by binary sex category. Therefore, historically there has been no formal place within the institution of competitive organized sport for athletes who exist outside of the dichotomous categories of male and female and who subsequently “fail” sex testing.

Female athletes who test positive for DSDs are deemed to have an unfair advantage in sport compared to female individuals without DSDs (those classified by sport organizations as normal females). As such, sport organizations attempt to police the boundaries of sex, stating that they do so to maintain a level playing field for “normal” female athletes. Until recently, most individuals diagnosed (or identified through sex testing) with a DSD were barred from sport competition altogether or were asked to quietly fake an injury and retreat from competition (Cole, 2000; Cooky, Dycus, & Dworkin, 2012). In the aftermath of the Semenya controversy, the International Olympic Committee (IOC) convened

a task force to review its policies on gender verification testing. The IAAF also revised its policies in May 2011, which continue to require female athletes to submit to a medical evaluation should “suspicions” of their sex arise or should an athlete have a known DSD. We review these policies in the sections that follow.

To assess sporting organizations’ policies that determine whether intersex athletes are eligible to compete, we first provide a brief history of gender verification testing in sport. Next, we critically assess the main concepts and claims that undergird gender verification/sex testing in sport, including that (a) sex exists as a binary; (b) sport is a level playing field for competitors; and (c) intersex athletes have an unfair advantage compared to female athletes, and they should be banned from competition to ensure that sport is a level playing field. To conclude, we make three recommendations that are consistent with the attainment of sex and gender justice in sport, which include acknowledging that myriad physical advantages are accepted in sport, recognizing that sport as a level playing field is a myth, and eliminating sex testing in sport.

History of Sex Testing/Gender Verification in Sport

Women began participating in Olympic competitions in 1900. Given that the institution of sport is largely sex segregated, and given emerging fears that some athletes in women’s competitions were too “masculine” to be female, international sports governing bodies such as the IOC implemented procedures to ensure that all participants were indeed female. Female athletes were first subjected to a nude parade in front of a panel of doctors whose job it was to verify the sex of the competitors (Cahn, 1994; Cole, 2000; Ljungqvist et al., 2006; Puffer, 2002). This was said to be highly invasive, embarrassing, and humiliating to athletes. The IOC instituted mandatory sex testing in women’s sport in 1968 and ended the mandatory aspect of the policy in 1998 (Elias et al., 2000; Ljungqvist et al., 2006). The IOC and other international sports bodies, such as the International Amateur Athletic Federation, implemented various versions of “gender verification” policies or monitoring policies regarding eligibility in female athletic competitions.

At the beginning stages of the implementation of the mandatory policy, the IOC took advantage of advances in technology, specifically the Barr body chromosomal test. This eliminated the need to rely solely on the visual test to verify sex and was thought to be less invasive for the athlete. The Barr body chromosomal test, which was used until 1992, could determine only the chromosomal makeup of an individual, not anatomical or psychosocial status (Simpson et al., 1993). Thus, the tests assessed only one component of an athlete’s sex/gender and as a result were of limited use.

Numerous limitations existed and continue to exist in the use of scientific technology to determine sex. For example, the Barr body test would categorize individuals with XXY genotypes as women and allow those individuals to compete in women's competitions, even though XXY individuals have "male" physical characteristics (Buzuvis, 2010). At the same time, athletes who were anatomically female but had genetic disorders such as 46, XY complete gonadal dysgenesis and 46, XY complete androgen insensitivity would be detected as male under the buccal smear, despite the fact that these individuals would be classified as female based on the appearance of their external genitalia (Genel & Ljungqvist, 2005). Recognizing the limitations of the Barr body test and buccal smear, experts convened at the request of the IAAF in late 1990. What became evident was that the way in which sport organizations measured or ascertained the sex of female athletes often failed to account for (or was unable to account for) the complexity in various chromosomal and genetic variations that exist. However, rather than eliminating sex testing as a means to determine eligibility in women's events, experts determined that laboratory-based sex testing should be replaced with a comprehensive medical assessment of all female athletes to determine their sex. This suggestion was later deemed unnecessary, as it was clearly impractical to implement from a cost perspective.

After 1992, the Barr body test was replaced by the polymerase chain reaction (PCR) test of the SRY gene, a DNA-based form of testing. PCR testing for the SRY gene is a sophisticated test, given the SRY gene signals the developmental pathway for males and has been found to be 99% accurate (Puffer, 2002). However, as with the Barr body test, this test is not without its limitations. Some argued that the DNA sequences used to prime the PCR were in fact not specific to males. This contributed to a number of false-positive test results in women's events (Buzuvis, 2010; Puffer, 2002; Reeser, 2005). For example, in the 1996 Summer Olympics in Atlanta, eight of more than 3,000 female athletes tested positive using the PCR test, but all eight athletes were allowed to compete, as further medical testing determined that the athletes did not have an "unfair advantage" (Buzuvis, 2010; Zaccone, 2010).

As a result of several high-profile cases involving female athletes who "failed" sex tests, and the scientific criticisms of the veracity of the tests in the late 1980s and early 1990s, members of the international medical community argued against the IOC and other international sport federations' use of chromosomal or genetic screening of female athletes to determine eligibility for participation in international sport competitions (see de la Chapelle, 1986; Ljungqvist et al., 2006; Ljungqvist & Simpson, 1992). Scholars—biomedical scientists and social scientists alike—argued that "using a range of sex-tests including the visual test, the Barr body test, and the PCR test, the IOC could not ascertain

beyond a shadow of a doubt who was and was not genetically female" (Cavanaugh & Sykes, 2006, p. 80). The IOC abandoned mandatory sex testing of female athletes in 2000 during the Sydney Olympic Games, in part because of challenges to the scientific veracity of the tests and also due to a multitude of objections that were raised. By 2000, 24 of 29 international sports federations had abandoned routine gender verification testing (Reeser, 2005).

In 2000, the IOC replaced mandatory testing with a policy that granted authority to medical experts at international events to arrange for the gender verification of an athlete's sex, if it was called into question (Cavanaugh & Sykes, 2006; Ljungqvist & Genel, 2005). A medical team including an endocrinologist, a geneticist, a gynecologist, and a psychologist would determine the results of the "gender verification" test. According to Genel and Ljungqvist (2005), the abandonment of mandatory sex testing of female athletes was well received, and in the first several competitions there were no objections to the new policy, nor was there a need to apply the policy.

While the IOC discontinued mandatory sex testing in the 2000 Olympic Games, they continued to retain the right to test athletes in cases deemed "suspicious," whereby the gender identity of an athlete was called into question (Buzuvis, 2010; Cavanaugh & Sykes, 2006; Wackwitz, 2003). Similar to the IOC's policy, the IAAF's Policy on Gender Verification (2006) no longer required "compulsory, standard or regular gender verification during IAAF sanctioned championships" (p. 2). Instead, according to the policy, a "gender issue" may arise due to a "challenge of an athlete or team" brought to the attention of authorities at an event, "suspicions" raised during the process of antidoping controls, or concerns expressed by the athlete or athlete's national federation. This policy allowed for athletes with syndromes that are said to not confer an athletic advantage, including androgen insensitivity syndrome, to compete in female athletic competitions gonadal dysgenesis, and Turner syndrome, to compete in female athletic competitions. Athletes with other conditions such as CAH, androgen-producing tumors, and polycystic ovary syndrome (POS) were also allowed to compete, according to the 2006 policy, even though the IAAF recognized that these "conditions may accord some advantages but nevertheless are acceptable" (p. 2). It should be noted that the 2006 Policy on Gender Verification was the policy in place when the international controversy surrounding Caster Semenya erupted.

The 2006 Policy on Gender Verification was replaced on May 1, 2011, with the IAAF's new policy on sex testing and sporting competition, titled Regulations Governing Eligibility of Females with Hyperandrogenism to Compete in Women's Competition. In the introduction, the policy states that the regulations are "predicated along the following principles," including "a respect for the very essence of the male and female classifications in Athletics" and "a respect for the fundamental notion

of fairness of competition in Athletics” (IAAF, 2011, p. 1). According to this policy, female athletes with hyperandrogenism may compete in women’s competitions, as long as athletes notify the IAAF in advance and the IAAF medical manager determines, in consultation with an expert medical panel (established by the IAAF), that the athlete does not have a definitive unfair advantage. Also, as part of this new policy, the IAAF states that it would no longer use the terms *gender verification* or *gender policy* in its rules. There are also new procedures in place to ensure the confidentiality of the process. According to this policy, an expert medical panel may recommend that an athlete be able to compete in a woman’s competition if she has androgen levels below the “normal male range” or if the female athlete has androgen levels within the normal male range but is “resistant such that she derives no *competitive advantage* from having androgen levels in the normal male range.” (IAAF, 2011, p. 12; emphasis added). It should be noted that the IAAF medical manager has only to “take into account” the recommendation made by the expert medical panel (which under the new policy consists of experts in pediatrics, endocrinology, gynecology, obstetrics, genetics, and psychology). Although allowing individuals with hyperandrogenism appears to be inclusive of intersex conditions, there are concerns regarding the way in which athletes are compared with the average “normal values” (Camporesi & Maugeri, 2010). This concern recognizes that sport training changes the realm of the “normal” body, underscoring that there are biological factors that interact with environmental factors to shape the body.

Assumptions of Sex Testing: Sex as a Binary Category

In the following sections, we critically assess three major conceptual assumptions that undergird sex testing of female athletes. The first assumption of sex testing is that sex exists naturally as a dichotomous binary. In fact, prior to the late twentieth century, technological constraints limited what could be known about sex. As such, scientists and medical professionals could not point to genes in the way we can today to define one’s sex (Dreger, 1998). However, despite the fact that the technology now exists to allow us to determine the genetic components of sex, we echo the position of scholars who argued that this does not mean we have the “ultimate, necessary, for-all-time answer to what it means to be of a certain sex” (Dreger, 1998, p. 9). In writing about scientific attempts to definitively establish a binary classification of sex categories, Fausto-Sterling (2000) argued, “A body’s sex is too complex. There is no either/or. Rather there are shades of difference” (p. 3). Indeed, the previous section illustrates how DSDs are but one example of these “shades of difference.” Yet sport organizations continue to police the boundaries of sex

through sex testing and the segregation of sports by sex, and the policies in place ostensibly are there to “ensure” that participants of men’s competitions are male, and women’s competitions are female. Indeed, the IAAF’s 2011 policy contains a key principle of maintaining “a respect for the very essence of the male and female classifications in Athletics” and thus illustrates how reaffirming the sex binary is central to sex testing policies.

The IOC’s 2003 Stockholm Consensus illustrates how athletes that transverse the landscape of the sex/gender continuum are allowed to compete, as long as the sex binary is resolutely (re)constituted and not challenged. It should be noted that the IOC allows for transsexual bodies that have received medical intervention (surgery, hormones) to participate in athletic competition, but bodies that are “naturally” of both sexes are deemed “unfair.” Although the concern for governing bodies appears to be with the degree to which the “male” hormones of testosterone and androgen provide an “unfair advantage” to athletes in women’s competitions (Vilain & Sánchez, 2012), the extent to which the IAAF and the IOC accommodate transsexual athletes and athletes with DSDs (the language they use in their policies and reports) illustrates how sport organizations are willing to embrace ambiguity in instances where ostensibly the IOC can monitor and classify participants as male or female (Sykes, 2006).

Assumptions of Sex Testing: Sport as a Level Playing Field

The second major assumption embedded in policies on sex testing/gender verification is the notion that sport is a level playing field (in other words, competitions should be determined through talent and hard work and thus athletes’ superior performances are the result of individual talents and not any advantages other athletes may not have the ability to possess) and its corollary: that unfair advantages need to be policed to continue to ensure sport is a level playing field. In response to the gender verification testing of Semenya published in the *Journal of Genetic Counseling*, Caplan (2010) wrote,

If an athlete’s gender is called into question, the task of scientists and physicians is to determine if genetics or biology has conferred an advantage upon the competitor that others in the gender group lack or could not obtain through training and practice. The question is not simply a matter of gonads, genes or hormones, but has biology or genetics conferred an unfair advantage on the athletes that others in the same class and competition lack. (p. 550)

We agree that whether one has an advantage in sport cannot be determined simply based on identifying various sex characteristics (gonads, genes, hormones) of the athlete. However, we contest the assumption that

unfair advantages must be monitored to ensure that sport is a fair and level playing field for competitors. We make two central critiques regarding the assumption that sport is a level playing field: (a) sport as a level playing field is neither an organizational reality nor a possibility, given the historical and contemporary social, economic, and cultural arrangements of sport; and (b) the way that sport organizations police unfair advantages is not implemented consistently for all physical advantages, given that sport-governing bodies tolerate myriad physical advantages that are not available to nor attainable by all athletes.

Sport studies scholars have noted the ways in which sport is *not* a level playing field; rather, it is a site wherein broader forms of social inequality are accepted, tolerated, and ignored. The historic and contemporary structure and culture of sport institutions often reproduces hegemonic masculinity, racism, classism, gender inequalities, and nationalism (Messner, 2002; Sage, 1998). In Western societies, sporting institutions have been organizationally structured to benefit the interests of dominant groups (i.e., White, male, economically affluent; see Burstyn, 1999; Sage, 1998).

Historically, the rationale for sex testing in women's events was to prevent men who might "masquerade" as women in sport, which sport-governing bodies argue would prohibit a level playing field for the "real" (some use "unaffected") female athletes. Interestingly, the most frequently cited case used by sport-governing bodies to uphold the rationale for gender verification of female athletes occurred in the 1936 Berlin Olympics when Herman (Dora) Ratjen, a man, was forced by German officials to compete in the women's high-jump event disguised as a woman. Yet Ratjen placed fourth in the competition; all three medal winners were female competitors (Dickinson, Genel, Robinowitz, Turner, & Woods, 2002). While there are no further documented cases where sex testing revealed a male athlete knowingly masquerading as a woman to gain an unfair advantage in sport (Puffer, 2002; Ritchie, Reynard, & Lewis, 2008), there have been several high-profile examples of female athletes who were penalized by the gender verification system and were disqualified from competition and deemed ineligible. These female athletes were barred from competing in women's events (for a discussion of these cases, see Cahn, 1994; Cavanaugh & Sykes, 2006; Cole, 2000; Martinez-Patino et al., 2010).

If monitoring genetically conferred advantage to ensure a level playing field was the primary basis for ensuring fair play, as the IOC and the IAAF claim, athletes would not simply be tested for sex; sport organizations would also test for "performance enhancing genes that predispose them to be athletically superior" by improving muscle growth and efficiency as well as blood flow to skeletal muscles (Vilain & Sánchez, 2012). Sport-governing bodies would also test for other conditions

that may predispose athletes to be athletically superior. For example, several basketball players have acromegaly, which is a condition responsible for excessive tallness, a clear advantage in basketball (Zaccone, 2010). Female volleyball players have been found to have Marfan syndrome, a disorder that contributes to their unusually tall height, an advantage in that sport. Endurance skier, Eero Mäntyranta, has primary familial and congenital polycythemia (PFCO), which causes high hemoglobin and increased oxygen capacity due to an inherited mutation in the erythropoietin receptor gene (EPOR) (Genel, 2010).

Further illustrating the limitation in the claim that sport is a level playing field is how fairness is often defined by sport organizations and governing bodies. Fairness is understood as an adherence to the same rules (Buzuvis, 2010). "Unnatural" advantages, such as those gained from drug doping, violate standards of fairness in sport. However, Buzuvis (2010) argued that while unnaturally obtained advantages may violate standards of fairness, "fairness requires no such categorical limitation on naturally obtained advantages" (p. 39). There are naturally occurring variations in sex-related conditions, and in most if not all cases these variations are unknown to the athlete until they are subject to sex testing. Thus, one could argue that intersex individuals, female athletes with varying levels of hormones, or athletes with a chromosomal makeup that does not conform to the sex binary have a naturally occurring genetic, chromosomal, or hormonal variation. Thus, if Semenya did indeed have testosterone levels three times higher than the "average" woman (as many in the popular press claimed), and if this was due to natural variations in sex development and not doping (according to IAAF officials she tested negative for doping), then given the standards of fairness in sport this is a "natural" variation that should be tolerated. The fact that female athletes were sex tested for these variations is particularly egregious, given other "natural" variations and conditions, some of which confer advantages, are not monitored or deemed unfair by sport organizations.

Genetically or biologically conferred physical advantages are "unfair" to the same degree that various intersex conditions may be, yet sport organizations do not implement policies to test athletes for these variations, while they do so for those who do not fit into the dichotomous sex binary. At the same time, sport organizations do not view athletes with other types of genetic advantages as a threat to the so-called level playing field, even though researchers have found that athletes with these conditions benefit from clear physical advantages, which by the IOC/IAAF's standards would be construed as unfair. Thus, as we have illustrated, the second key assumption which justifies the use of sex testing—it levels the playing field by eliminating unfair advantages—has not been consistently upheld when it comes to other naturally occurring genetic variations that predispose

athletes to be “athletically superior.” Furthermore, we have shown that sport is not a level playing field, and we argued the claims that current policies are necessary to maintain “fairness” are contradictory (and later, we argue that these are discriminatory). Indeed, sport celebrates those individuals who exist on the extreme end of the biological, physical, and genetic spectrum of human diversity. Here we echo Vilain and Sánchez (2012) who argued that “attempting to create a ‘level playing field’ among people with unique biological profiles may be a futile endeavor” (pp. 198–199). The flaws in both the rationale and justification for sex testing policies raises a central question, which we return to in the conclusions, regarding the necessity or desirability of sex testing/gender verification policies.

Assumption of Sex Testing: Intersex Athletes Have an Unfair Advantage

If we accept the argument that a level playing field is desirable or possible (a point with which we disagree), then we ask why is it only *sex* that is tested while other physical advantages—which are also “naturally conferred”—are not monitored and policed. Here, the belief among sport-governing bodies such as the IOC and the IAAF, as well as some biomedical experts, is that to allow male athletes to participate with women at elite levels would prove unfair because the male competitor will win most, if not all, competitions given their physical superiority (Vilain, 2012). In this way, sport-governing bodies reaffirm the belief that categorically all male athletes are better at sports when compared to female athletes (Cahn, 1994; Cavanaugh & Sykes, 2006; Cole, 2000; Kane, 1995). However, “athletic prowess is not simply a matter of genetics or a matter of biological sex” (Zaccone, 2010, p. 397). In the United States, there is legal precedent that sex is not and cannot be a proxy for ability in athletics (McDonagh & Pappano, 2007). Yet the belief in the categorical physical superiority of male athletes and the physical inferiority of female athletes continues despite social science and biomedical research and legal precedent that suggests otherwise (Dworkin & Cooky, 2012; Kane, 1995).

Given the overarching belief in natural male physical superiority and female inferiority, sex-testing policies target only female athletes. Despite the fact that sport requires powerful physical prowess, women are sex tested when they carry out an explosive athletic performance, have a high degree of musculature, or are perceived to be “too male.” If it is found that their testosterone levels are greater than those of a “normal woman,” this is said to confer unfair advantage to the other women in the field. Following the logic employed by sport-governing bodies, one question is: Why are men not also tested for hormonal, muscular, endocrine, or other genetic advantages relative to other men? Here, one could also

argue that these advantages are unfair, producing an unlevel playing field for some male athletes over other male athletes. If the need for sex testing resides in ensuring a level playing field, as sport-governing bodies and organizations claim, then why is there no inquiry or test to determine whether some men have testosterone that exceeds the “normal male range”? Biomedical scholars, including clinical geneticists, have posed similar questions for sport-governing bodies to consider: Should “male athletes with elevated levels of androgens be forced to take androgen inhibitors?” (Vilain & Sánchez, 2012, p. 198). Or should some men be prevented from participating in men’s competitions, given that these athletes would have an “unfair advantage” over other male competitors who have lower levels of androgens?

The question as to why there is no parallel examination concerning what might make some men genetically or physiologically more competitive than other men has not been considered in the institution of sport. Indeed, from the vantage of sport organizations’ policies on sex testing, there is no reason to believe that biology or genetics would confer an unfair advantage for some male athletes that other male athletes in the same competitive field lack. Instead, men’s superior performances relative to other men are attributed to “natural talent,” hard work, and dedication, and are celebrated and embraced.

Given that sport organizations do not attempt to police the boundaries of biologically occurring advantages in men’s sporting competitions and do not seem concerned with eliminating genetic outliers from men’s sport events to level the playing field for men, this leads one to question why it is that women’s sport is the only competitive context wherein sex is tested to determine a “naturally” occurring advantage. To put it another way:

Taking an excess of testosterone is cheating. Producing an excess of testosterone is a genetic advantage, and there is nothing inherently wrong with that. Genetic advantages are the norm and not the exception in competitive sports. High-level competitive athletes are rife with individuals who are genetic outliers. (Hercher, 2010, p. 552)

Part of the reason why only athletes in women’s sport competitions are tested for sex and why sex is the only “naturally occurring advantage” that is tested is this: for sport-governing bodies, sex testing is necessary because of the underlying belief that all biological males are stronger, bigger, faster, and thus superior athletes when compared to all biological women competing in the same sport. Hence, sex testing legitimates sex segregation as necessary to “ensure a level playing field” in sport,

whereby it seems intuitively obvious, given the physiological differences that exist between men and women, that athletes should compete against others of the same

sex, unless otherwise specified by rule—for example, in co-educational contests—or in disciplines for which the physiological differences between men and women offer no competitive advantage or disadvantage. (Reeser, 2005, p. 695)

While biology and the need for ensuring fair play through sex segregation are often cited as the reason for differences in women's and men's athletic performances, numerous sport and gender scholars have challenged this logic (Cahn, 1994; Cavanaugh & Sykes, 2006; Cole, 2000; Kane, 1995; Lenskyj, 1986; Ritchie, 2003; Ritchie et al., 2008). Historically, women have been purposefully excluded from competing with or against men. When women were given the opportunity and excelled against men in direct competition, they were subsequently banned from sport (for a discussion, see Dworkin & Cooky, 2012; Cahn, 1994).

Examples of women restricted from direct competition with men are abundant, particularly in the Olympics and international competitions. Women were not allowed to compete in marathon events in the United States until 1965, and it was not until the 1984 Olympics that the marathon was added to the women's Olympic Games events; medical experts deemed women too frail and vulnerable to reproductive problems should they compete in endurance events (Cahn, 1994; Vertinsky, 1994). Numerous contemporary examples of sex discrimination in sport also exist; for example, in 2010, despite protests, women's ski jumping was not added to the Olympics even though the numbers of women in the sport had risen dramatically (Travers, 2011). Thus, assumptions of female inferiority and frailty frequently underlie the decision to keep sport sex segregated (Dworkin & Wachs, 2009; McDonagh & Pappano, 2007; Messner, 2002). Given that the logic of sport organizations and sport-governing bodies are undergirded by an assumption that women are inherently physically inferior to men, they view men and intersex athletes as individuals who should be prohibited from competing with women. This logic is viewed as eliminating any "unfair advantage" and is said to ensure that female athletes are able to participate in sport. And given that sports are sex segregated, this further justifies the necessity to police the boundaries of sex in women's sport.

Although it is believed that intersex athletes/female athletes with CAH or other DSDs may have an "unfair advantage" relative to other female athletes without DSDs (primarily as a result of the higher levels of androgens they possess), the research is inconclusive regarding what types of conditions confer or do not confer a so-called advantage and to what extent (Vilain & Sánchez, 2012). Some researchers have found that female athletes with CAH may be at a disadvantage in some sports—especially those that require height, such as basketball and volleyball. This is because

women with CAH tend to be shorter (Wonkam, Fieggen, & Ramesar, 2010). There is also an issue with salt loss for individuals with CAH, which may be a disadvantage in some endurance events (Wonkam et al., 2010).

In this section, we have argued that principles of unfair advantage are not consistently applied in women's and men's sport. We have drawn upon available empirical research to challenge the notion that "real" (or "unaffected" or "normal") female athletes are categorically disadvantaged relative to male athletes and intersex female athletes.

Concluding Comments and Suggestions for Change

On July 6, 2010, the IAAF made the decision to reinstate Caster Semenya and to clear her for competitive sporting events. In a separate ruling, on August 28, 2011, the IAAF decided to change its requirements for what qualifies as a women's world record in marathon road races. Specifically, the IAAF elected to ban women's marathon records if the woman attained the world record with a male pacer who ran with her at the time. The IAAF declared the only world records that count are those from a "women's-only" event, and that in "mixed-race" events (where men are a part of the race at the same time) a woman's world record would not be deemed a world record; instead, it would be classified as a "world's best." In fact, even though this policy was written in 2011, the IAAF maintained that it would go back to marathon world records attained by women from 2003 to 2011 and declare those records invalid. The reason? The IAAF claimed that women had an "unfair advantage" if a man was present, running with them in the field. The IAAF has not sought to make a parallel examination of the men's events to see if there are any pacers on the road that offer men the ability to pace themselves faster than they typically would run (producing an unfair advantage in the men's events). Here too, it is evident that sex segregation in sport and beliefs about male physical superiority and female inferiority are key factors undergirding the practice and ensuing policies. Rather than suggest that we can objectively determine how far women can go without the help of extra testosterone or male pacers who train with them, we suggest that many sportsmen and sportswomen have "unfair advantages." If a level playing field is desired (or even possible), then we posit sport-governing bodies and sport organizations should treat all genetic advantages and all pacing advantages equally. Following the logic employed by sport-governing bodies in their rationale to sex test female athletes, we argue that male athletes who have unusually high levels of endogenous testosterone or androgen levels that exceed the "normal male range" should also be prevented from participating in men's

competitions or be required to take androgen inhibitors (Vilain & Sánchez, 2012). By the IOC's and IAAF's own standards, these athletes would have an "unfair advantage" over other male competitors who have lower levels of testosterone. While testing men for high levels of endogenous testosterone would implement the logic of fairness more consistently because it would equally apply the claim that certain levels of testosterone represent a definitive athletic advantage, this suggestion is not supported by empirical evidence in biomedical research. As Karkazis, Jordan-Young, Davis, and Camporesi (2012) discussed, "Despite the many assumptions about the relationship between testosterone and athletic advantage, there is no evidence showing that successful athletes had higher testosterone levels than less successful athletes" (p. 9). With regard to the use of pacers, male athletes who pace themselves with other male athletes or pacers and perform better given their presence should also have their world records invalidated. If genetic advantages or pacers are not treated equally within women's and men's sporting competition and only records in women's sports are revoked, and only women are sex tested and disqualified from sport, these are evident cases of sex discrimination that should be pursued through appropriate legal channels.

These suggestions assume that we agree with the organization of sport as it currently exists. Other solutions are certainly possible. For example, rather than viewing sex segregation as necessary and "disorders of sex development" as a much-needed category that is used to "objectively" determine who is and is not a woman in sport, we argue the category of "sex" is not the only acceptable way to organize sport. Echoing Travers (2008), we argue that "all sports competitions should be based on the abilities of individuals who seek to play, not on stereotypical attributes" of sex (p. 93).

One thing is apparent: when "suspicious" female athletes are sex tested, the ambiguities of sex as a dichotomous category—and the real social processes involved in constituting and reconstituting what sex is—become exposed. Rather than leveling the playing field, sex testing in sport offers us the biological reality of a continuum of sex. Simultaneously, sex testing illustrates how sport organizations, scientists, athletes, and broader society adhere to notions of categorical difference and efforts to maintain sex dichotomies and sex segregation in sport. Such a policy not only interferes with the right to participate in sport but also bolsters the inequitable treatment of intersex and female athletes in sport.

As we have noted elsewhere, the voice of Caster Semenya was silenced in the aftermath of the 2009 Berlin World Championships (Cooky, Dycus, & Dworkin, 2012; Dworkin, Swarr, & Cooky, in press). Indeed, in the hearings that were held to determine the IOC's and the IAAF's new policies, the voices of athletes who have

been disqualified by the policies were excluded from the deliberations. Yet representatives of intersex communities argued that the policies were discriminatory (Viloria & Martinez-Patino, 2012). Echoing these representatives, including Hida P. Viloria and Maria Jose Martinez-Patino (Martinez-Patino is an athlete who was disqualified from participating in sport after "failing" a sex test), along with other scholars (Karkazis et al., 2012), we call for the abandonment of sex testing in sport. It is time for sport-governing bodies and organizations to cease justifying the discriminatory policy and practice of sex testing. Arguing that sport is a level playing field and that sex testing is about "respect" for male and female differences is highly dubious, as we have illustrated. We advocate the end of these discriminatory policies that violate the rights of some female athletes to compete in sport (Viloria & Martinez-Patino, 2012). This change is necessary not only to protect the rights of female athletes who may be intersex but also to ensure the rights of all female athletes to participate in sport that is free from discriminatory policies.

References

- IAAF: Semenya decision in November. (2009, September 16). *ESPN.com*. Retrieved from <http://sports.espn.go.com/oly/trackandfield/news/story?id=4464405>
- Athlete Caster Semenya free to compete. (2010, July 6). *BBC News*. Retrieved from <http://news.bbc.co.uk/sport2/hi/athletics/8793668.stm>
- Blackless, M., Charuvastra, A., Derrryk, A., Fausto-Sterling, A., Lauzanne, K., & Lee, E. (2000). How sexually dimorphic are we? Review and synthesis. *American Journal of Human Biology*, *12*, 151–166.
- Burstyn, V. (1999). *The rites of men: Manhood, politics, and the culture of sport*. Toronto: University of Toronto Press.
- Buzuvis, E. E. (2010). Caster Semenya and the myth of a level playing field. *The Modern American*, *6*, 1–7.
- Cahn, S. (1994). *Coming on strong: Gender and sexuality in twentieth century women's sport*. New York: Free Press.
- Camporesi, S., & Maugeri, P. (2010). Caster Semenya: Sport, categories, and the creative role of ethics. *Journal of Medical Ethics*, *36*, 378–379.
- Caplan, A. L. (2010). Fairer sex: The ethics of determining gender for athletic eligibility: Commentary on "Beyond the Caster Semenya controversy: The case of the use of genetics for gender testing in sport." *Journal of Genetic Counseling*, *19*, 549–550.
- Cavanaugh, S. L., & Sykes, H. (2006). Transsexual bodies at the Olympics: The International Olympics Committee's policy on transsexual athletes at the 2004 Athens summer games. *Body and Society*, *12*, 75–102.
- Cole, C. L. (2000). One chromosome too many?. In K. Schaffer & S. Smith (Eds.), *The Olympics at the millennium: Power, politics, and the game* (pp. 128–146). New Brunswick, NJ: Rutgers University Press.
- Cooky, C., Dycus, R., & Dworkin, S. L. (2012). "What makes a woman a woman?" vs. "Our First Lady of sport": A comparative analysis of the United States and the South African media coverage of Caster Semenya. *Journal of Sport and Social Issues*. Advance online publication. doi:10.1177/0193723512447940
- Coyle, E. F. (2005). Improved muscular efficiency displayed as Tour de France champion matures. *Journal of Applied Physiology*, *98*, 2191–2196.

- de la Chapelle, A. (1986). The use and misuse of sex chromatin screening for “gender verification” of female athletes. *Journal of the American Medical Association*, 256, 1920–1923.
- Dickinson, B. D., Genel, M., Robinowitz, C. B., Turner, P. L., & Woods, G. L. (2002). Gender verification of female Olympic athletes. *Medicine and Science in Sports and Exercise*, 34, 1539–1542.
- Dreger, A. (1998). *Hermaphrodites and the medical invention of sex*. Cambridge, MA: Harvard University Press.
- Dworkin, S. L., & Cooky, C. (2012). Sport, sex segregation, and sex testing: Critical reflections on this unjust marriage. *American Journal of Bioethics*, 12(7), 21–23.
- Dworkin, S. L., Swarr, A. L., & Cooky, C. (in press). Sex, gender, and racial (in)justice in sport: The case of South African track star Caster Semenya. *Feminist Studies*.
- Dworkin, S. L., & Wachs, F. L. (2009). *Body panic: Gender, health, and the selling of fitness*. New York: New York University Press.
- Elias, L. J., Ljungqvist, A., Ferguson-Smith, M., Simpson, J. L., Genel, M., Carlson, A. S., et al. (2000). Gender verification of female athletes. *Genetics in Medicine*, 2, 249–254.
- Fausto-Sterling, A. (2000). *Sexing the body: Gender politics and the construction of sexuality*. New York: Basic Books.
- Genel, M. (2010, October). *Sex and gender in sport: Fallacy of the level playing field*. Paper presented at the Third Congress of the European Academy of Paediatric Societies, Copenhagen, Denmark.
- Genel, M., & Ljungqvist, A. (2005). Gender verification of female athletes. *Lancet*, 366, S41.
- Hercher, L. (2010). Gender verification: A term whose time has come and gone. *Journal of Genetic Counseling*, 19, 551–553.
- International Association of Athletics Federations. (2011, May). *IAAF Regulations governing eligibility of females with hyperandrogenism to compete in women's competition*. Retrieved from http://www.iaaf.org/mm/Document/AboutIAAF/Publications/05/98/78/20110430054216_httppostedfile_HARegulations%28Final%29-Appendices-AMG-30.04.2011_24299.pdf
- Kane, M. J. (1995). Resistance/transformation of the oppositional binary: Exposing sport as a continuum. *Journal of Sport and Social Issues*, 19, 191–218.
- Karkazis, K. (2008). *Fixing sex: Intersex, medical authority, and lived experience*. Durham, NC: Duke University Press.
- Karkazis, K., Jordan-Young, R., Davis, G., & Camporesi, S. (2012). Out of bounds? A critique of the new policies on hyperandrogenism in elite female athletes. *American Journal of Bioethics*, 12, 3–16.
- Lenskyj, H. (1986). *Out of bounds: Women, sport, and sexuality*. Toronto: Women's Press.
- Ljungqvist, A., & Genel, M. (2005). Transsexual athletes: When is competition fair? *Lancet*, 366, 42–43.
- Ljungqvist, A., Martinez-Patino, M., Martinez-Vidal, A., Zagalaz, L., Diaz, P., & Mateos, C. (2006). The history and current policies on gender testing in elite athletes. *International SportMed Journal*, 7, 225–230.
- Ljungqvist, A., & Simpson, J. L. (1992). Medical examination for health of all athletes replacing the need for gender verification in international sports: The International Amateur Athletic Federation Plan. *Journal of the American Medical Association*, 267, 850–852.
- Martinez-Patino, M. J., Mateos-Padorno, C., Martinez-Vidal, A., Sanchez, A. M., Garcia, J. L., Diaz, M. P., et al. (2010). An approach to the biological, historical and psychological repercussions of gender verification in top level competitions. *Journal of Human Sport and Exercise*, 5, 307–321.
- McDonagh, E., & Pappano, E. (2007). *Playing with the boys: Why separate is not equal in sports*. New York: Oxford University Press.
- Messner, M. A. (2002). *Taking the field: Women, men, and sport*. Minneapolis: University of Minnesota Press.
- Puffer, J. C. (2002). Commentary to accompany gender verification of female athletes. *Medicine and Science in Sports and Exercise*, 34, 1543.
- Reeser, J. C. (2005). Gender identity in sport: Is the playing field level? *British Journal of Sports Medicine*, 39, 695–699.
- Ritchie, I. (2003). Sex tested, gender verified: Controlling female sexuality in the age of containment. *Sport History Review*, 34, 80–98.
- Ritchie, R., Reynard, J., & Lewis, T. (2008). Intersex and Olympic games. *Journal of the Royal Society of Medicine*, 101, 395–399.
- Sage, G. (1998). *Power and ideology in American sport*. Champaign, IL: Human Kinetics.
- Simpson, J. L., Ljungqvist, A., de la Chapelle, A., Ferguson-Smith, M. A., Genel, M., Carlson, A. S., et al. (1993). Gender verification in competitive sports. *Sports Medicine*, 16, 305–315.
- Sykes, H. (2006). Transsexual and transgender policies in sport. *Women in Sport and Physical Activity*, 15, 3–13.
- Travers, A. (2008). The sport nexus and gender injustice. *Studies in Social Justice*, 2, 79–101.
- Travers, A. (2011). Women's ski jumping, the 2010 Olympic Games, and the deafening silence of sex segregation, whiteness, and wealth. *Journal of Sport and Social Issues*, 35, 126–145.
- Vertinsky, P. (1994). Women, sport, and exercise in the 19th century. In V. Costa & S. Guthrie (Eds.), *Women and sport: Interdisciplinary perspectives* (pp. 63–82). Champaign, IL: Human Kinetics.
- Vilain, E. (2012, June 18). Gender testing for athletes remains a tough call. *New York Times*. Retrieved from <http://www.nytimes.com/2012/06/18/sports/olympics/the-line-between-male-and-female-athletes-how-to-decide.html?pagewanted=all>
- Vilain, E., & Sánchez, F. J. (2012). Reproductive endocrinology: Athletes' bodies, sexed bodies—Intersexuality in athletics. *Nature Reviews Endocrinology*, 8, 198–199.
- Viloria, H. P., & Martinez-Patino, M. J. (2012). Reexamining rationales of “fairness”: An athlete and insider's perspective on the new policies on hyperandrogenism in elite female athletes. *American Journal of Bioethics*, 12(7), 17–33.
- Wackwitz, L. A. (2003). Verifying the myth: Olympic sex testing and the category “woman.” *Women's Studies International*, 26, 553–560.
- Wonkam, A., Fieggen, K., & Ramesar, R. (2010). Beyond the Caster Semenya controversy: The case of the use of genetics for gender testing in sport. *Journal of Genetic Counseling*, 19, 545–548.
- Zaccone, L. (2010). Policing the policing of intersex bodies: Softening the lines in Title IX athletic programs. *Brooklyn Law Review*, 76, 385–438.