Twitter Thread by Ross Tucker

Ross Tucker
@Scienceofsport

I also wrote an article for the @thetimes on the transgender controversy, explaining some key issues, from the meaning of sport to biological advantages (it's not like height!), and why a "T fix" doesn't work. Thanks @martynziegler for the invitation:
https://t.co/UCOG0nbSz7

team, we have a strong culture of manaaki [caring] and inclusion and respect for all."

Hubbard became eligible to lift as a woman after meeting the IOC criteria. But it is an issue that still raises questions because some studies have shown males, upon reaching puberty, retain significant advantages in power and strength even after taking medication to suppress their testosterone levels.

Hubbard is ranked 16th in the world

elbow injury suffered at the 2018 Commonwealth Games.

"Laurel has shown grit and perseverance in her return from a significant injury and overcoming the challenges in building back confidence on the competition platform," he said.

However, support for Hubbard's selection is contested. Her former team-mate Tracey Lambrechs said last month that the concerns of female weightlifters were being ignored.

"I've had female weightlifters come up to me and say, 'This isn't fair, what can we do?'" she told broadcaster TVNZ. "Unfortunately there's nothing we can do because every time we voice it [concerns] we get told to be quiet."

Hubbard, a media-shy athlete, did not address the gender issue in her remarks released in a statement by the New Zealand Olympic Committee.

She thanked the community for

me through the darkness," she said.

The US transgender BMX rider Chelsea Wolfe also has a chance of competing in Tokyo after being named as an alternate in the team. She will travel to Tokyo but only participate if a team-mate pulls out.

Up to 10,000 local spectators will be allowed to attend events at the Olym-

Days to go until the Tokyo Olympics begin. The Games will run from Friday, July 23 to Sunday, August 8

all venues. That will be confirmed or reduced — possibly to zero — after July 12, when the Japanese government will make a final decision.

Tokyo and other areas are under "quasi-emergency" status until July 11. This replaced a full state of emergency that was in effect until the weekend.

SCOTT BARBOUR/GETTY IMAGES

Evidence suggests inclusion comes at expense of fairness

Trans women retain biological advantages of men even when they reduce testosterone levels, says **Ross Tucker**

To understand the physiological nuances of transgender women in sport, we must first understand the purpose of competitive sport. It exists to reward performance excellence, which is the result of physiological attributes that are optimised by preparation and environment. We recognise Simone Biles, Michael Phelps and Usain Bolt as outstanding proponents of their crafts because they possess the optimal physiological hardware and software, harnessed through preparation, to win Olympic gold medals.

Katie Ledecky and Shelly-Ann Fraser-Pryce are worthy of the same recognition for their medals as Phelps and Bolt were for theirs. Yet Ledecky in swimming and Fraser-Pryce on the track are about 11 per cent slower than Phelps and Bolt. In other sports the male-female difference is even larger. Power is about 30 per cent greater in men than women, male upper-body strength advantages range between 30 and 60 per cent, and punching power is 260 per cent higher in men.

These performance differences exist because, unlike their male counterparts, female athletes never have access to high levels of so-called androgen hormones (literally "male-making" hormones, the most well-known of which is testosterone), that drive development of what are called secondary sex characteristics at puberty and into adulthood. These include longer and stronger bones, a narrower pelvis, a larger heart and lungs, lower body fat mass, increased muscle mass and vastly increased muscle strength.

These biological differences create a sports performance chasm that necessitates a separate women's category to ensure fairness and opportunity. The only reason we can celebrate the accomplishments of exceptional female athletes as equal to those of males is because a separate women's category exists.

Without this protected category, the biological reality is that at every single matched level — high school, club, county, Olympic Games — the best men outperform the best women by margins large enough that in a single sex category, women would disappear from that sport. For example, the 2016 Olympic 100m champion, Elaine Thompson, was outperformed by 1,826 boys and men that year, including by 14-year-olds, over-50s and Paralympic sprinters.

A pervasive and uninformed counter-argument is that the male sex advantage is similar to having long arms for swimming, fast-twitch muscle fibres for sprinting or being tall for basketball. This argument equates male biology to other advantages that are "natural" and should thus not be regulated. Those arguing this fail to realise that if this were accepted as true, there would be no reason to create any categories for any sport — all biological advantages could be considered "natural".



Gone would be age categories, weight categories and there would be no reason at all to keep men and women separate under any circumstances. The result would be a giant genetic lottery in which being biologically male was a prerequisite for sporting success, since about 2,000 boys and men, the "lucky ones" by this logic, can outperform the very best women, who are simply "unlucky" not to have that advantage, in every event.

These natural traits form part of the package of attributes that the sport rewards in both men and women, creating meaning for that sport. The best male and female athletes in each sport are similar, possessing "the right stuff" in the right combinations to succeed. Yet the female champion with the "right stuff" is still significantly outperformed by the best males. The difference is androgen-induced, and by scale and concept, long arms or any other variable cannot make up for it.

All of this brings us to the thorny issue of transgender inclusion and whether it can be achieved fairly. The IOC requires a trans woman to reduce testosterone levels to below 10 nmol/L for 12 months to be eligible for women's competition. The premise here is that since testosterone is the primary source of the male advantages, its removal should "fix" the problem and ensure fairness.

But is there any evidence that the required testosterone reduction removes the biological differences that create male performance advantages? The short answer is no. In 13 longitudinal studies tracking trans women who undergo testosterone suppression for more than a year, measures such as total mass, bone density, muscle mass and muscle strength are either unchanged, or removed by only a fraction of the initial male vs female advantage. For instance, where an initial difference in muscle strength was 50 per cent, testosterone suppression reduced strength by between 0 and 10 per cent.

This is crucially important — it means that a significant portion of the male biological advantages are retained. The "fix" does not work. Critics will argue that these studies are imperfect, not done on athletes, and this is certainly a limitation. However, there is no basis to believe that athletically trained trans women would lose more of their advantages than untrained trans women, and in fact, there is abundant evidence that training may protect against the losses documented in these studies.

The upshot of the scientific picture is that the three key imperatives for any sport — fairness, safety and inclusion — cannot be balanced or achieved simultaneously. Based on the available scientific evidence, inclusion will occur at the expense of fairness and possibly safety. Put differently, fairness cannot be guaranteed to biological females by the present inclusion policies.

It is thus an unsolvable problem, if the solution involves keeping all parties happy. The IOC has committed to consultation and a possible revision of guidelines. It appears likely that all federations will be asked to drive their own regulations, and as the number of transgender athletes rises, the controversy will intensity.

Laurel Hubbard will be the first, but is unlikely to be the last to ask these difficult questions.

● *Ross Tucker is a leading sports scientist based in Cape Town*



Hubbard in action at the 2018 Commonwealth Games, five years after she transitioned at the age of 35