

Should women athletes earn the same as men? The science says they work as hard

Written by The Conversation USA

Should professional female athletes be paid the same as their male counterparts? Its a question that produces emotion, heated debate and a glaringly large glimpse into Pandora's Box.

We've had [Novak Djokovic](#) claim male tennis players should earn more because men's matches get more spectators. Women's bodies, he noted, "are much different than men's bodies. They have to go through a lot of different things that we don't have to go through. You know, the hormones and different stuff". After a public outcry he [apologised for his comments](#)

Australia's women's soccer team, the Matildas, [went on strike](#) over the question of pay last year. In some recent good news, [Cricket Australia's](#) new pay deal for women will see its top female players become the highest paid team sports athletes in Australia, earning more than A\$100,000 a year. Still, [Steve Smith](#) and a handful of the top ranked male players reportedly earn over A\$2 million a season.

Most of the commentary we hear is just that, commentary. I'd like to approach the question of women, pay and sport from the perspective of exercise science.

Are female and male athletes physically different? You don't need a PhD to answer that one! But how does this affect performance in sport?

The biggest discrepancy in muscle distribution between a female and male body is that by and large, women have less muscle in the upper body (especially around the shoulders and neck) compared to men. The difference can be [as large as 30 per cent](#) in healthy individuals.

When applied to sport, the impact is clear. Let's compare the world record for a sport such as the javelin to that of the 100m sprint. The difference between the distance the javelin has been thrown in the men's and women's world records is around 30 per cent. The time difference between male and female athletes in the 100m sprint is about 10 per cent.

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In sports such as javelin, tennis, golf or cricket, female athletes are substantially less strong and powerful in the upper body compared to their male counterparts.

For any given task in these sports, women have to work harder. To drive a golf ball 200 metres, for instance, a woman would need to use 80-90 per cent of her maximum force whereas a man might draw upon 60 per cent.

Ok, we get the biomechanics. How about the physiology?

Men have larger hearts (though some might argue the contrary); greater blood volume, more red blood cells, greater lung capacity and are on average, taller (15cm) and larger (10kg) than women.

The gap does narrow in [athletic populations](#), but in terms of sports performance this means that for any given athletic task – such as running 100 metres in 11 seconds – a woman athlete would be using almost 100 per cent of her potential, whereas a male athlete might use 90 per cent of his potential to complete that goal.

There are exceptions, such as long distance swimming. Many women outswim men as a woman's greater fat mass allows better buoyancy and as such, more efficiency through the water.

However, in endurance and ultra-endurance land-based events, a male athlete's greater physiological potential has the upper hand.

Training days

Another glaringly large difference between the sexes is the effect athletic training has on female and male bodies. Because of differences in sex hormones, male athletes have a greater response to training stimuli – such as weight training and strength and conditioning – compared to female athletes.

Male muscle tends to grow larger and stronger than female muscle, given comparable training regimes. This again points to differences in athletic potential.

These reasons are why most Olympic sports are divided (quite appropriately) by sex. In 2016, only equestrian and one sailing event (Nacra 17) will have mixed competitions, where men and women compete for medals on an equal basis.

The injury count

How about injury? Statistics show, in non-contact sports, that female athletes suffer [more knee and shoulder](#) injuries compared to males. This has been attributed to a wider pelvis (thus more knee injuries) and smaller muscle mass in the upper body (thus more shoulder injuries).

So for any given exposure to training or competition, female athletes are more at risk of injury. Needless to say, this would have dire impact on the earning potential of the individual.

On top of that statistic, here are a couple more interesting differences between the sexes. A woman's core body temperature can differ [by up to 1°C](#) from the mid-luteal to follicular phase of her menstrual cycle. Considering elevated core body temperature can be detrimental to athletic performance, a female athlete's physiology will be excessively stressed, especially competing in the heat compared to a male athlete who does not have these fluctuations.

And here's a curve ball for you. Females suffer more than two times more whiplash injuries in car accidents compared to males. Considering athletes spend time commuting to training and competition, female athletes are at [200 per cent greater risk](#) of injuring their neck if even a minor car accident happens.

Again, the detriment to athletic performance and thus earning potential could be huge.

So should women athletes be paid the same as men? Obviously, there are other factors that might influence levels of pay beyond the amount of physical energy exerted.

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Still, as a scientist, I deal with biomechanical and physiological facts. And these say female athletes work hard if not harder than their male counterparts to achieve an absolute target – especially in sports such as tennis and cricket.

They expose their bodies to similar, if not higher risks of injury, which could potentially be career ending.

Should they be remunerated equally? I think they should (yep, the scientist has an opinion) but I'll let the facts do the talking.

Kevin Netto does not work for, consult, own shares in or receive funding from any company or organization that would benefit from this article, and has disclosed no relevant affiliations beyond the academic appointment above.

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