Twitter Thread by Ross Tucker

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New study on transgender & performance. The paper’s title could've been “Significant endurance & strength-endurance advantages are retained for up to 2 years despite T reduction in TW: Implications for the assumptions of fairness in current policies”. Some thoughts to follow

Effect of gender affirming hormones on athletic performance in transwomen and transmen: implications for sporting organisations and legislators

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ABSTRACT:

Objective To examine the effect of gender affirming hormones on athletic performance among transwomen and transmen.

Methods We reviewed fitness test results and medical records of 29 transmen and 46 transwomen who started gender affirming hormones while in the United States Air Force. We compared pre- and post-hormone fitness test results of the transwomen and transmen with the average performance of all women and men under the age of 30 in the Air Force between 2004 and 2014. We also measured the rate of hormone associated changes in body composition and athletic performance.

Results Participants were 26.2 years old (SD 5.5). Prior to gender affirming hormones, transwomen performed 31% more push-ups and 15% more sit-ups in 1 min and ran 1.5 miles 21% faster than their female counterparts. After 2 years of taking feminising hormones, the push-up and sit-up differences disappeared but transwomen were still 12% faster. Prior to gender affirming hormones, transmen performed 43% fewer push-ups and ran 1.5 miles 15% slower than their male counterparts. After 1 year of taking masculinising hormones, there was no longer a difference in push-ups or run times, and the number of sit-ups performed in 1 min by transmen exceeded the average performance of their male counterparts.

Summary The 15–31% athletic advantage that transwomen displayed over their female counterparts prior to starting gender affirming hormones declined with feminising therapy. However, transwomen still had a 9% faster mean run speed after the 1 year period of testosterone suppression that is recommended by World Athletics for inclusion in women's events.

BACKGROUND

Most competitive sports segregate male and female athletes due to biologic differences between the sexes. Because exposure to testosterone in males leads to physiologic advantages in strength and endurance, female sports need to be a protected category to ensure fairness in competition.[1] Questions arise then as to which category a transgender athlete competes in and how society balances benefits to the athlete of sports participation in their experienced gender with perceptions of fairness to other athletes.[2–5] Supraphysiologic doses of androgens have a positive effect on athletic performance.[6 7] However, gender affirming hormones have an unknown effect on athletic performance among transgender individuals during gender transition, making it difficult to develop guidelines for transgender inclusion in sports. Several guidelines for inclusion of transgender athletes in elite international or professional sports exist but they are based on limited research.[8 9] The World Athletics (IAAF) and the International Olympic Committee (IOC) created guidelines requiring female athletes to demonstrate suppression of testosterone levels to less than 5 –10 nmol/L for at least 12 months prior to competing in women's events. However, athletes have challenged the section of these guidelines applying to women with disorders of sexual development and other causes of hyperandrogenism, citing a lack of supporting evidence, which calls these guidelines into question.[10 11]

Gender affirming administration of testosterone in transmen decreases adiposity, and increases muscle mass, thigh muscle volume, haemoglobin, grip strength and thigh strength.[9 12–14] Gender affirming blockage of testosterone and administration of oestrogen in transwomen (oestrogen) has the opposite effect, but transwomen retain an advantage in muscle mass, volume, and strength over female controls after 1 year on oestrogen.[9 14–17] Most changes in body composition occur within the first year on testosterone or oestrogen, with slower changes after that time.[9 16 18–20]

How do these body composition changes affect athletic performance? A retrospective review of self-reported run times among eight transwomen runners found an overall decline in times collected months to years before and after starting oestrogen but not in the runners' performance relative to runners of the same age and gender. No other studies have examined the effect of testosterone or oestrogen on athletic performance.[21]

We conducted this study to examine the effect of gender affirming hormones on body composition and athletic performance among transgender individuals to help improve future guidelines for transgender inclusion in sporting competition.

METHODS

Study population

This was a retrospective review of medical records and fitness tests results from 222 self-identified military personnel who filed a request to begin gender transition or continue testosterone or oestrogen while serving in the United States Air Force (Air Force).

Patient involvement

The idea for this study arose from our discussions with servicemembers seen in the Air Force

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First, remind ourselves of the principle and why the results matter. Sports policies have allowed inclusion of TW who lower T for 12 months on the assumption that this removes the male physiological advantages sufficiently to create fairness when women's sport is "opened" up (2/)

The obvious (though amazingly unasked) question is “Is there evidence showing that this actually works? In other words, does T suppression remove the biological advantages that necessitate a separate women’s category in sport?" This is the question the study is trying to address:

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The study includes 46 trans women (TW) and 29 trans men, all in the Airforce. It capitalises on the practice of physical fitness assessments every 12 months to track how performance in push-up, sit-ups and 1.5 mile run changes when T is

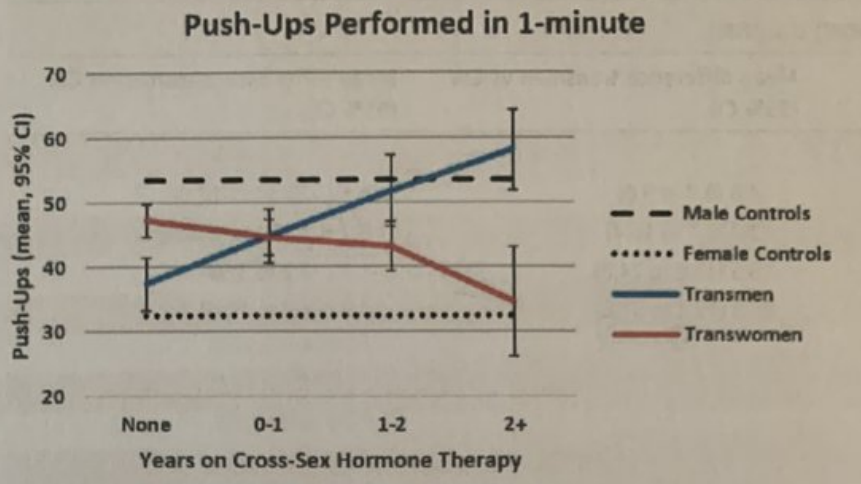
either reduced (TW) or increased (TM) (4/)

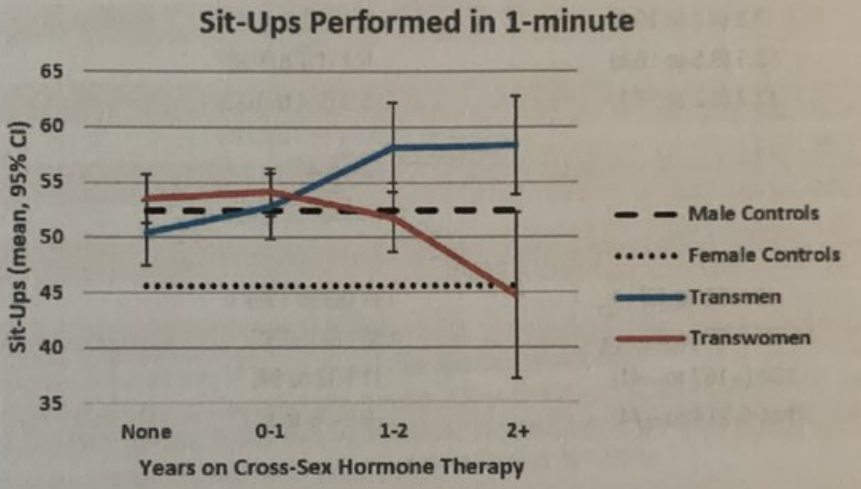
The TW and TM results are, correctly, compared to ciswomen and cismen, respectively. They have data for over 2 million CM and 500,000 CW for these comparisons. So it's about tracking the changes in performance with T alteration AND comparisons to the appropriate group (5/)

The main finding is that 1.5 mile run performance in TW remains significantly faster than in CW even after three years of T reduction. It starts 21% faster, and then TW do slow down, but remain 12% faster than CW in the third year. So T reduction doesn't remove male advantage

1.5 mile RUN RESULT (secs)				
	TW	CW	ADV	TW ADV %
Baseline	708	855	-147	20.8%
0-1 yr	758	855	-97	12.8%
1-2 yr	791	855	-64	8.1%
2-2.5yr	765	855	-90	11.8%
Run perf loss. 1yr	7%	*Slow down by 7%*		
2yr	4%	*Slow down by 4%*		
2.5yr	-3%	*Speed up by 3%*		

Push-up and sit-up performance remains significantly better in TW than CW into the second year. By the 3rd year it drops to CW levels (more on that shortly). At 12 months (as per policy), the TW advantage is 37%, 19% & 13% for the 3 tasks, respectively (7/)





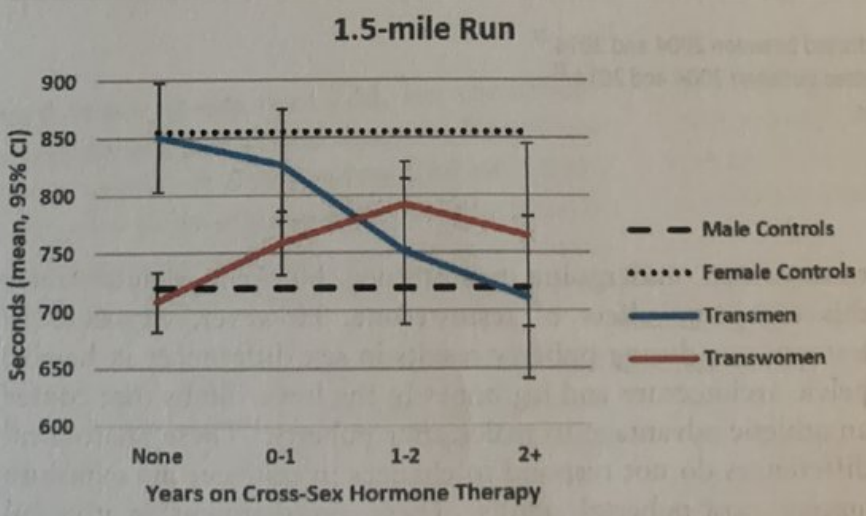


Figure 2 Gender affirming therapy and athletic performance. Male controls line represents the average performance on over 2.3 million Air Force physical fitness tests performed by males under the age of 30 between 2004 and 2014.[22] Female controls line represents the average performance on over 567 000 Air Force physical fitness tests performed by females under the age of 30 between 2004 and 2014.[22]

This is not the first evidence of retained advantage. There are a dozen studies, measuring variables ranging from lean mass to strength in TW, all showing that T suppression causes very modest reductions. This adds to that, in a trained cohort in

functional performance tasks (8/)

One thing that is important (& as yet unknown) is whether the ‘targets’ for TW and TM changed in line with their gender identity. That is, there are minimum fitness standards that must be met by service members, and I’m not sure if those are changed for TW between Year 0 and 3

The reason this matters is that if standards differ for men & women (anyone know this?), AND IF TW are evaluated against a lower standard after beginning reassignment, then their incentive to do X push-ups and & Y sit-ups is reduced by design, amplifying the noted decline (10/)

So when push-up scores drop by 6% in Yr 1, 3% in Yr 2, and 20% in Yr 3, and sit-ups go -1%, 4% and 14%, is it possible that the large drop at the end is the result of conscious “pacing”, target-hitting, or group compliance? That seems important, I don’t know the answer yet (11/)

PUSH UP TEST RESULTS (# in 60s)						
	TW	CW	ADV	TW ADV %		
Baseline	47.3	32.5	14.8	45.5%		*TW decline*
0-1 yr	44.6	32.5	12.1	37.2%		*6%*
1-2 yr	43.2	32.5	10.7	32.9%		*3%*
2-2.5yr	34.6	32.5	2.1	6.5%		*20%*
SIT UP TEST RESULTS (# in 60s)						
	TW	CW	ADV	TW ADV %		
Baseline	53.5	45.6	7.9	17.3%		*TW decline*
0-1 yr	54.1	45.6	8.5	18.6%		*-1%*
1-2 yr	51.8	45.6	6.2	13.6%		*4%*
2-2.5yr	44.8	45.7	-0.9	-2.0%		*14%*
1.5 mile RUN RESULT (secs)						
	TW	CW	ADV	TW ADV %		
Baseline	708	855	-147	20.8%		*TW decline*
0-1 yr	758	855	-97	12.8%		*7%*
1-2 yr	791	855	-64	8.1%		*4%*
2-2.5yr	765	855	-90	11.8%		*-3%*

The other point, made in the paper, is that for push-ups, a body weight exercise, the TW are heavier than CW, so when they do say 33% more push-ups in 1 minute (Yr 2), the power output difference is even greater than the number suggests. As noted in the discussion of the paper:

This finding suggests that governing bodies for sporting competition should require more than 1 year of testosterone suppression prior to competition when creating guidelines for inclusion of transwomen in women's elite athletics.

Study findings and prior research

Like previous studies, our study showed an association between testosterone and increased strength among transgender men.[13 17] We confirmed the decrease in strength associated with oestrogen in transgender women that was found in some studies,[14–16] but not others.[17] Unlike several of these previous studies, our measures of muscular strength assessed repeated submaximal efforts (push-ups and sit-ups) over a 1 min period as opposed to a single maximal effort. Our results capture differences in both endurance and strength rather than just strength and probably have more relevance to sports that require sustained effort over time rather than single explosive efforts like power lifting. Our assessments of muscular strength are also confounded by differences in weight between our transgender participants and reference populations. For example, as a group, transwomen weigh more than CW. Thus transwomen will have a higher power output than CW when performing an equivalent number of push-ups. Therefore, our study may underestimate the advantage in strength that transwomen have over CW. Further studies are needed to determine if the changes we saw in our study also apply to measures of explosive strength. Participants' exercise intentions or training habits were unknown, making it difficult to determine the aetiology of the pretreatment differences in push-up performance between transgender servicemembers and all servicemembers

So the picture is: Running performance is modestly reduced, so more than half the male advantage is retained into a 3rd year. In strength-endurance tasks, TW significantly outperform CW for 2 years, probably longer in absolute terms. This

supports evidence from lab-trials (13/)

My CONCLUSION, then, is that there remains ZERO good evidence that T suppression can ensure fairness (or safety). There is now plenty of evidence that a large proportion of male physiological attributes and therefore performance advantages persist despite T suppression (14/)

The notion (or hope) that fairness and inclusion can be ‘balanced’, which underpins many policies and is even shared by many scientists, is unsupported, and indeed refuted, by the evidence available to us. Given limitations, more studies are of course required.

Finally, this is the latest study (of 13, I count) showing pretty much the same thing. They have limitations, but they are consistent & solid. The first of them was by Gooren, and it concluded, astonishingly, that because T suppression caused some strength reductions, that...

…TW could compete fairly with women depending "on what degree of arbitrariness one wishes to accept”. In other words, fairness can be arbitrary for women’s sport. But even then, it was clear that retained advantages would undermine the meaning of the women’s category (16/)

Unless of course, decision makers & academics decide this fairness (& safety, in instances where physical risk is a factor) is secondary in importance. Which, coming full circle to this study, is what would be implied if the policies didn’t recognise this latest evidence (end)

We did a podcast on this recently. It precedes this study (though I knew this was coming), but it explains the other dozen studies, the concept of balancing imperatives & why WR reached a guideline that keeps women’s rugby closed based on evidence to date: https://t.co/aGcd1FlG1E