Twitter Thread by Emma Hilton

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Here follows my quick first thoughts of Roberts et al., 2020.

I predict this paper will generate much discussion over the coming weeks and months.



The link to the paper is here:

https://t.co/iK6vmw9ixz

The authors studied 46 transwomen (TW) and 29 transmen (TM), majority in active service with the US Air Force.

Highly-active people, albeit not specifically-trained athletes. Mean age 26.6 yrs +/- 5.5 yrs.

Table 1 Pretreatment demographics and body composition

Pretreatment demographics and body composition	Transwomen (n=46)	Transmen (n=29)
	Mean (SD)	Mean (SD)
Age at initiation of gender affirming hormones (years)	26.6 (4.8)	25.6 (6.6)
Height (cm)	176.3 (7.1)	165.6 (5.3)
Weight (kg)	76.7 (12.6)	69.5 (10.0)
Body mass index (kg/m^2)	24.4 (3.7)	25.3 (3.3)
Waist circumference (cm)	80.8 (8.4)	76.7 (8.9)
Rank (%)		
Enlisted	100	93.10
Officer		6.90
Duty status (%)		
Active duty	95.70	86.20
Reserves	2.20	6.90
Air National Guard	2.20	6.90

Transgender officers were treated along standard hormone regimes. There is “documented suppression” of testosterone in TW but no raw numbers. Similarly, there are no raw numbers for TM.

Table 2 Gender affirming hormones prescribed

	Transwomen (n=46)	Transmen (n=29)
Gender affirming hormones prescribed	Oral oestradiol: 67.4% Transdermal oestradiol: 15.2% Oestradiol valerate IM: 13.0% Oestradiol cypionate IM: 2.2% Unknown: 2.2%	Testosterone cypionate: 89.7% Testosterone enanthate: 3.4% Transdermal testosterone: 3.4% Testosterone 2% gel: 3.4%
Time to first therapeutic level (39 transwomen, 26 transmen) (days) (median (range))	234.0 (27–1270)	98.5 (23–1116)
Testosterone blockade prescribed (transwomen only)	Spironolactone: 80.4% Spironolactone and finasteride: 13.0% GnRH agonist IM: 2.2% GnRH agonist and spironolactone: 2.2% Unknown: 2.2%	
Time to first documented suppression (n=35) (days) (median (range))	200 (27–979)	

GnRH, gonadotropin releasing hormone.

USAF officers are subject to annual fitness tests, comprising push-up/sit-up reps per minute and a timed 1.5 mile run.

The performance of TW/TM over 30 months of treatment was retrieved from official records and compared with pre-treatment “baseline” performance.

Because these fitness tests are scheduled annually for large groups, data from TW/TM are presented as year cohorts. So, 0-1 yrs covers those who had been on hormone treatment 1-365 days. And so on.

(I think I’m reading that correctly...)

The performance data is charted in Figure 2. The raw numbers are in stable 4.

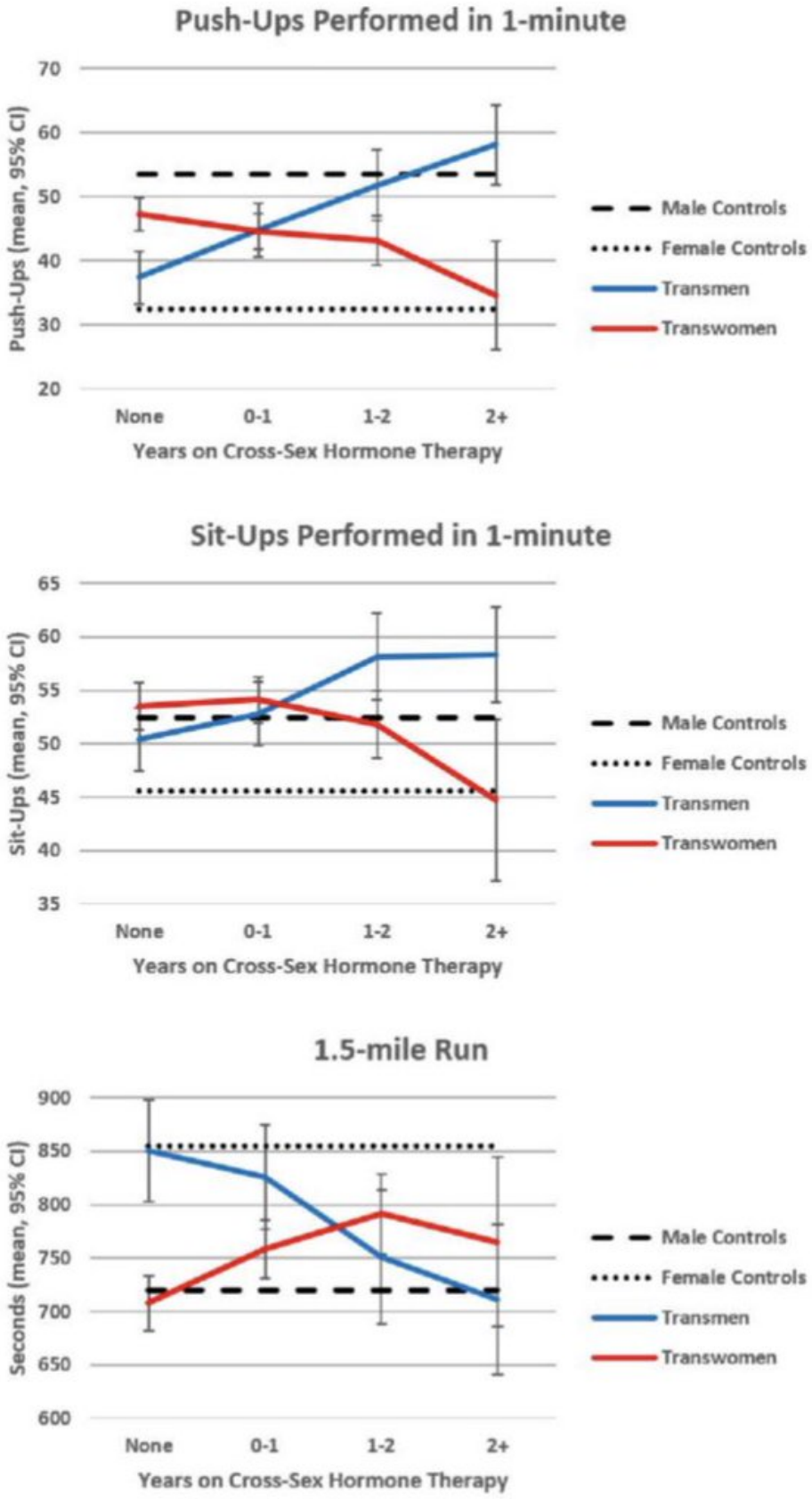
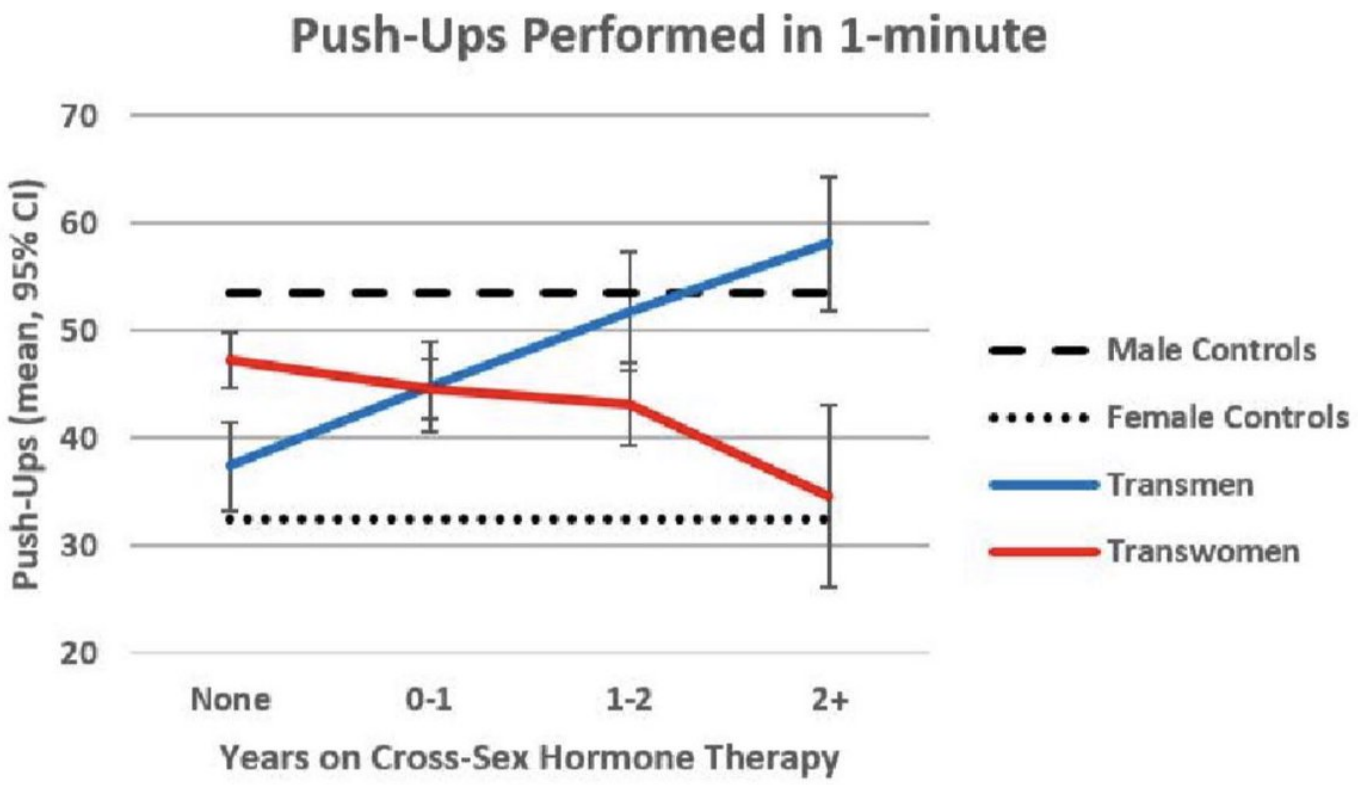


Figure 2 Gender affirming therapy and athletic performance. Male controls line represents the average performance on over 2.3 million Air Force physical fitness tests performed by males under the age of 30 between 2004 and 2014.[22] Female controls line represents the average performance on over 567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

First, push-ups (top panel).

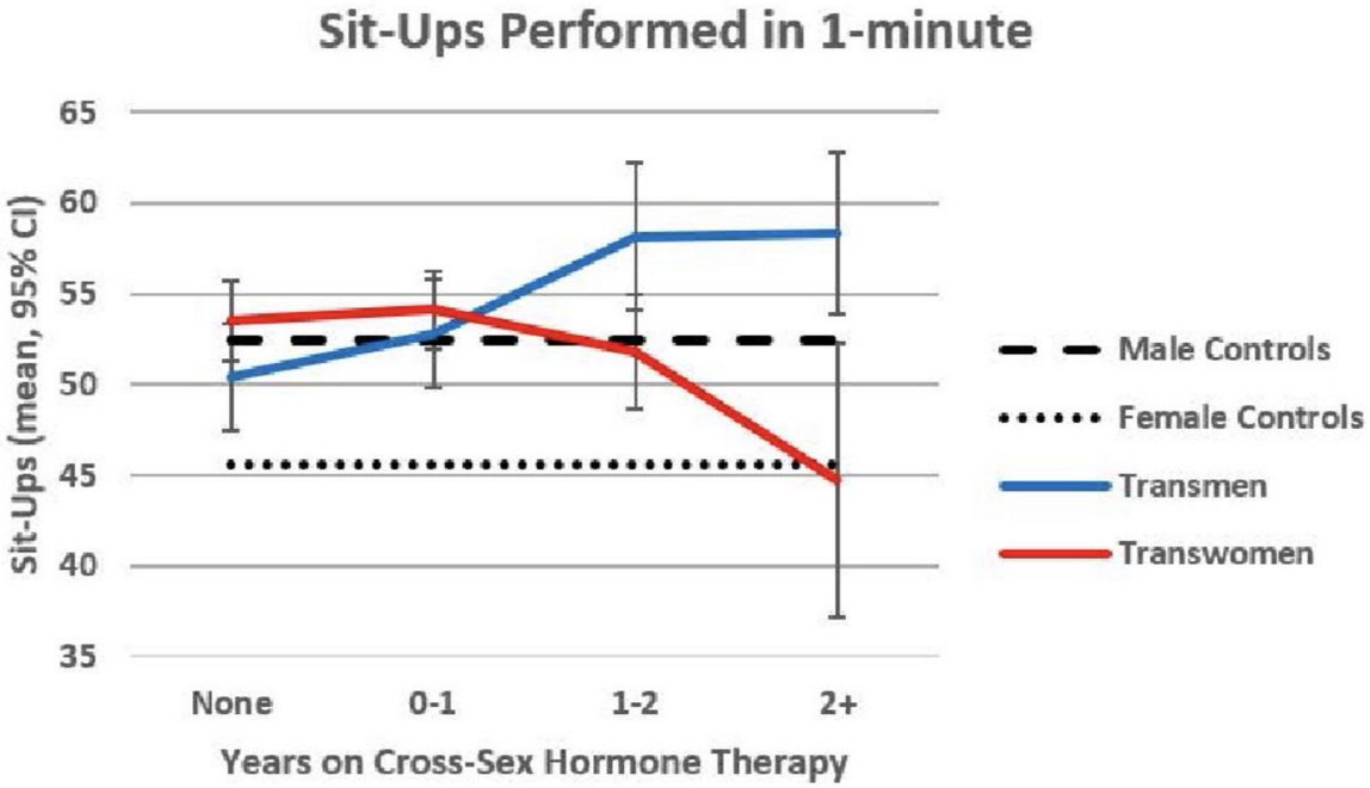
TW were weaker than control men (CM) pre-treatment and throughout transition. The authors speculate this may be explained by aversion to upper body training and its aesthetic outcomes.



TW retained +30% advantage over control women (CW) to 2 yrs transition, then converged sharply with female performance metrics at 2+ yrs, with the final measurement showing +5% advantage over CW.

Next, sit ups (middle panel).

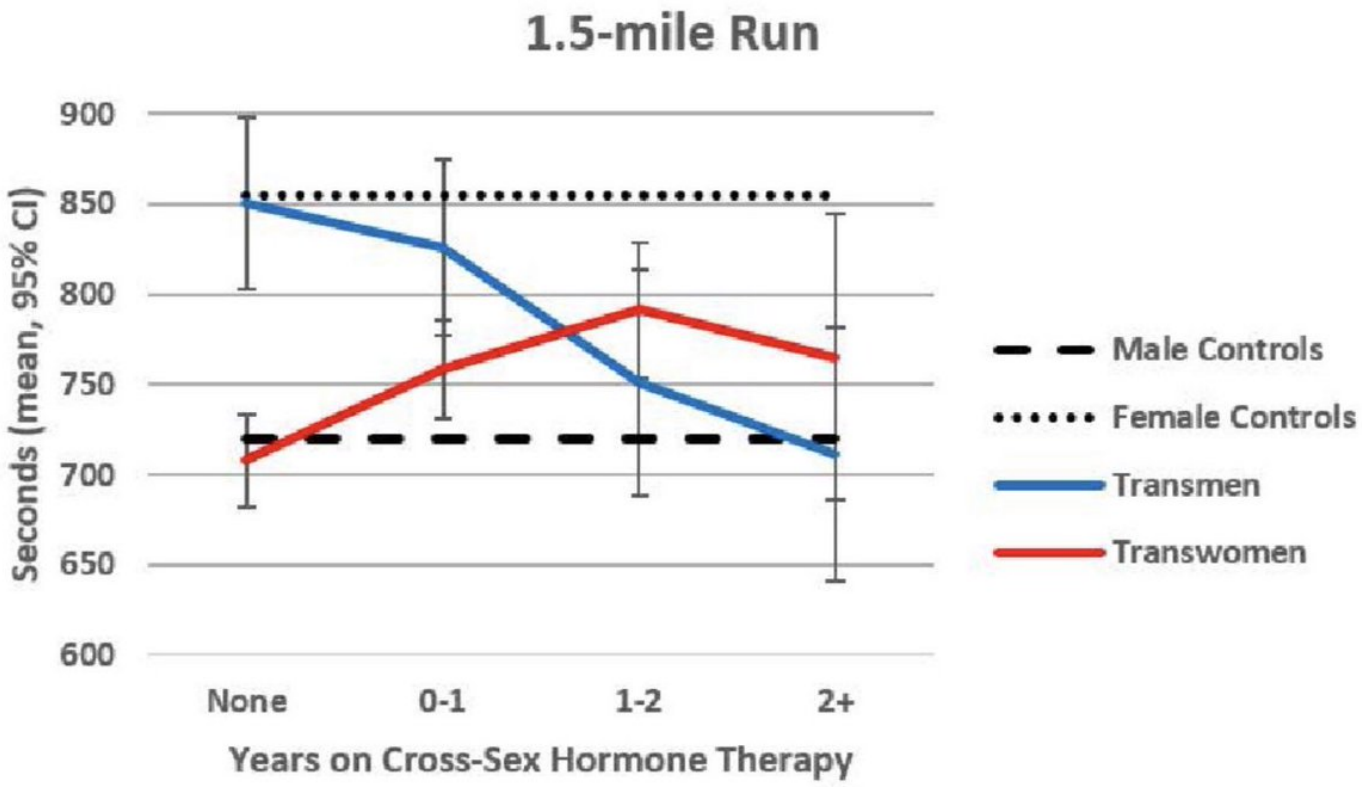
TW were equivalent to CM pre-treatment and to 2 yrs of transition. The authors argue that there is no clear aversion to abdominal training and its effect on body shape.



TW retained +10% advantage over CW to 2 yrs transition, then, as for push ups, converged sharply with female performance metrics at 2+ yrs, with the final measurement showing a slight disadvantage for TW.

Finally running (bottom panel).

This is where it gets really interesting. While TW clearly lose speed from baseline, they appear to recover some speed after 2yrs.



TW retain running advantage over CW past 2 yrs of transition. The final measurements show a performance loss of 8% from baseline time, and retained advantage over females of +10% after 2 yrs.

The authors attribute this to: “height, pelvic architecture and leg bones in the lower limbs that confer an athletic advantage to males after puberty” that “do not respond to changes in testosterone exposure among post-pubertal adults.”

Any runners here know it’s tricky to artificially shorten stride or slow natural cadence (more so than lengthening or speeding up). In fact, it may be painful to do so.

This paints a picture of TW who simply can’t help but run at a pace faster than female average, even if they are genuinely as weak as females in terms of muscular endurance.

Note: ‘weak’ is relative. These females are pretty hardcore :)

Some comments on the tests.

The push-up/sit-up data are interesting. These fitness tests come with targets that must be reached and the targets are different for males and females. My first question is therefore: after 2 yrs of transition, are TW are being set female targets?

There is little incentive for anyone to exceed the target once reached, perhaps evidenced in the very tightly packed average (no error bars?) for CM and CW.

Is it possible the apparent sharp drop off in performance is actually an artifact of the test conditions?

Another point of interest: TM *do* ultimately exceed CM performance.

Are CM not bothering more than necessary, while TM go the extra mile? The authors also speculate that, again for aesthetic reasons, TM may train - hard - and thus, genuinely outperform CM. I'm not convinced.

In support of my not being convinced, TM, while apparently getting far stronger than CM in push ups and sit ups, could just meet CM running times. Is this all about the limit of female skeletal structure, or are the push-up/sit-up data not reflective of true gains?

It seems that the data from push-up/sit-up tests has the capacity to throw up artifacts, and it's a little difficult to get a real handle on it.

Furthermore, the authors note: "transwomen weigh more than CW = 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."

Could be mirrored in TM?

And, of course, the authors note that these tests are sub-optimal measures of strength, more a test of muscular endurance, and can offer little understanding of explosive/max effort changes.

So, a couple of options here.

1. TW are genuinely losing all their muscular endurance advantage after 2 yrs, in which case the running data shows it is impossible to undo the benefits of a male skeleton.

2. TW are not losing all of their muscular endurance advantage after 2 yrs, and that's evident in retained running advantage.

I'd argue that, when viewed as part of the ever-increasing body of knowledge, there is a retained strength advantage *and* unaltered skeletal advantage.

We will assume that TW Hb levels are female reference [robust response to T suppression]. Another question then: does the running data show that TW still retain CV advantage - larger hearts/lungs etc - or that, again, skeletal advantage is simply irreversible?

I will note that the running data was gathered from a reasonably-sized cohort, with individuals tracked longitudinally, times generated under controlled conditions, recorded and verified.

Thus, this study presents far more robust running data than that of Harper 2015.

In news that will shock no-one, the authors conclude: "pretreatment differences between TW and CW persist beyond the 12 month time requirement currently being proposed for athletic competition by the World Athletics and the IOC."

So , yet another study showing that current rules permitting inclusion of TW in the female sports category are not fit for purpose. They fail to deliver fair competition, the ‘overriding’ objective for the IOC.

The sports feds really need to start paying attention.