

Gender Affirming Hormonal Care and Athletic Performance

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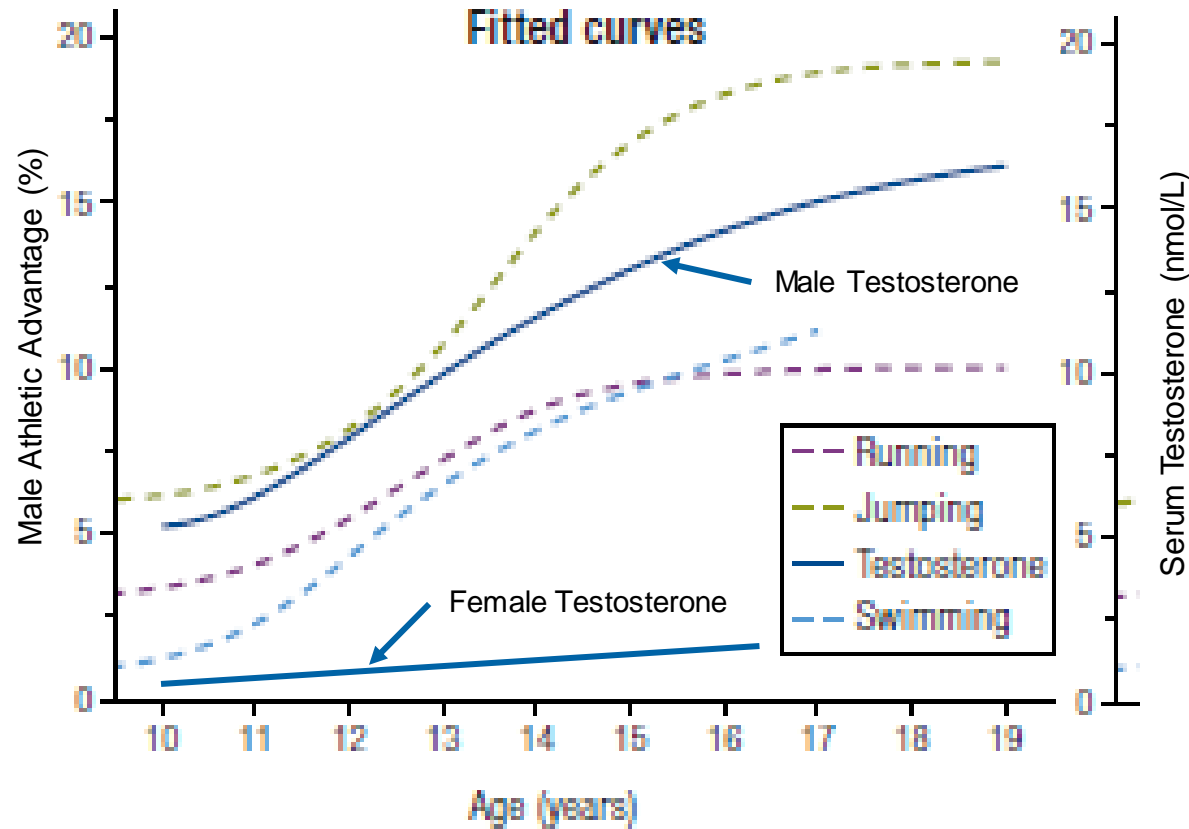
Adolescent Medicine

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Effect of Endogenous Hormones on Athletic Performance

Changes in Performance with Puberty



Handelsman DJ. Sex differences in athletic performance emerge coinciding with the onset of male puberty. Clin Endocrinol 2017;87(1):68-72. Used with permission from the publisher

Sex Hormones and Athletic Performance

- Given the differences in performance between adult males and females, many sporting events offer gender segregated competitions after puberty to level playing field
- This division by sex assigned at birth does not work for athletes with atypical testosterone levels for their assigned gender including:
 - Female athletes with disorders of sexual differentiation (DSD) or Polycystic Ovarian Syndrome (PCOS)
 - Transgender athletes on hormones
- Women with PCOS can have testosterone levels 3-times higher than other athletes and levels in women with DSD can be even higher

PCOS, DSDs and Athletic Performance

- 31% of adolescent elite female athletes have hormone levels consistent with PCOS versus 2-12% of the general population
- Olympic level female athletes have higher testosterone levels than age matched controls
- At the Track and Field World Championships women with free testosterone concentrations in the top third of levels performed 1.78-4.53% better than women in the bottom third

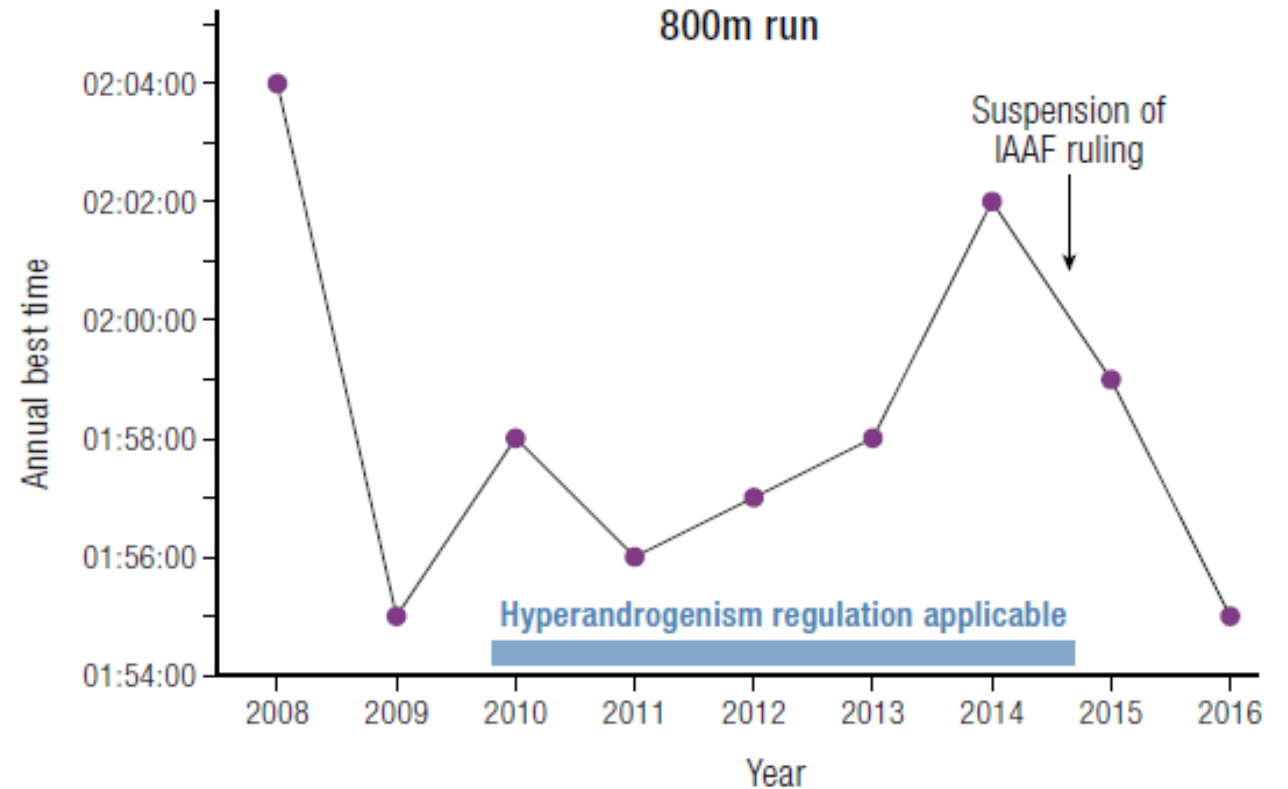
Eliakim A, Marom N, Galitskaya L, Nemet D. Hyperandrogenism among elite adolescent female athletes. *J Pediatr Endocrinol Metab.* 2010;23(8):755–758.

Eklund E, Berglund B, Labrie F, Carlström K, Ekström L, Hirschberg AL. Serum androgen profile and physical performance in women Olympic athletes. *Br J Sports Med.* 2017;51(17):1301–1308.

Bermon S, Garnier PY. Serum androgen levels and their relation to performance in track and field: mass spectrometry results from 2127 observations in male and female elite athletes. *British journal of sports medicine.* 2017 Sep 1;51(17):1309-14.

- World Athletics attempted to ensure fair competition by restricting testosterone levels among female athletes to <10 nmol/L (normal 0-1.7 nmol/L) for one year prior to competition
- Part of this regulation was repealed because there was insufficient evidence to support this restriction among women with DSD
- World Athletics has not approved new regulations leaving regulatory bodies without guidance for inclusion of women with DSD or transwomen

Effect of IAAF hyperandrogenism regulation on annual best 800m time in one elite female athlete with a DSD



Handelsman DJ, Hirschberg AL, Bermon S. Circulating testosterone as the hormonal basis of sex differences in athletic performance. *Endocrine reviews*. 2018 Oct;39(5):803-29. Used with permission from publisher

Effect of Gender Affirming Hormones on Athletic Performance

Effect on Muscle Mass and Strength

- Male to Female Transition
 - Muscle mass declined during the first 12 months on hormones
 - Transwomen who were on hormones for >3 years experienced a decline in strength
- Female to Male Transition
 - Muscle mass and grip strength increased during the 1st year on hormones
- Changes in muscle mass stabilize after 12 months on hormones in both transmen and women

- Gooren, L. J., and M. C. Bunck. "Transsexuals and competitive sports." *European Journal of Endocrinology* 151.4 (2004): 425-429
- Elbers JM, Asscheman H, Seidell JC, Gooren LJ. Effects of sex steroid hormones on regional fat depots as assessed by magnetic resonance imaging in transsexuals. *AmJPhysiol.* 1999;276(2 Pt 1): E317-E325
- Lapauw, Bruno, et al. "Body composition, volumetric and areal bone parameters in male-to-female transsexual persons." *Bone*43.6 (2008): 1016-1021
- Elbers JM, Asscheman H, Seidell JC, Megens JA, Gooren LJ. Long-term testosterone administration increases visceral fat in female to male transsexuals. *J Clin Endocrinol Metab.* 1997;82(7):2044-2047.
- Van Caenegem, Eva, et al. "Body composition, bone turnover, and bone mass in trans men during testosterone treatment: 1-year follow-up data from a prospective case-controlled study (ENIG)." *European journal of endocrinology* 172.2 (2015): 163-171

Muscle Mass vs Strength

- Muscle mass and strength are correlated but not interchangeable
- After 12 months of hormones among recreational athletes
 - Transwomen: experienced decreased muscle mass but did not change knee extensions strength at one year
 - Transmen: experienced increased muscle mass and knee extension strength at one year
 - After one year the transwomen were still stronger and had more muscle mass than the baseline level among the transmen in the study

- Handelsman DJ, Hirschberg AL, Bermon S. Circulating testosterone as the hormonal basis of sex differences in athletic performance. *Endocrine reviews*. 2018 Oct;39(5):803-29.
- Wilk A, et.al. Muscle strength, size and composition following 12 months of gender-affirming treatment in transgender individuals. *J Clin Endocrinol Metab* 2019 (Epub ahead of print)

Transition and Athletic Performance

- Transwomen experienced a decline in 5k run times with gender transition, but no change in athletic performance relative to other athletes of similar age and gender
- These races occurred 1 to 29 years apart
- No other studies assessed the influence of gender affirming hormones on athletic performance

Harper J. Race times for transgender athletes. *Journal of Sporting Cultures and Identities*. 2015;6(1):1-9.

Gender Transition and Athletic Performance

- We conducted a study of fitness test results and medical records of 29 transmen and 46 transwomen who started gender-affirming hormones while on active duty with the United States Air Force
 - Mean age at transition 26.2 (S.D. 5.5)
- Assessed changes in athletic performance and body composition in the first 2 1/2 years on hormones after adjusting for age at medical transition and pre-treatment performance
 - Weight and waist circumference
 - Push-ups in 1 minute, sit-ups in 1 minute, and 1.5 mile run time

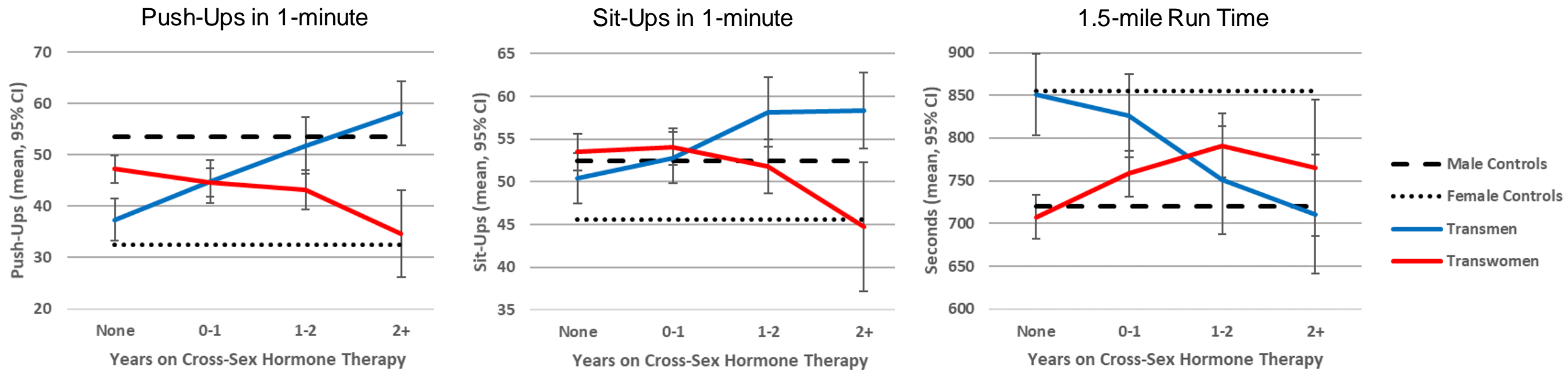
Roberts T, Smalley J, and Ahrendt D. Effect of gender-affirming hormones on athletic performance in both transwomen and transmen: Implications for sporting organizations and legislators. British Journal of Sports Medicine 2020 in print

Gender Transition and Athletic Performance

- For transwomen, time on estrogen was associated with an increase in weight and a decline in athletic performance
- For transmen, time on testosterone was not associated with a change in body composition but was associated with an improvement in athletic performance

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Gender Transition and Athletic Performance



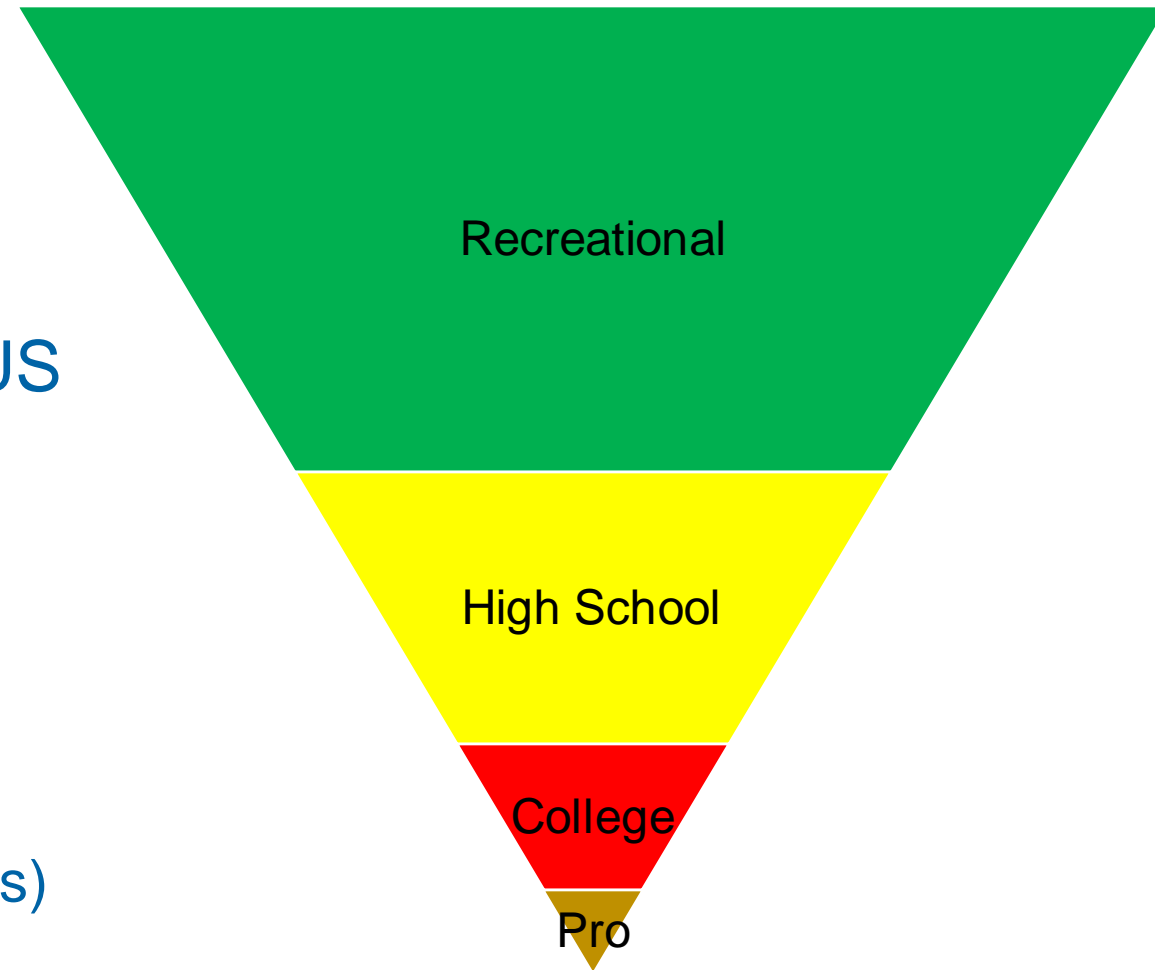
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"Fairness" in Sports

- Sports have never been fair
- Athletes from well-off families have an advantage in equipment, coaching, and time over athletes with fewer resources
- Athletes from the majority group have an advantage over members of disadvantaged groups
- Athletes who live in urban areas have an advantage in available sporting opportunities over athletes who live in remote rural areas
- However, we are not banning rich, white kids from the city from participation in sport

Sports Funnel

- 30 to 45 million American youth play recreational or competitive organized sports
- 8,000,000 high school athletes in the US
- 480,000 compete as NCAA athletes (about 6% of HS athletes)
 - fewer on division I teams
- About 1-2% of NCAA level athletes become professional athletes
 - (Varies by sport, about 0.1% of HS athletes)



Gender Transition and Athletic Performance

- Transwomen are currently mandated to have 1-year of testosterone suppression before being permitted to compete at the elite level.
- One year may be too short if the aim is a level playing field in elite level competition
- In non-elite competition, where the stakes of the competition are lower, the 1-year of testosterone suppression among transwomen is likely sufficient
- Whatever additional unevenness is created by a transwoman's prior testosterone exposure is probably outweighed by the benefits to the transgender athlete from competing in their affirmed gender

Roberts T, Smalley J, and Ahrendt D. Effect of gender-affirming hormones on athletic performance in both trans women and transmen: Implications for sporting organizations and legislators . British Journal of Sports Medicine 2020 in print

Case 1:

Your local YMCA is putting together the plan for their summer sports league. Last summer they had a mother approach them stating she had a transgender 7 YO who identifies as a male (natal female) and wants to play soccer. Her mother is asking for him to play on the boy's team. They reach out to you for assistance in deciding how to manage the situation.

What do you advise them?

Case 2:

You are following a 13 YO transgender female (natal male) who wants to play basketball at her middle school on the girls team. She was started on pubertal blockers at the age of 12 at an SMR of 3 and has had no further signs of pubertal progression. The patient's mother is asking for a letter from you in support of their plan to take to the school.

What do you think of the situation?

Would you write the letter, and if yes what would you put on the letter?

Case 3:

You are asked to speak at a school board meeting. One of the local High Schools has a transgender male (natal female) student who is entering his senior year and wants to wrestle on the male wrestling team. He was on the female wrestling team as a Sophomore but took his Junior year off. He will have been on testosterone therapy for about 16 months when wrestling season starts. You live in a 'purple' state that allows a case-by-case decision in these matters. He states he is trying to get a college wrestling scholarship.

What will you say?

Case 4:

18 YO transgender male (natal female) wants to play on the boys baseball team. He started on pubertal blockers at age 16 (SMR 4) and started hormone therapy with testosterone about 1 year ago. The school district is saying he cannot as they are concerned that he is at risk of hurting himself playing against other natal males. You suspect they are just trying to make excuses to keep him off the team. They have said they are willing to have a meeting with the team members and their parents and let everyone voice their opinion.

What would you do?

Case 5:

A 17 YO transgender female (natal male) who is going into her senior year wants to compete on the girls track team. She socially transitioned last year and was started on spironolactone for testosterone suppression 6 months ago. Prior to her transition she was on the boys track team as a sophomore and did well early in the season before getting injured. She hopes to get noticed for a college track scholarship. A parent of one of the other members of the track team has raised objections to the State High School Athletics Association. They turn to you as an expert resource.

What do you say?