Transgender Sports from the Perspective of Women's Sports

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Acknowledgements

Karolinska Institutet

STOCKHOLM TRANSGENDER STUDY

- Dr. Anna Wiik
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- Thuring foundation
- 1.6 Million Club

INTERNATIONAL COLLABORATORS

- Emma Hilton, University of Manchester
- Ross Tucker
- *And all co-authors*

Sex-related controversies

- Males masquerading as females in women's events
- Sex verification procedures
- XY DSD athletes
- Transgender athletes

Sex tests brought in after data showed 50-60 DSD athletes in finals, World Athletics says

Nilla Fischer: "We had to show our genitalia to be allowed to play in the FIFA Women's World Cup"

"This policy is the cornerstone of our commitment to protect women's sport, and we are convinced that there is only one fair and transparent way to do that: by relying on science and biological facts."

– Johan Eliasch, FIS President

Terminology

- Sex: Male or female based on biology
- Gender Identity: How you identify (Male, Female, Non-Binary)
- Transgender: Umbrella term for people whose gender identity does not align with birth sex
- Trans women: Born male, identify as a woman
- Trans men: Born female, identify as a man
- DSD: Differences/Disorders of sex development

Two groups with barriers and challenges in sport and physical activity

Transgender

- Lower Physical activity levels – lower fitness
- *"Sport would be just another area where I see problems related to being transgender"* Panel discussion, 2023

Females

- Fewer reach physical activity guidelines compared with males
- Fought an uphill battle for equal opportunities in sport

After athletics and swimming, transgender women banned from competing by World Netball

Transgender Women Banned From Elite Track and Field Competitions by World Athletics

20 juni 2022

Transgender women banned from elite swimming competitions, FINA rules

World chess has banned transgender women from competing

Trans women are not banned from sport – the issue concerns the eligibility criteria for sex-restricted events

Everyone should have the opportunity to enjoy sports

Trans people need inclusive pathways into recreational and elite sport

The DSD vs. Transgender issue

Similarity:

- Has the athlete experienced male development that provides a performance advantage?

Differences:

- Exclusion vs. seeking entry to a new category
- Ethical issues surrounding hormone therapy

“In 2003, a National Olympic Committee asked the IOC Medical department for guidance concerning a female athlete. She had transitioned from the male sex and her female fellow competitors questioned her participation. In the absence of any rules or guidelines, the IOC Medical Commission convened a group of experts to a consensus meeting in Stockholm in October 2003”

Arne Ljungqvist


NEW ZEALAND


BRITISH
CYCLING

Evolvement of the policy landscape

IOC
Stockholm Consensus on Sex Reassignment in Sports

Sex reassignment surgery required
Eligible 2 years after gonadectomy

IOC
T levels <10 nmol/L for 12 months

World Athletics
T levels <5 nmol/L for 12 months

World Rugby
Trans women not eligible for women's international rugby

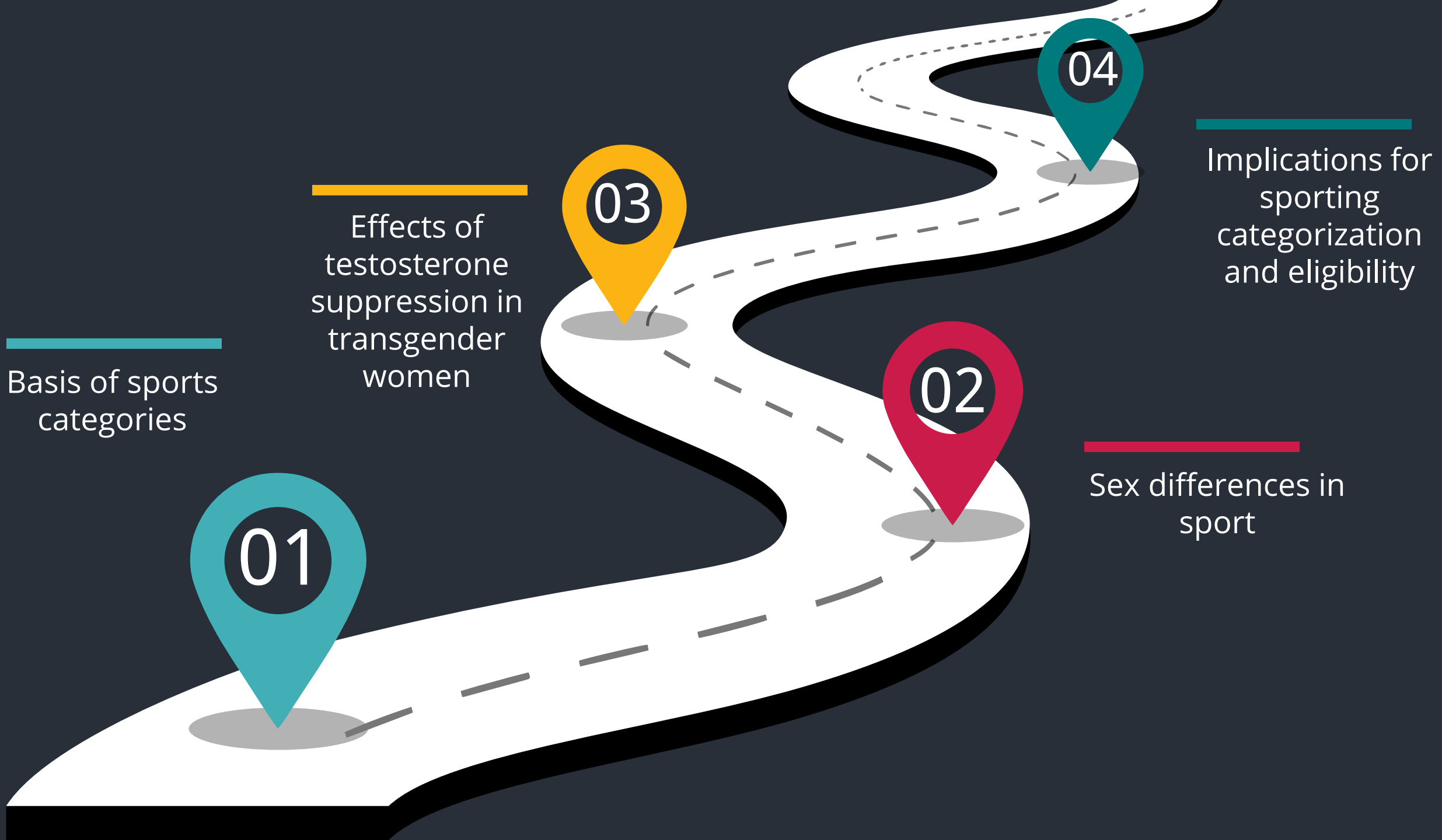
IOC
Framework for inclusion (moved responsibility to the individual sports)

World Aquatics
Female + Open category (age 12 or Tanner 2)

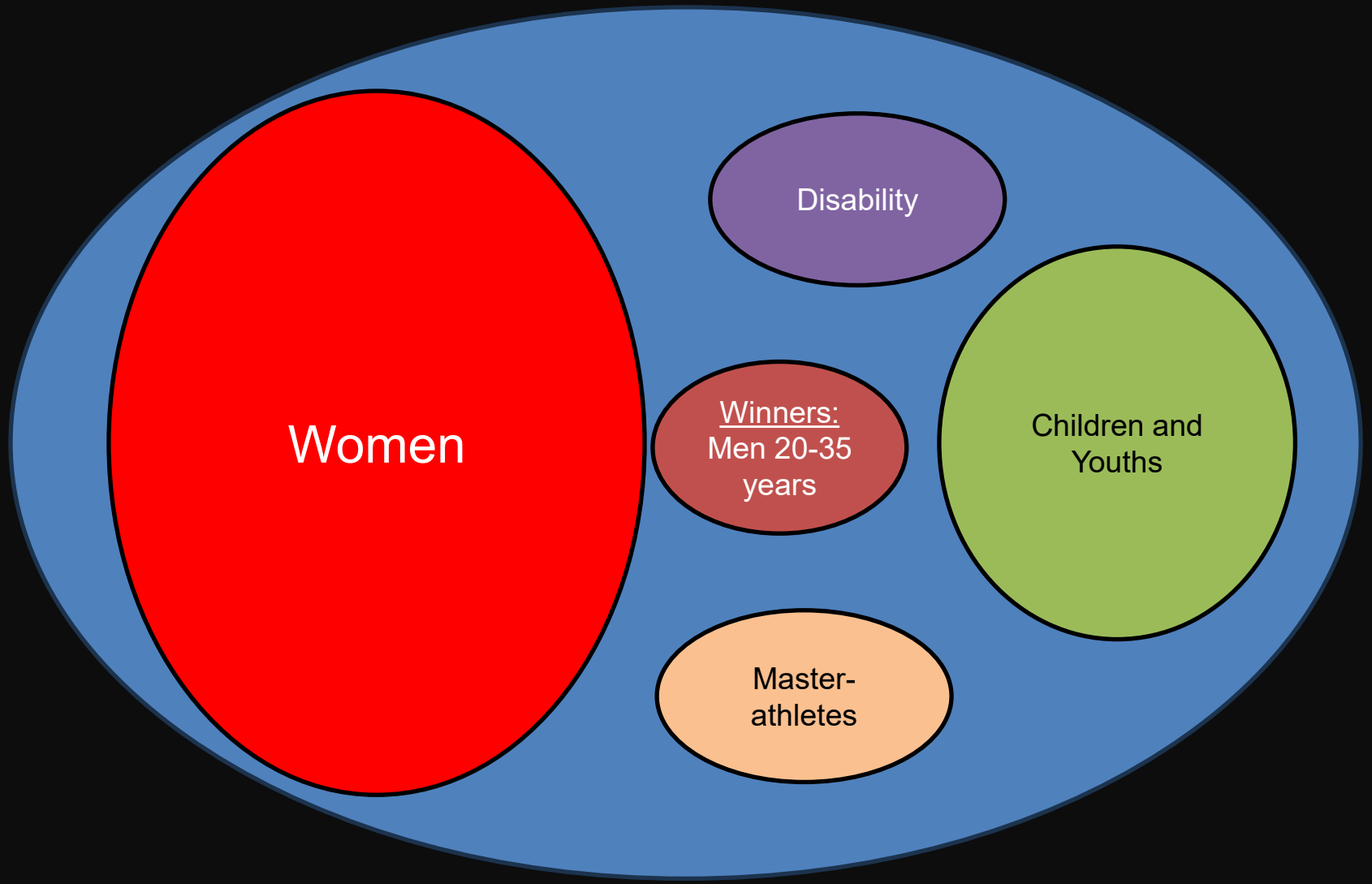
UCI (cycling)
T <2.5 nmol/L for 24 months

Current policies: four main approaches

- Female only e.g., World Boxing, FIS (skiing)
- Excluding those who have experienced male puberty e.g., World Aquatics
- Testosterone suppression (12, 24, 48 months) e.g., World Triathlon
- Self-ID e.g., England and Wales Cricket
- Case by case assessment e.g., Swedish Football Association

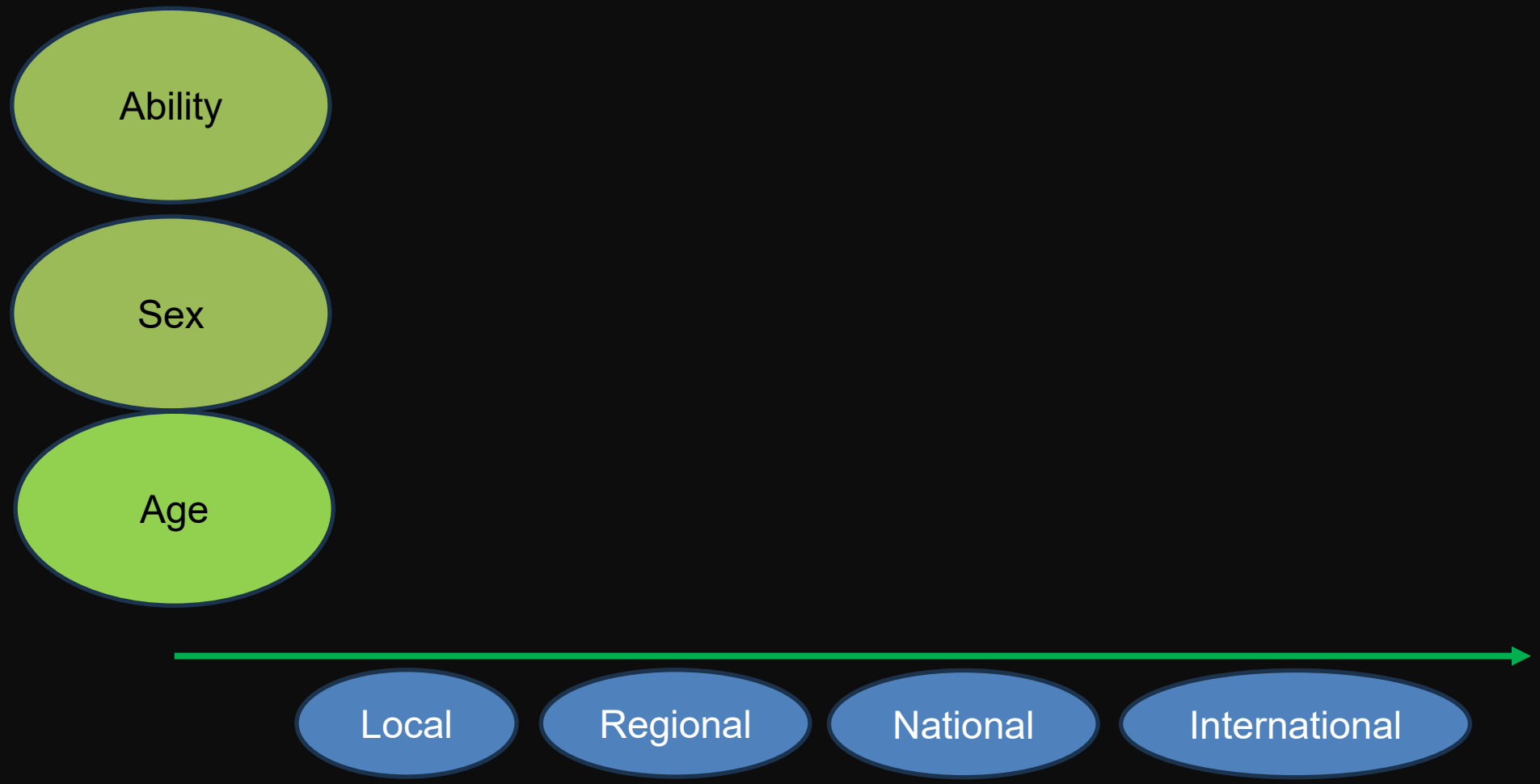

01
Basis of sports categories
02
Sex differences in sport
03
Effects of testosterone suppression in transgender women
04
Implications for sporting categorization and eligibility

Sports categorization is the most effective measure to maximize inclusion



The talent/quality that sport seeks to isolate and reward can be over-shadowed by advantages that have nothing to do with talent/quality

CATEGORICAL ADVANTAGES



MEANINGFUL COMPETITION

Charlotte Kalla and Marcus Hellner, Olympic gold medalists in Vancouver 2010

Male puberty- Testosterone

- TRAINING
- GENETICS
- DEDICATION
- NUTRITION

Sex differences in sport

Sex is binary and secondary sex characteristics show a bimodal distribution

- *The male sex*

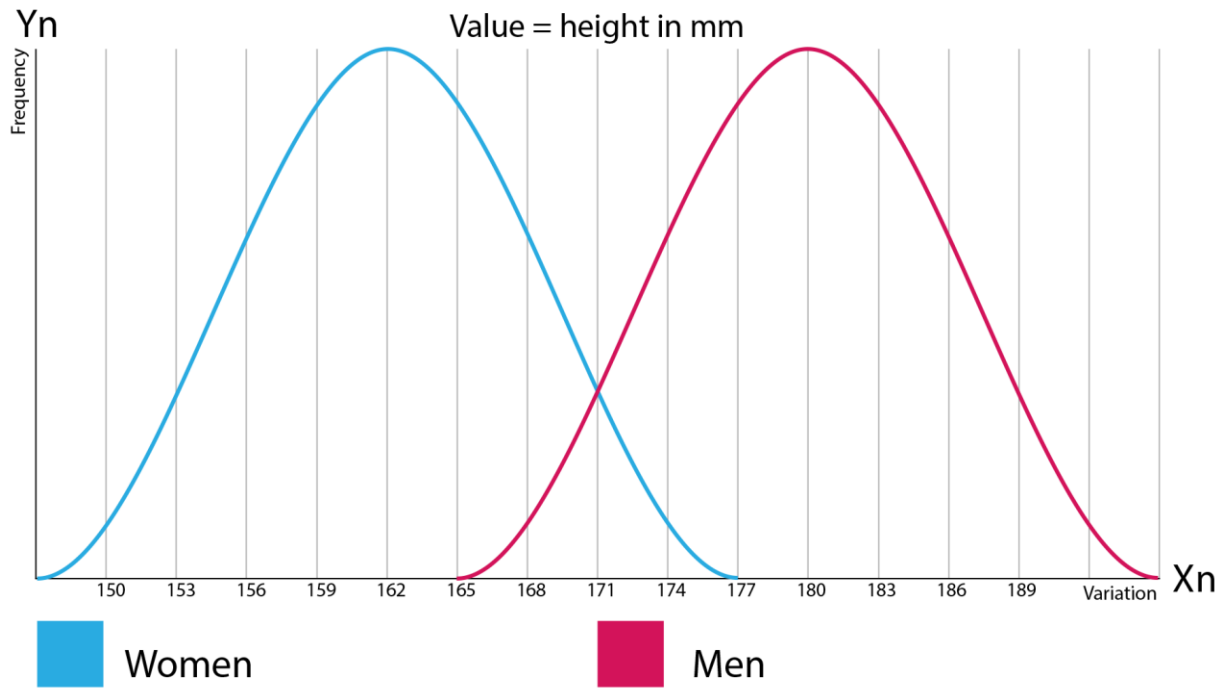
Physiology and reproductive system that deliver the smaller gamete (sperm)

- *The female sex*

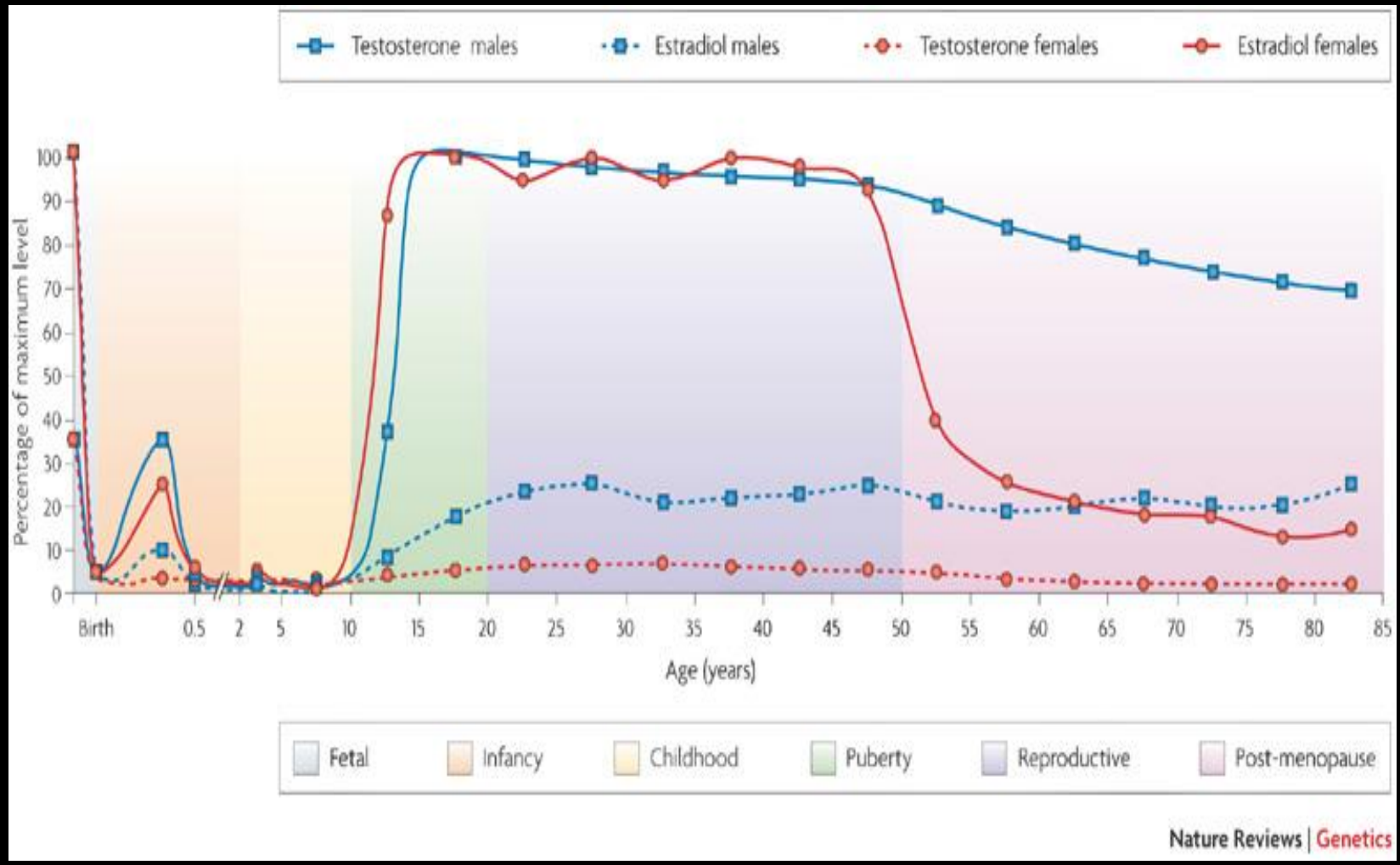
Physiology and reproductive system that deliver the larger gamete (the egg)

- Differences of sex development (DSD)

Does not disprove this concept – most can easily be classified as male or female, there is no third sex



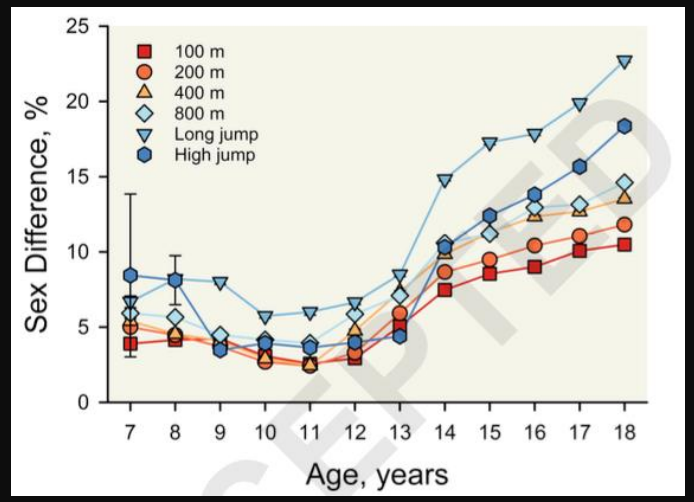
Levels of sex hormones



Ober et al. 2008. Sex-specific genetic architecture of human disease. Nat Rev Genet 9, 911–922.

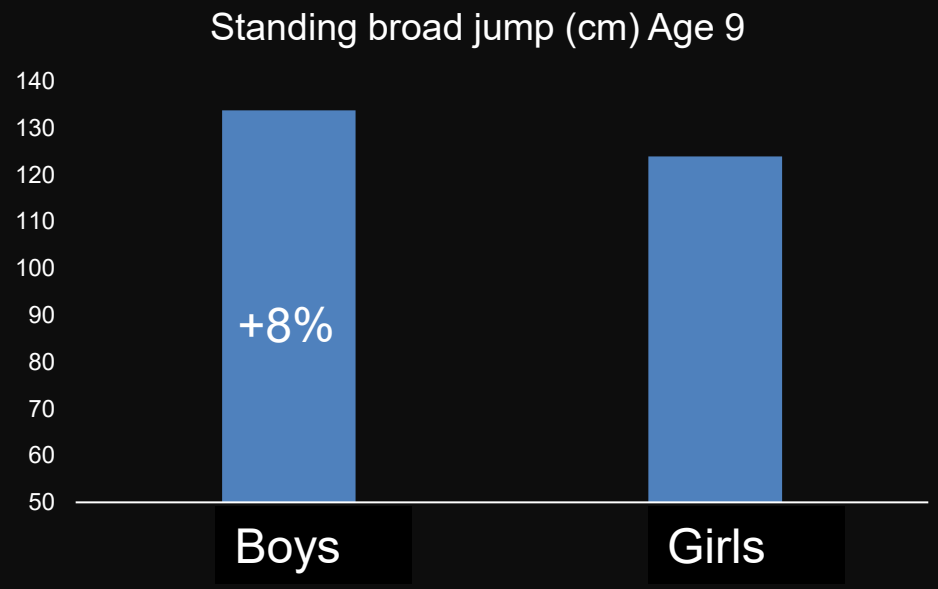
Testosterone drives sex differences in performance

- Before puberty, sex differences in performance are evident, but smaller
- During and after puberty, sex differences are so large that it would be highly unlikely that girls/women could win competitions if they competed against boys/men in sports where strength, stamina and/or physique are important



Atkinson et al. MSSE. 2024

EuroFit project, based on 464 900 tests



Question? What consequences will this have for any attempts at mixed/sex-neutral sports groups and competitions before puberty?

"HBL's news that Helsinki was organising gender-neutral athletics competitions for primary school pupils in September sparked a lot of discussion. Many people noticed that the boys took 14 out of 18 gold medals and 44 out of 60 medals in total."

Friidrott

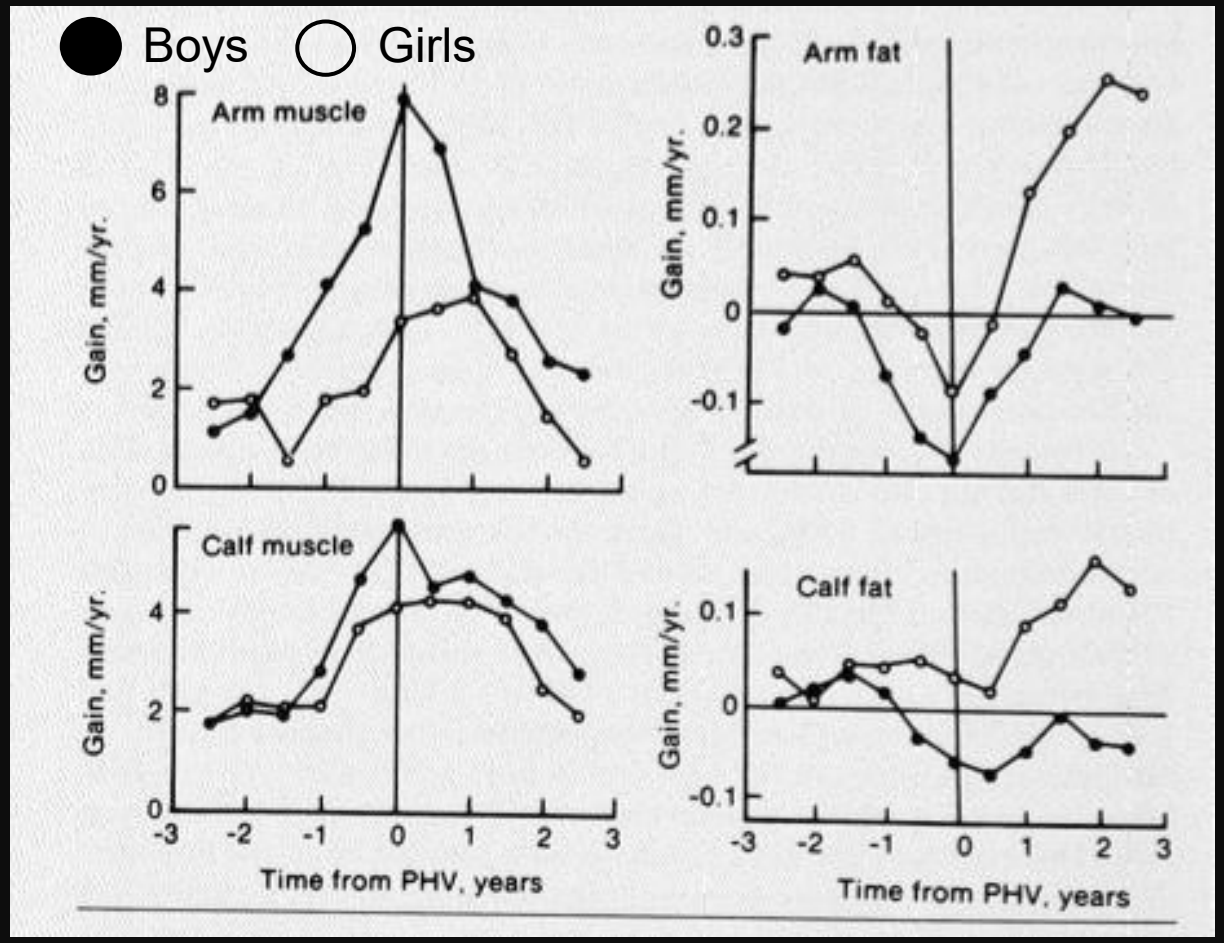
Forskare om könsneutrala friidrottstävlingar: ”Förödande för flickors idrott”

7 oktober 2023 07:00

Docent Tommy Lundberg förklarar varför flickorna drabbas av könsneutrala friidrottstävlingar.

https://www.hbl.fi/artikel/forskare-om-konsneutrala-friidrottstavlingar-forodande-for-flickors-idrott/

Gains in muscle and fat tissue: girls vs. boys



Tanner et al. 1981 Ann Human Biol

Athletic development: Males vs. females

- “For all of the analyzed disciplines, overall improvement rates were >50% higher for males than for females.”

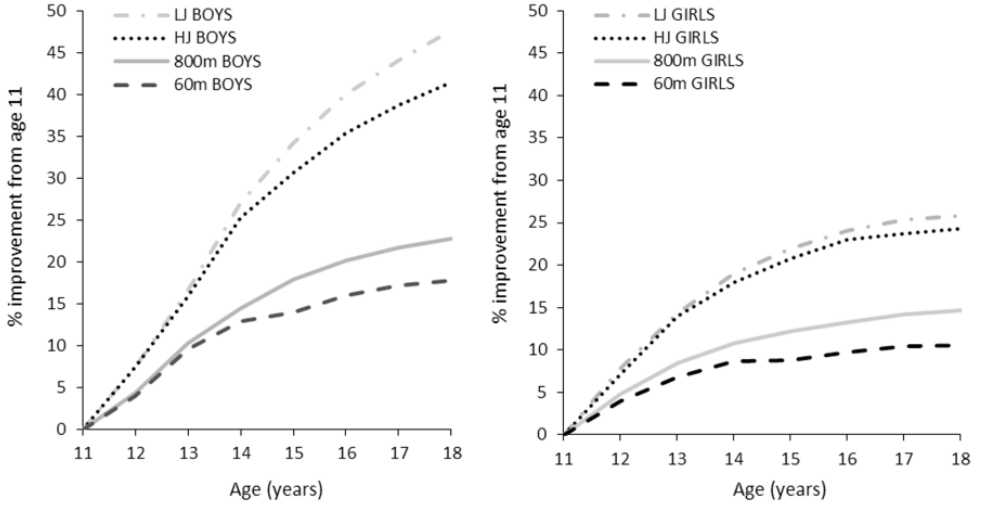
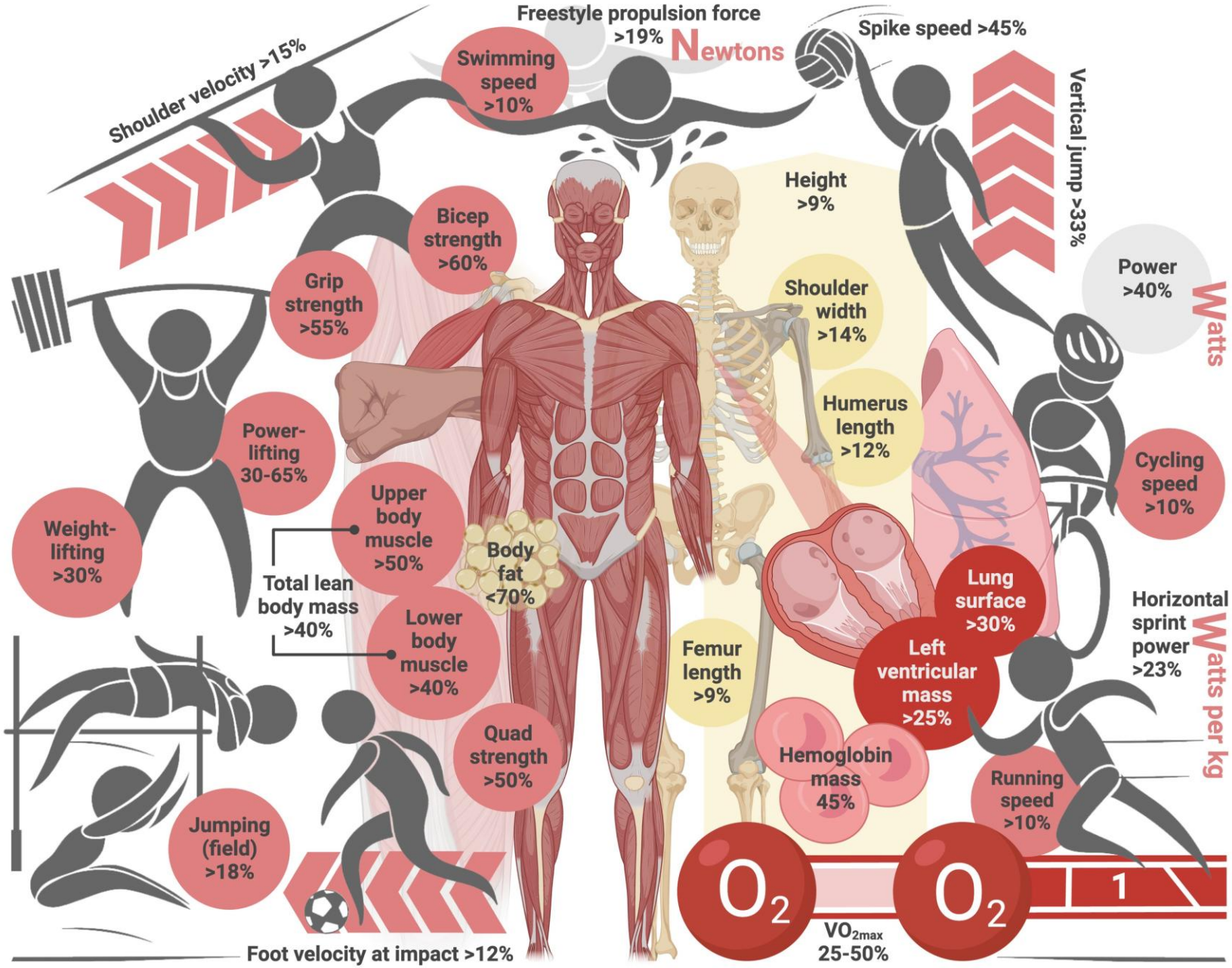
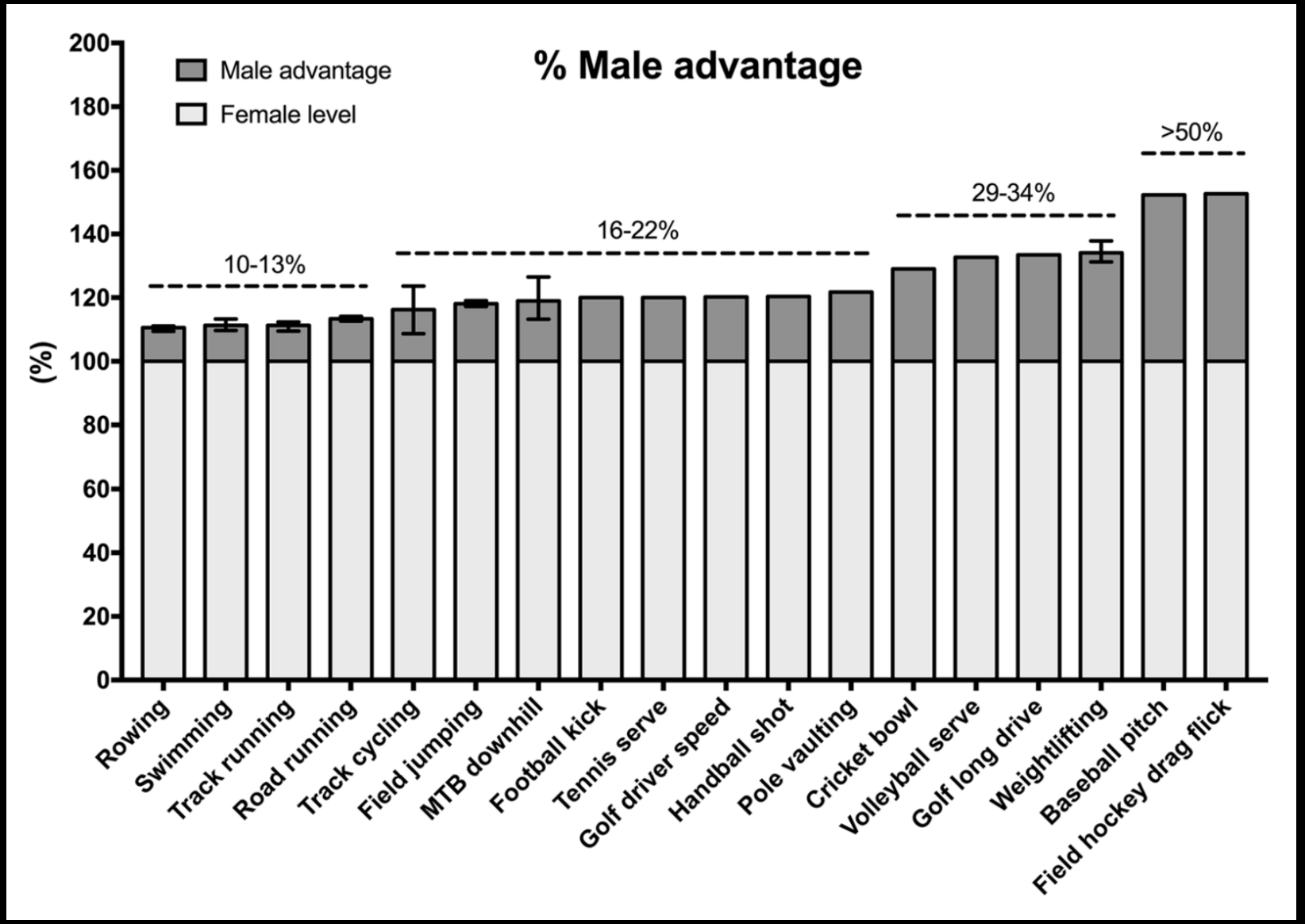


Fig 2. Percentage improvement in performance from age 11 to 18 in long jump, high jump, 60 m sprint and 800 m. Data are mean for top 100 Norwegian male (panel A) and female (panel B) performers in each discipline.

Tønnessen et al. PLoS One. 2015 Jun 4;10(6):e0129014.


Shoulder velocity >15%
Freestyle propulsion force >19%
Newtons
Swimming speed >10%
Spike speed >45%
Vertical jump >33%
Height >9%
Bicep strength >60%
Grip strength >55%
Shoulder width >14%
Power >40%
Watts
Humerus length >12%
Power-lifting 30-65%
Cycling speed >10%
Weight-lifting >30%
Upper body muscle >50%
Body fat <70%
Total lean body mass >40%
Lower body muscle >40%
Lung surface >30%
Horizontal sprint power >23%
Watts per kg
Femur length >9%
Left ventricular mass >25%
Quad strength >50%
Hemoglobin mass 45%
Running speed >10%
Jumping (field) >18%
O2
O2
VO2max 25-50%
Foot velocity at impact >12%

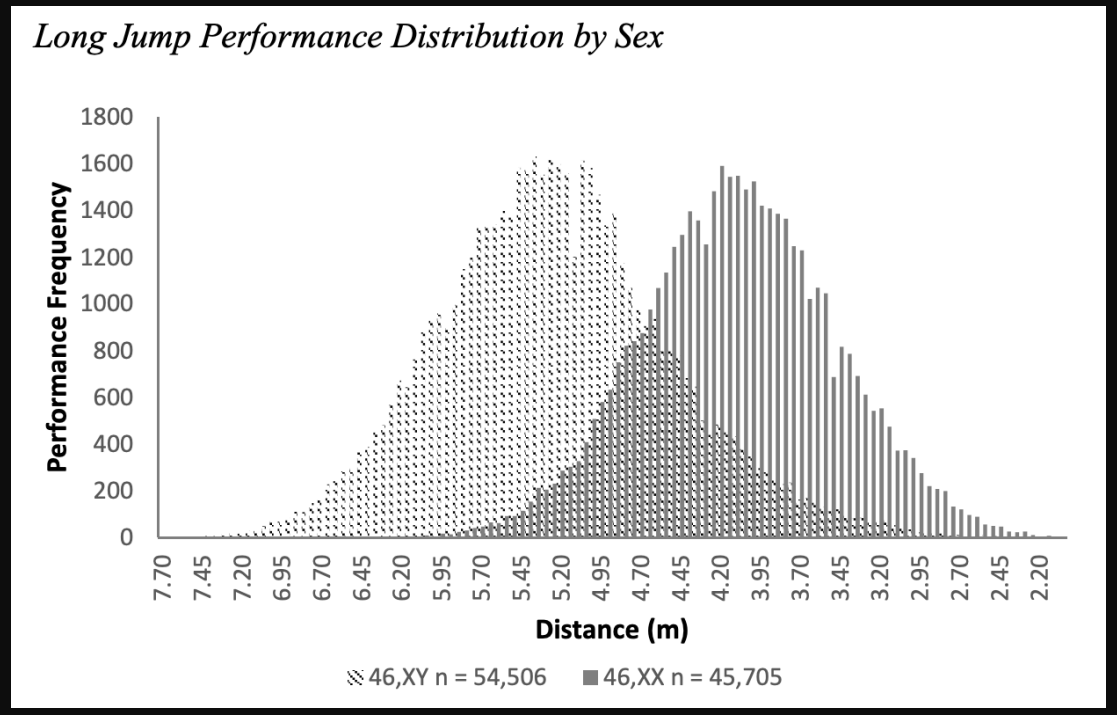
Performance differences

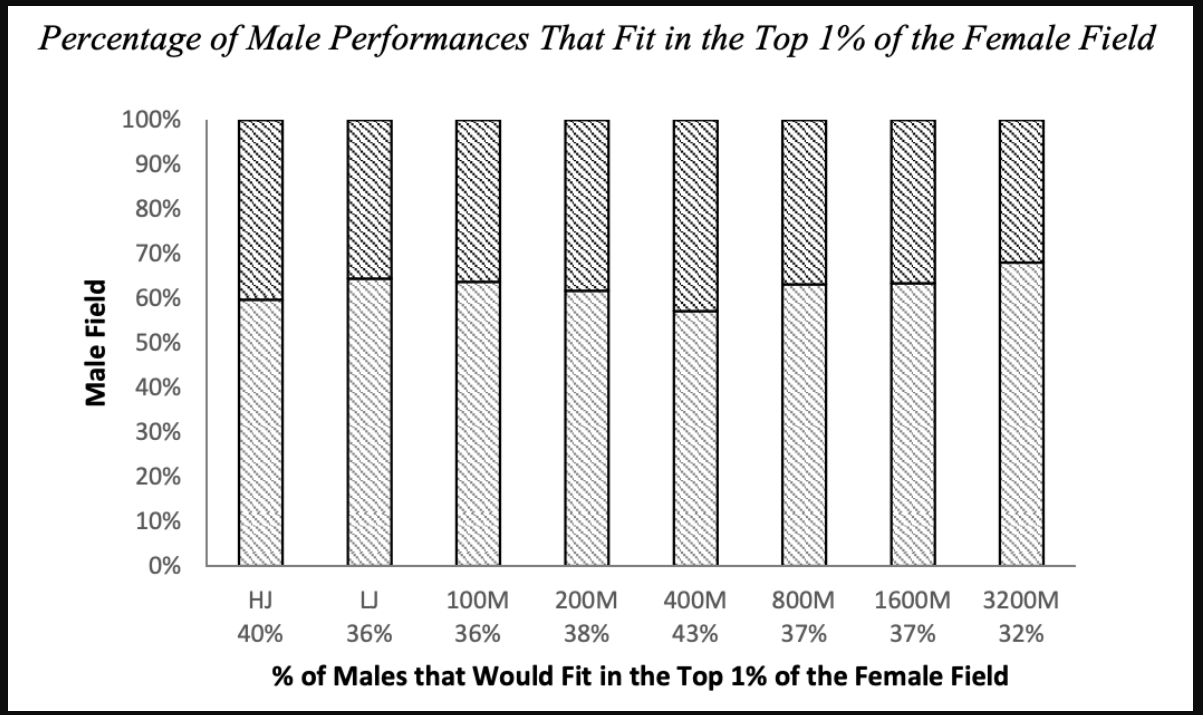


Hilton & Lundberg, 2020 Sports Med

Overlap vs. average advantage

- Many women outperform many men
- At any matched level, many men outperform all women



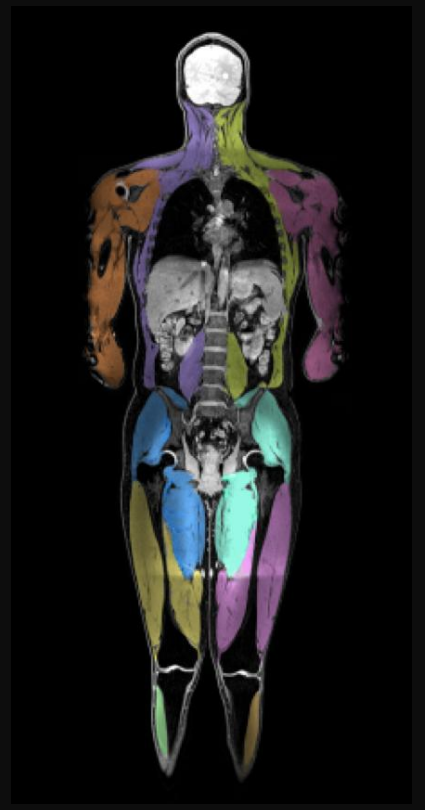


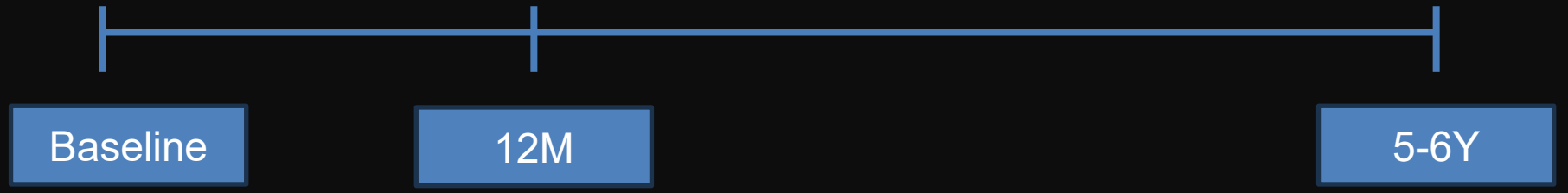
Gabriel A. Higerd PhD thesis 2020


03
Effects of testosterone suppression

Design of the Stockholm study

- 16 Transgender women (age 22–38 years)
- 17 Transgender men (age 19–36 years)
- Cross-hormone treatment
- All patients reached their target sex hormone level
- Whole-body and muscle composition using MRI
- Lower-limb Muscle strength (Biodex)
- Tissue samples: blood, muscle, fat, skin
- Heart/vessel function





ACCEPTED MANUSCRIPT

Muscle strength, size and composition following 12 months of gender-affirming treatment in transgender individuals

Anna Wiik, Tommy R Lundberg ✉, Eric Rullman, Daniel P Andersson, Mats Holmberg, Mirko Mandić, Torkel B Brismar, Olof Dahlqvist Leinhard, Setareh Chanpen, John N Flanagan, Stefan Arver, Thomas Gustafsson

The Journal of Clinical Endocrinology & Metabolism, dgz247,
https://doi.org/10.1210/clinem/dgz247
Published: 04 December 2019 **Article history** ▾

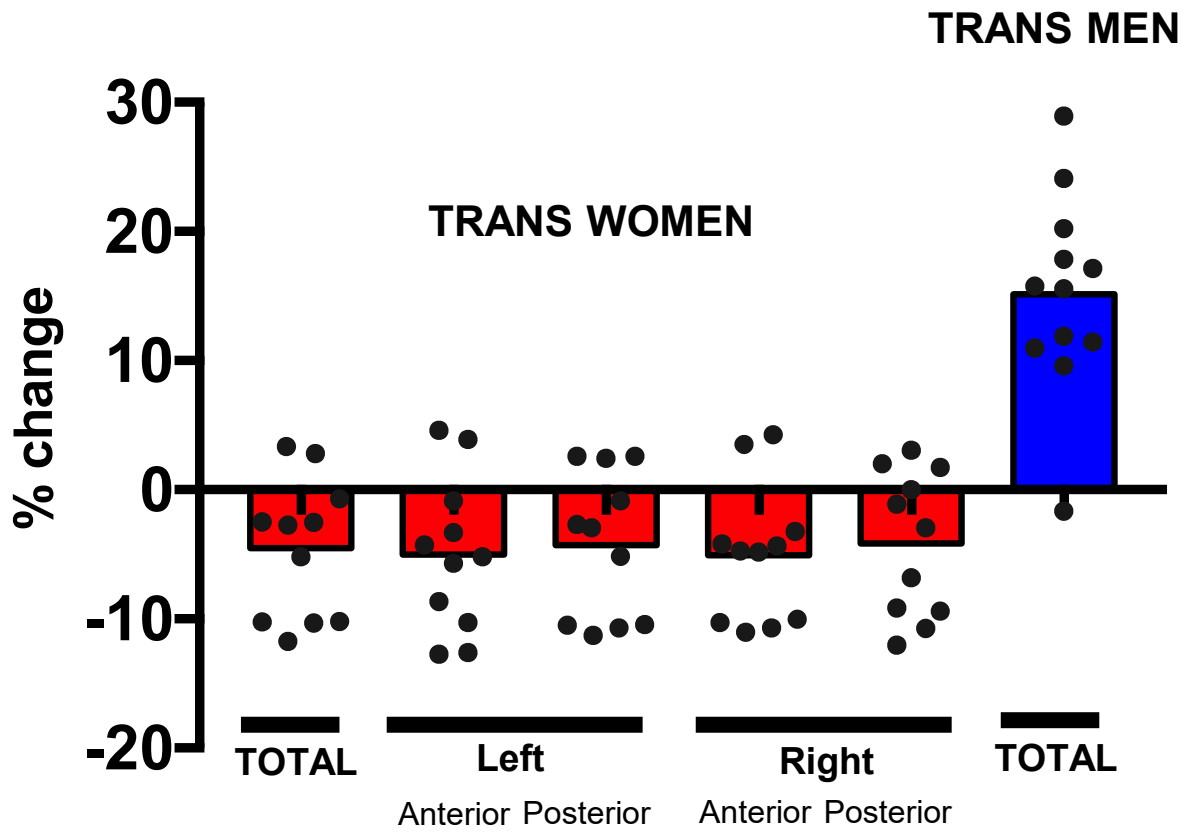
JIM Journal of Internal Medicine
Founded in 1863

Original Article | Open Access

Longitudinal changes in regional fat and muscle composition and cardiometabolic biomarkers over 5 years of hormone therapy in transgender individuals

Tommy R. Lundberg ✉, Andrea Tryfonos, Lisa M.J. Eriksson, Helene Rundqvist, Eric Rullman, Mats Holmberg, Salwan Maqdasy, Jennifer Linge, Olof Dahlqvist Leinhard ... See all authors

Muscle volume decreased 5% after 12 months in trans women



Wiik et al. 2020, JCEM

London, Feb 2020
Trangender workshop
World Rugby

Emma Hilton

Ross Tucker

rld Rugby transgender worksho
riate rugby-specific policy

le, safe and evidence-based rugby-specific policy for transgen

meeting in London this week.

Sports Medicine (2021) 51:199–214
https://doi.org/10.1007/s40279-020-01389-3

REVIEW ARTICLE

Transgender Women in the Female Category of Sport: Perspectives on Testosterone Suppression and Performance Advantage

Emma N. Hilton[1] · Tommy R. Lundberg[2,3]

Published online: 8 December 2020

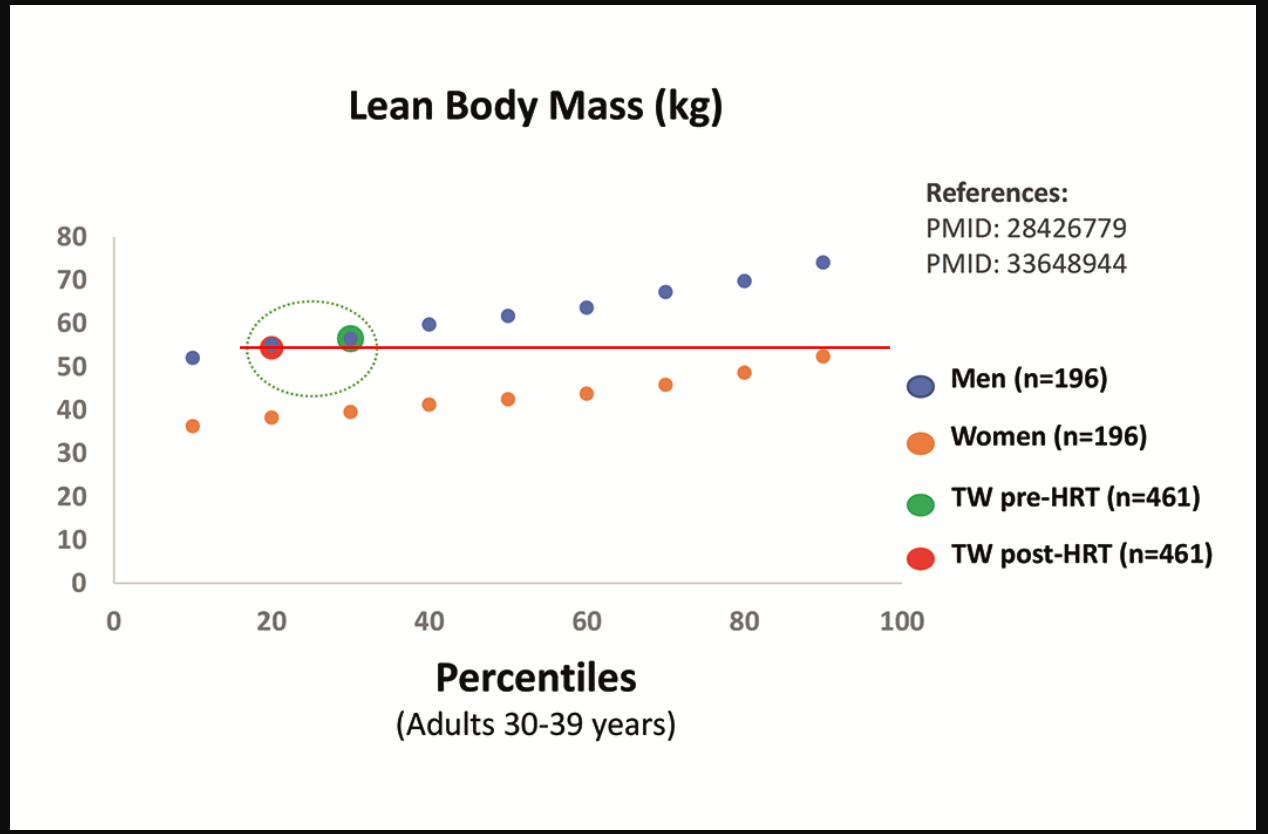
Height and skeletal bone metrics are unaffected.

The muscular advantage enjoyed by transgender women is only minimally reduced when testosterone is suppressed.

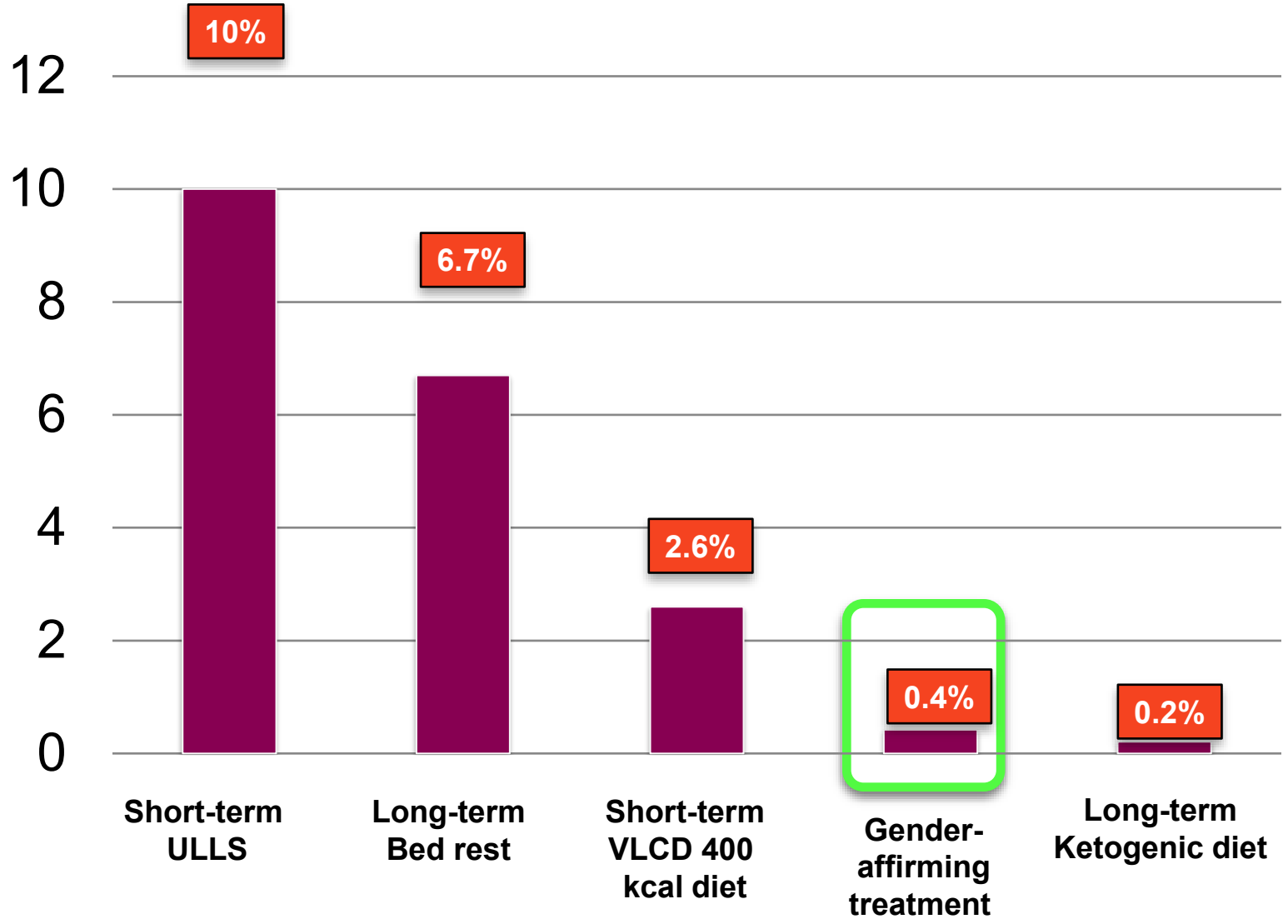
Testosterone suppression in transgender women – key results

Study	Outcome	1 yr	2 yr	3 yr
Gooren & Bunck 2004	Thigh area	−9 %		−12 %
Haraldsen et al. 2007	LBM	-2%		
Mueller et al. 2011	LBM	−4 %	−7 %	
Wierckx et al. 2014	LBM	−5 %		
Van Caenegem et al 2015	LBM	−4 %	-0.5%	
Van Caenegem et al 2015	Grip Strength	−7 %	−9 %	
Gava et al. 2016	LBM	−4 %		
Auer et al. 2018	LBM	−3 %		
Scharff et al. 2019	Grip Strength	−4 %		
Klaver et al. 2018	LBM	−3 %		
Fighera et al. 2018	ALM		-4%	

1 year of therapy: Lean Body Mass



Monthly rate of muscle loss (%)



"These findings suggest that strength may be well preserved in transwomen during the first 3 years of hormone therapy"

"Transgender women who completed masculinizing puberty before starting GAHT show some legacy effects of testosterone in strength and muscle mass; however, more studies beyond 2–3 yr of treatment are warranted in athletes and nonathletes"

Two recent cross-sectional studies

- Trans women who have been on hormone therapy for 6 to 16 years have higher absolute values in muscle strength, VO_2max and lean body mass, but not higher relative values (adjusted for height or mass) compared to females

- Cross-sectional design precluded conclusions on the role of T suppression

Original research

Cardiopulmonary capacity and muscle strength in transgender women on long-term gender-affirming hormone therapy: a cross-sectional study FREE

Leonardo Azevedo Mobilia Alvares [1, 2], Marcelo Rodrigues Santos [3], Francis Ribeiro Souza [3], Lívia Marcela Santos [2], Berenice Bilharinho de Mendonça [1], Elaine Maria Frade Costa [1], Maria Janieire Nazaré Nunes Alves [3], Sorahia Domenice [1]

Original research

Strength, power and aerobic capacity of transgender athletes: a cross-sectional study

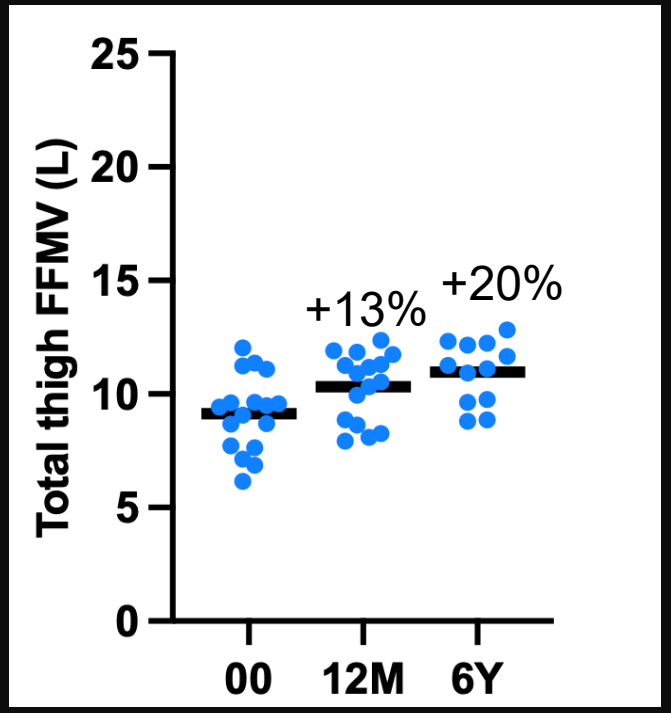
Blair Hamilton [1, 2], Andrew Brown [2], Stephanie Montagner-Moraes [2], Cristina Comeras-Chueca [3], Peter G Bush [2], Fergus M Guppy [4], Yannis P Pitsiladis [5, 6]

Correspondence to Professor Yannis P Pitsiladis, Department of Sport, Physical Education and Health, Hong Kong Baptist University, Hong Kong, Hong Kong SAR; ypitsiladis@hkbu.edu.hk

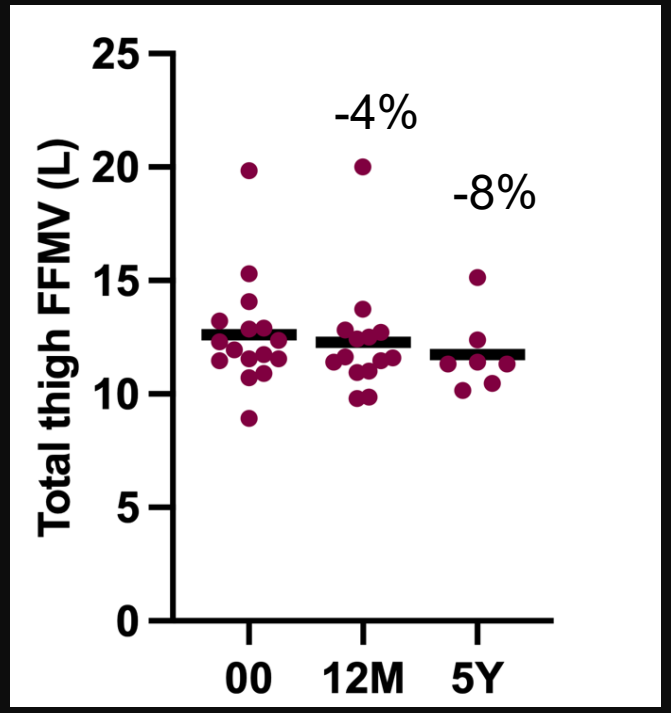
Longitudinal study: 5-6 years of hormone therapy

Thigh fat-free muscle volume

Transgender men



Transgender women

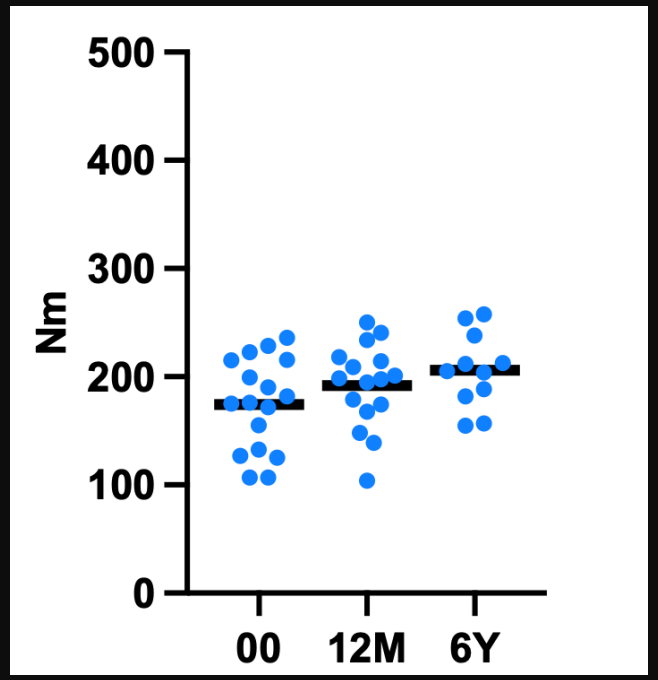


Lundberg et al. 2024

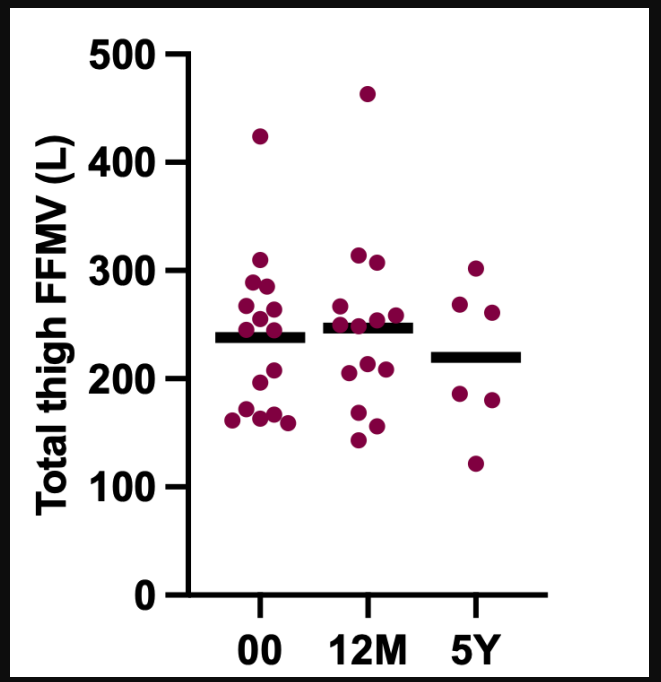
Longitudinal study: 5-6 years of hormone therapy

Knee extension torque

Transgender men



Transgender women

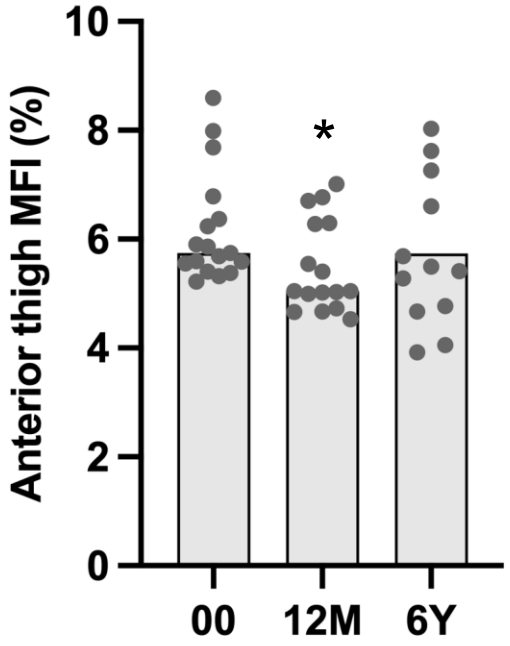


Lundberg et al. 2024

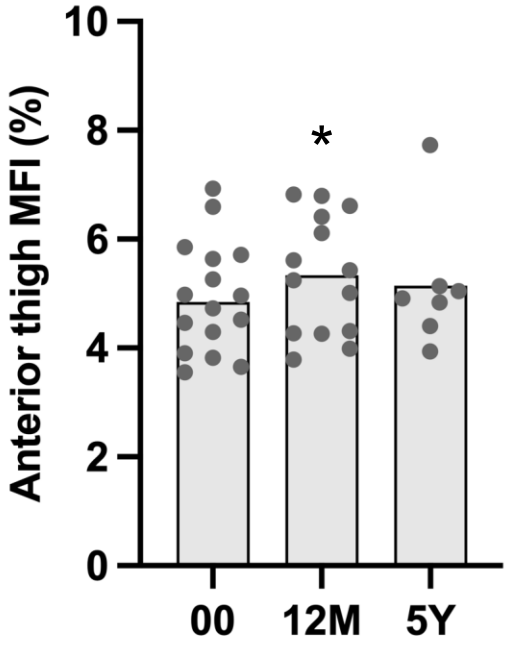
Skeletal muscle fat infiltration

Thigh MFI

Transgender men

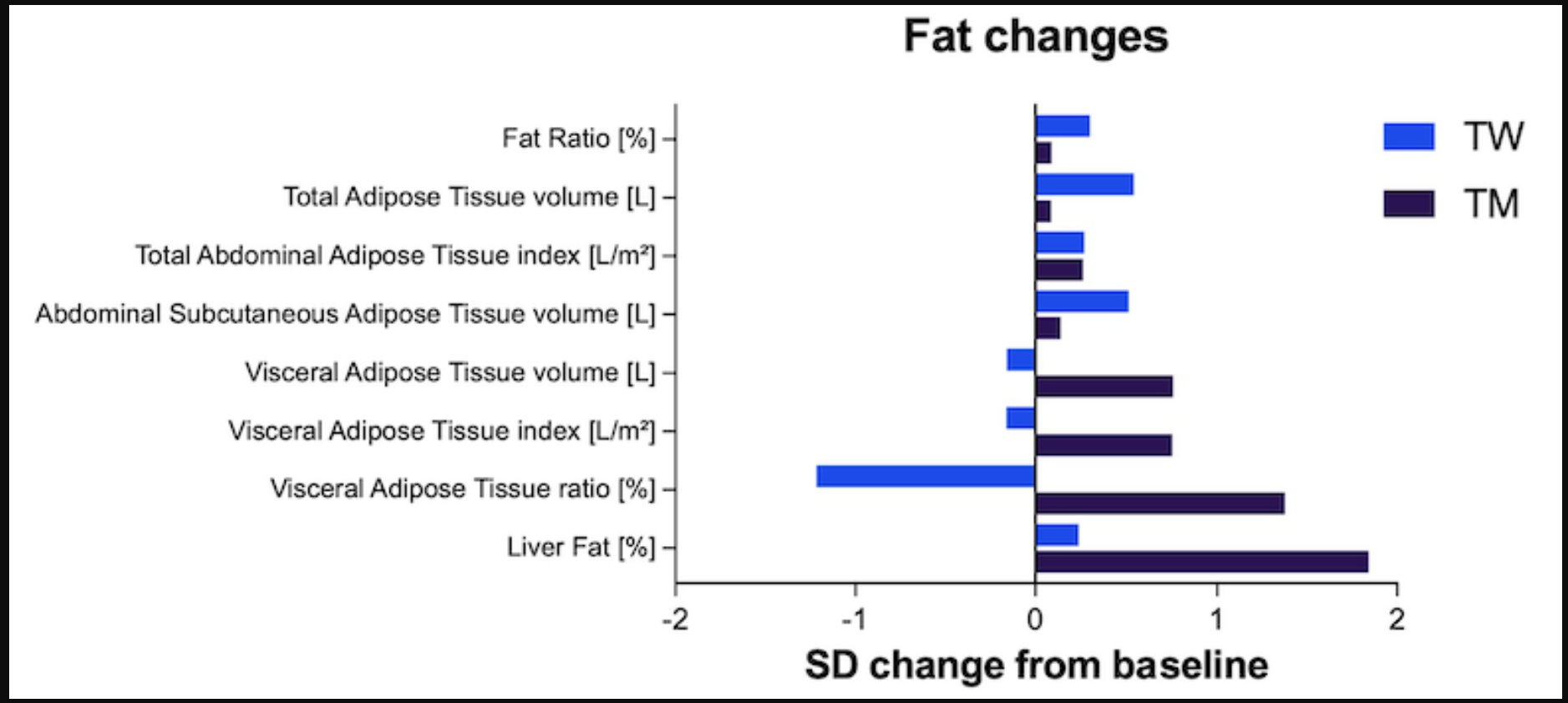


Transgender women



Lundberg et al. 2024

Fat changes



Lundberg et al. 2024

Suppression of testosterone in healthy males and effects of resistance training

- RCT
- 8 weeks T suppression
- 0.4 kg increase in lean leg mass
- Lower than placebo

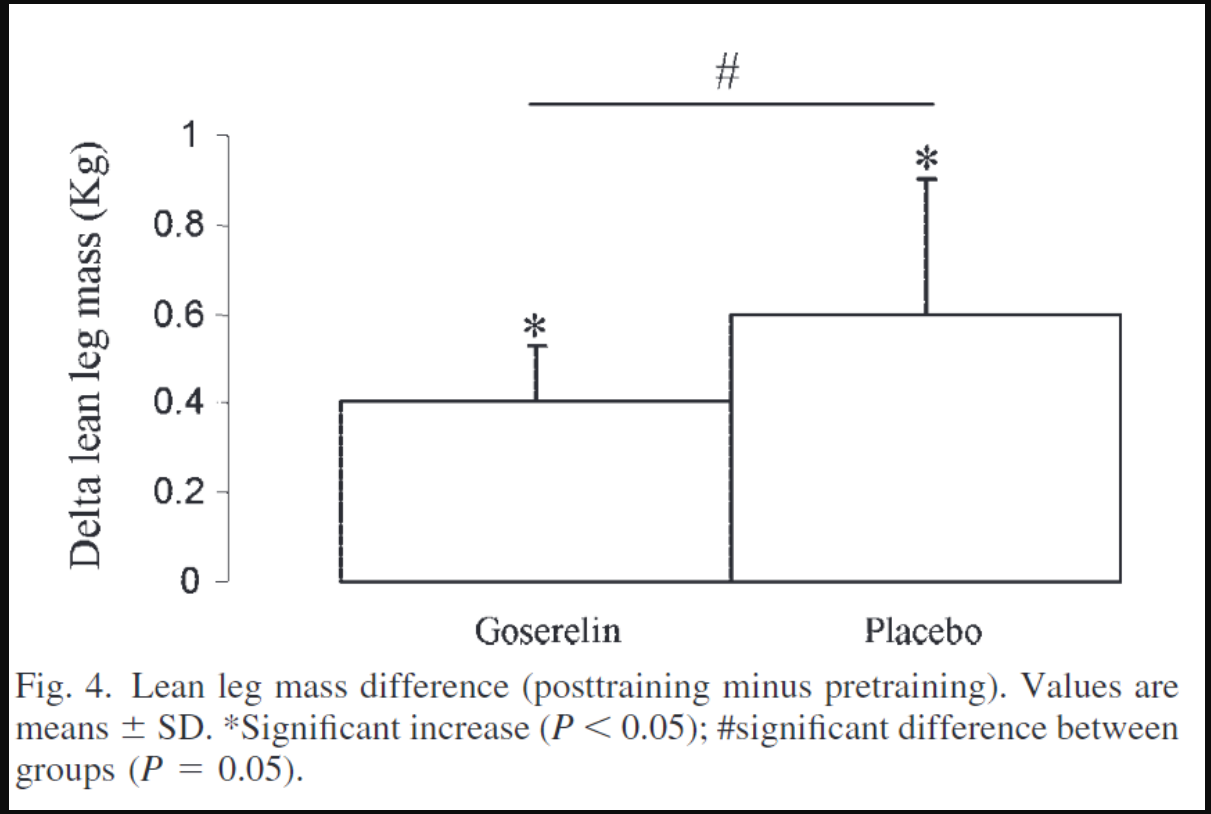


Fig. 4. Lean leg mass difference (posttraining minus pretraining). Values are means ± SD. *Significant increase ($P < 0.05$); #significant difference between groups ($P = 0.05$).

Kvorning et al. 2006 Am J Physiol Endocrinol Metab

Implications for sporting categorization and eligibility

International
Olympic
Committee

IOC FRAMEWORK ON FAIRNESS, INCLUSION AND NON-DISCRIMINATION ON THE BASIS OF GENDER IDENTITY AND SEX VARIATIONS

IOC framework

- “No presumption of advantage”
- “Disproportionate advantage”
- “Meaningful competiton”

SCANDINAVIAN JOURNAL OF
MEDICINE & SCIENCE IN SPORTS

NOTE | Open Access

The International Olympic Committee framework on fairness, inclusion and nondiscrimination on the basis of gender identity and sex variations does not protect fairness for female athletes

Tommy R. Lundberg, Ross Tucker, Kerry McGawley, Alun G. Williams, Grégoire P. Millet, Øyvind Sandbakk, Glyn Howatson, Gregory A. Brown, Lara A. Carlson, Sarah Chantler, Mark A. Chen, Shane M. Heffernan, Neil Heron, Christopher Kirk, Marie H. Murphy, Noel Pollock, Jamie Pringle, Andrew Richardson, Jordan Santos-Concejero, Georgina K. Stebbings, Ask Vest Christiansen, Stuart M. Phillips, Cathy Devine, Carwyn Jones, Jon Pike, Emma N. Hilton ... See fewer authors

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NOTE | Open Access

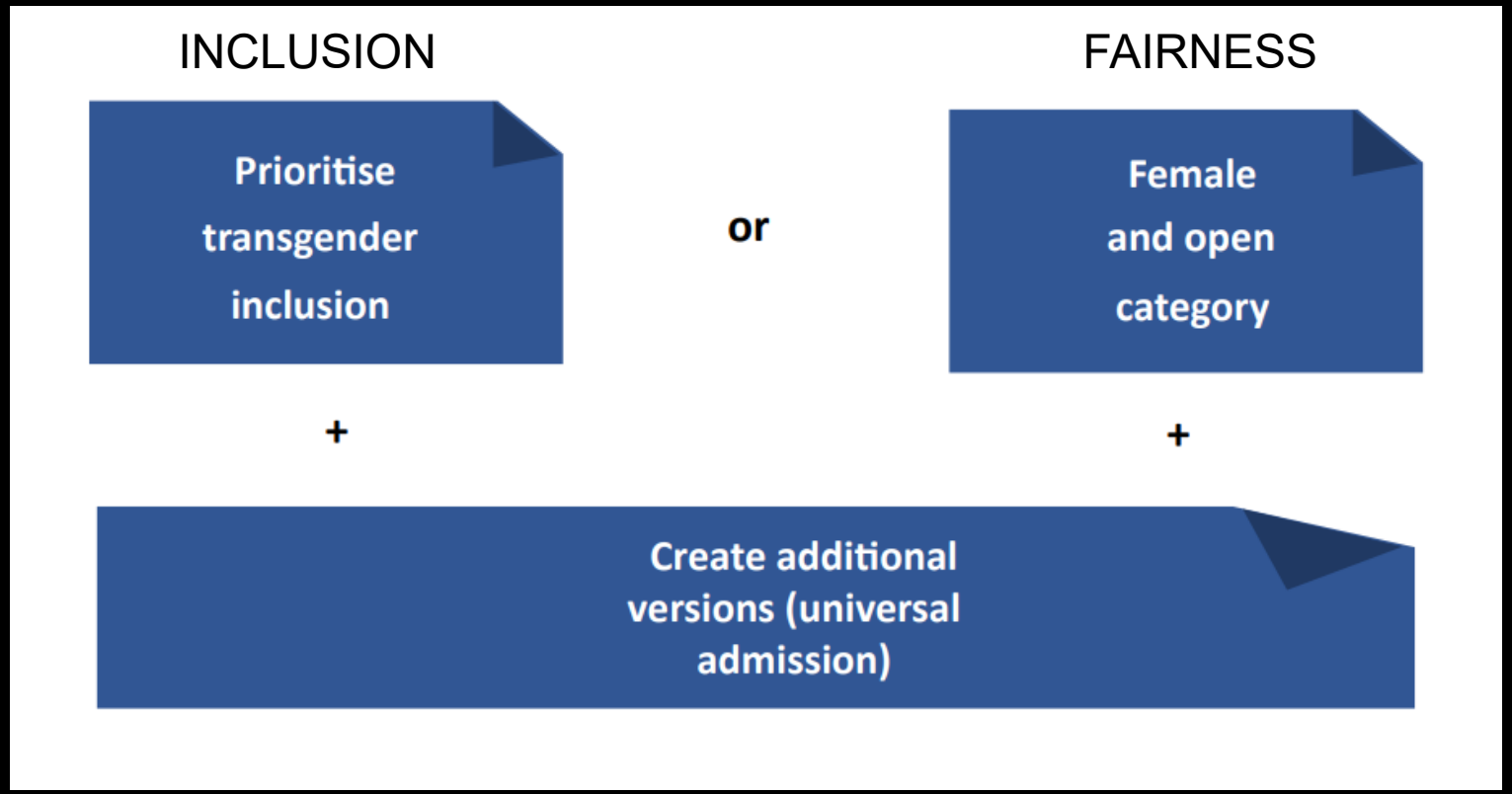
The International Olympic Committee framework on fairness, inclusion and nondiscrimination on the basis of gender identity and sex variations does not protect fairness for female athletes

- The IOC's concept of “meaningful competition” is flawed because fairness of category does not hinge on closely-matched performances
- The IOC's ”no presumption of advantage” principle disregards biological reality of male advantage
- Case-by-case testing for transgender women may lead to stigmatisation and cannot be robustly managed in practice
- Eligibility criteria for female competition must consider male development rather than relying on current testosterone levels
- Female athletes should be recognized as key stakeholders in the consultation and decision-making processes
- We urge the IOC to re-evaluate the recommendations of their Framework

Common fallacies in the policy debate

- ”We all have advantages” – The Phelps’ gambit
- ”How many Olympic medals have they won?”
- ”Testosterone does not determine performance”

The way forward: Prioritize between inclusion and fairness



UK's Sports Councils guidance for transgender inclusion (2021)

The solution?

- ”Sport sex” based on male development
- Broad screening is preferred over targeted testing based on allegation and suspicion
- Must be handled outside the stages of the largest scenes

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EDITORIAL | Full Access

Fair and Safe Eligibility Criteria for Women's Sport

Ross Tucker, Emma N. Hilton, Kerry McGawley, Noel Pollock, Grégoire P. Millet, Øyvind Sandbakk, Glyn Howatson, Gregory A. Brown, Lara A. Carlson, Mark A. Chen, Neil Heron, Christopher Kirk, Marie H. Murphy, Jamie Pringle, Andrew Richardson, Jordan Santos-Concejero, Ask Vest Christiansen, Carwyn Jones, Juan-Manuel Alonso, Rebecca Robinson, Nigel Jones, Mathew Wilson, Michael G. Parker, Arabah Chintoh, Sandra Hunter, Jonathon W. Senefeld, Mary I. O'Connor, Michael Joyner, Eva M. Carneiro, Cathy Devine, Jon Pike, Tommy R. Lundberg ... See fewer authors

First published: 21 August 2024 | https://doi-org.proxy.kib.ki.se/10.1111/sms.14715

Conclusions (1/2)

- Both transgender athletes and female athletes face barriers and challenges in elite and recreational sport
- Biological sex differences between males and females are very large, especially body size, aerobic capacity, muscle mass and strength and power
- These sex differences are evident *before* puberty, but increase significantly *during* puberty
- The testosterone surge that males experience during puberty is the key driver of the sex difference between males and females manifested in the adult phenotype
- As a result, the performance gap in most sports is between 10-40% in favor of males

Conclusions (2/2)

- Transgender men can compete fairly in male sport
- Suppressing testosterone in trans women does not change body height or the size, shape, length or size of skeletal bones
- Testosterone suppression does not negate the male performance advantage in muscle mass and strength
- Therefore, current testosterone levels are an ineffective method of determining eligibility in sex-restricted events
- The voices of both transgender athletes and female athletes deserve to be heard and valued
- Ultimately, it is an uncomfortable reality that sports governing bodies must prioritize between fair competition for female athletes and the inclusion of transgender women

Thank you!

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