Executive Summary

Dissertation Title: *Assessing the potential transgender impact on girl champions in American high school track and field*.

By

Gabriel A. Higerd, Doctor of Education in Sports Management

Presented December 2020

Introduction

The intersection of the transgender movement and sport is at the forefront of sport policy discussions. The rise in the numbers, as well as the cultural acceptance of transgender individuals, have accelerated the need to create modern transgender sport policies. President Joe Biden has said, "Let's be clear: Transgender equality is the civil rights issue of our time. There is no room for compromise." Meanwhile, pushback from states, legislators, and organizations who want to restrict sports participation based on biology is growing. The goal of this research was to assist those seeking to make informed, evidence-based transgender policy decisions.

The purpose of the study was to investigate the underlying basis for post-pubertal sex segregation in sport and assess the probability of a female classification state sport champion being transgender. This research answered three questions: (1) Is there a statistically significant relationship in the performances of female and male high school track and field athletes? This question assesses whether biological males and females are really different [vs. just a social construct] and determines the scale of that difference. (2) Is there a statistically significant relationship between event distance and the percentage of males that are superior performers to the best female? This question assesses what percentage of males are better than the best female in certain events and whether distance matters. (3) Is there a statistically significant probability of one or more biological male (46, XY) transgender individuals being a girls' champion in an event. In other words, if male athletes came out as trans at the same rates as other teens, how often would a biological female win?

Research Methods

The study investigated roughly one million (920,115) American high school track and field performances available through the track and field database Athletic.net. The sample was from five states (CA, FL, MN, NY, WA), over three years (2017 – 2019), in eight events (high jump, long jump, 100M, 200M, 400M, 800M, 1600M, and 3200M). The participation in these events were 400,929 female and 519,186 male (44% female, 56% male). Biological males and females are identified in the study by their genetic karyotype of 46, XY and 46, XX respectively.

Statistical correlation and regression analysis were used to answer the first two research questions. A statistical simulation involving over 1.1 million random number generated trials developed the probability of trans dominance in the female classification.

Results

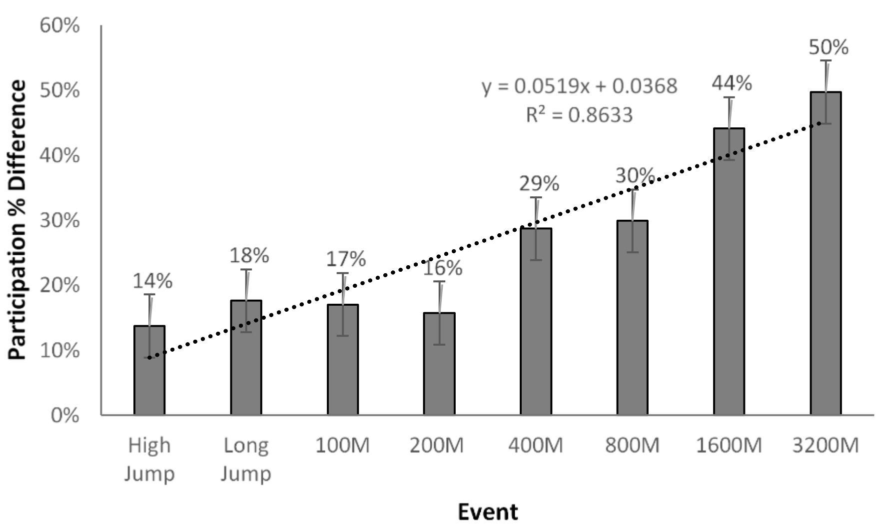
Interestingly, girls' participation percentage difference in comparison to boys was the closest (14%) in events that are more dependent on power and speed (e.g., high jump, long jump, 100M), and furthest (50% difference) in participation in events that rely on endurance (e.g., 1600M, 3200M).

Difference in Participation by Sex

	n 46, XX	*n* 46, XY	% Difference by Sex
High Jump	23,390	26,843	13.7%
Long Jump*	45,705	54,506	17.6%
100M*	79,663	94,447	17.0%
200M*	75,192	88,045	15.7%
400M	52,050	69,517	28.7%
800M	56,670	76,599	29.9%
1600M**	43,914	68,787	44.1%
3200M**	24,345	40,442	49.7%
Total	400,929	519,186	25.7%

Note. N = 920,115. 44% Female and 56% Male. States = CA, FL, MN, NY, WA. 2017, 2018, 2019 outdoor seasons. *Excludes 2017 MN. **Excludes NY.

Difference in Participation Between Boys and Girls and Event Distance

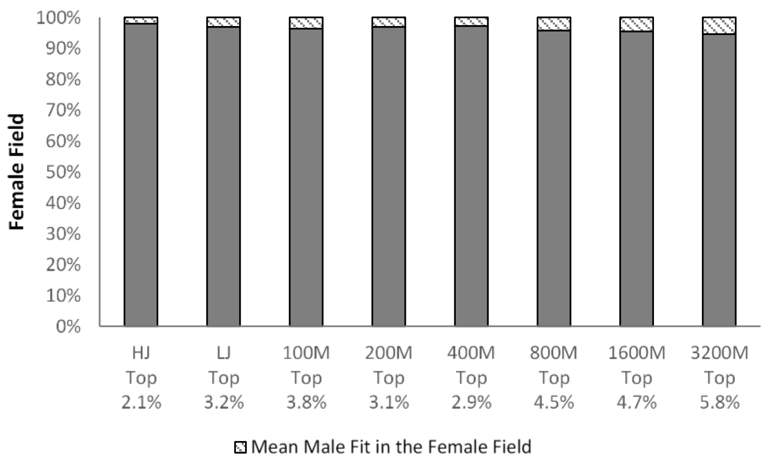


Note. N = 920,115. 400,929 female, 519,186 male. High jump = 15M and long jump = 30M for regression and correlation. r = .93, R^2 = .87, $F(1, 6)$ = 38.58, p <.001.

Not surprisingly, in each of the eight events, there was a significant difference in performance by sex. The average differences in performance by sex ranged from 14% at the low end in the 100M, to 24% at the high end in the long jump, and the average difference of all the events is 18% in favor of males.

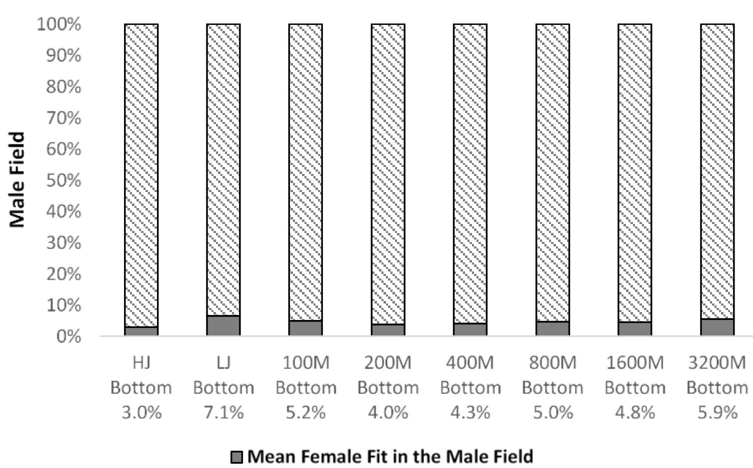
To some those percentage numbers are not immediately shocking. However, explaining the data another way, is that the average boy is better than 94%-98% of girls (top 2%-6% of the female field). The average girl is worse than 93%-97% of boys (bottom 3%-7% of the male field). Approximately one-third or more (32%-43%) of boys are better than 99% of girls. The best girl in the state would never get even remotely close to winning if there were not sex segregation. Boys that are better than the best girl in each event (potential female champions) ranged from 8-9% of all boys in the long jump, 100M and 200M, to 14-16% of all boys in the high jump, 400M, 800M, 1600M, and 3200M.

Mean Male Performance Fit Among the Female Field



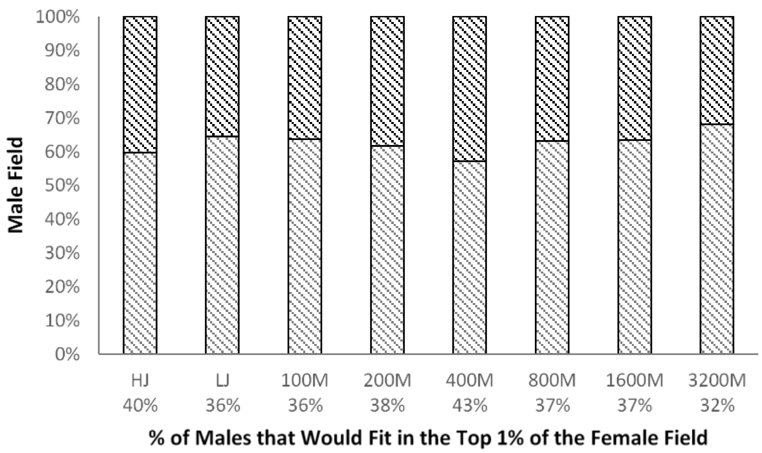
Note. The average male performance is better than 94.2%-97.9% of female performances.

Mean Female Performance Fit Among the Male Field



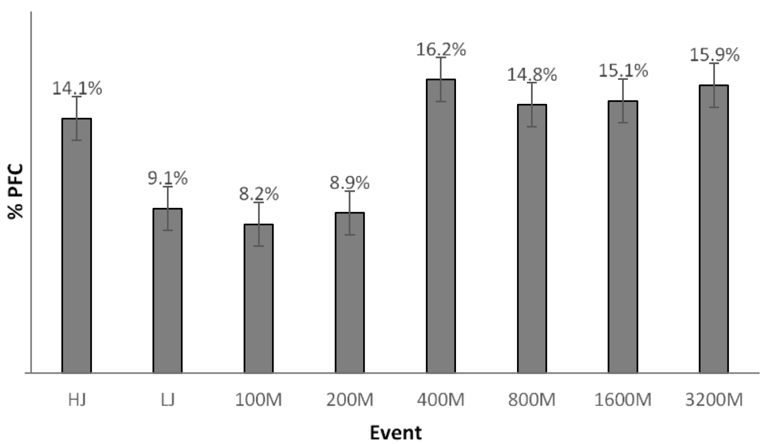
Note. The average female performance is worse than 92.9%-97% of male performances.

Percentage of Male Performances That Fit in the Top 1% of the Female Field



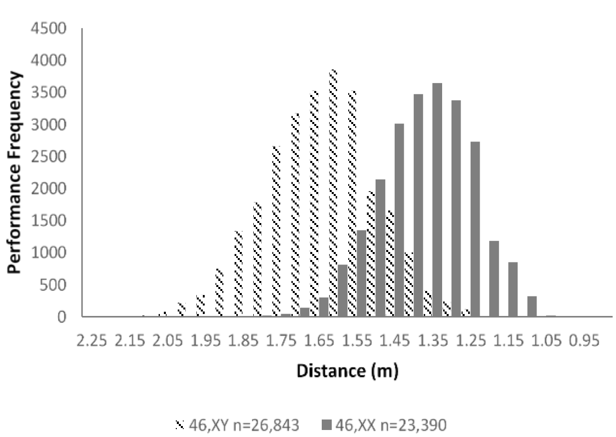
Note. 32%-43% of male performances fit within the top 1% of female performances.

Percentage of Male Performances Better than the Best Female



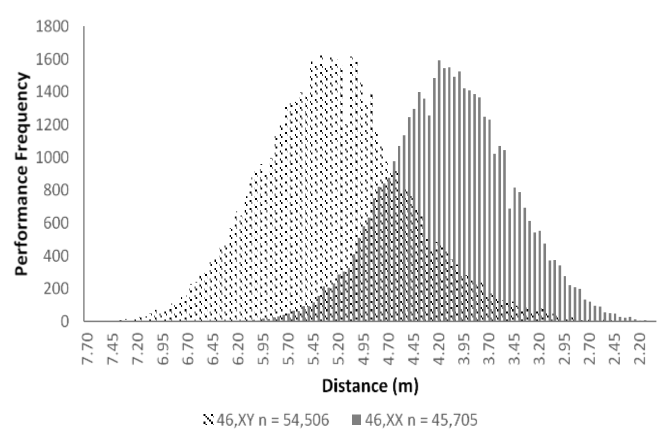
Note. HJ = high jump, LJ = long jump. PFC = potential female champion. The average percent PFC totals varied from 8.23%-16.24%, with the smallest occurring in the sprint events and the largest in the 400M.

High Jump Performance Distribution by Sex



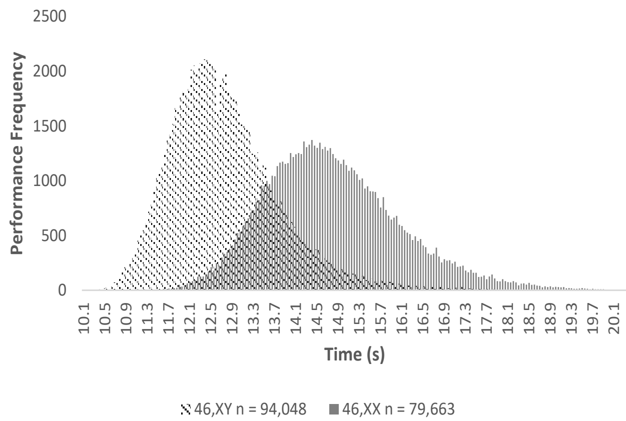
Note. Mean difference = 18.18%. Mode 46, XX = 1.32 46, XY = 1.52 Range 46, XX = .94, 46, XY = 1.09.

Long Jump Performance Distribution by Sex



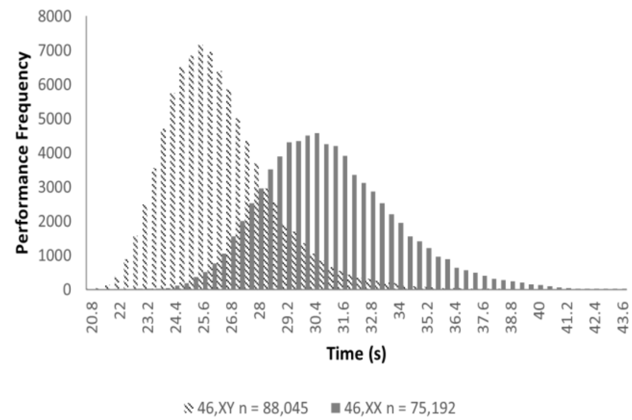
Note. Mean difference = 24.14%. Mode 46, XX = 3.96 46, XY = 5.18 Range 46, XX = 4.72, 46, XY = 5.29

100 Meter Performance Distribution by Sex



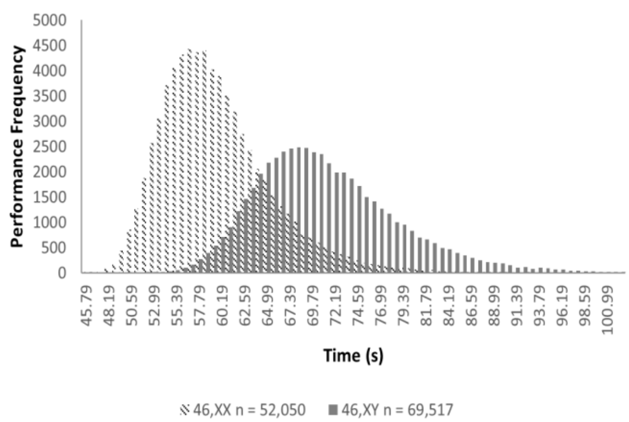
Note. Mean difference = 14.38%. Mode 46, XX = 14.50 46, XY = 12.43
Range 46, XX = 9.14, 46, XY = 8.57.

200 Meter Performance Distribution by Sex



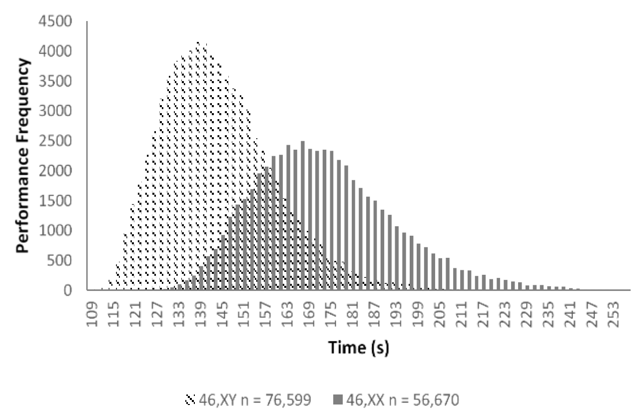
Note. Mean difference = 16.17%. Mode 46, XX = 29.57, 46, XY = 25.10
Range 46, XX = 20.81, 46, XY = 17.83

400 Meter Performance Distribution by Sex



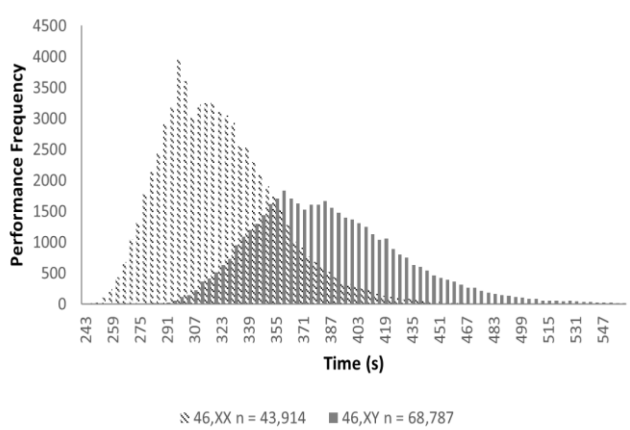
Note. Mean difference = 17.62%. Mode 46, XX = 70 46, XY = 57.54
Range 46, XX = 50.68, 46, XY = 47.56

800 Meter Performance Distribution by Sex



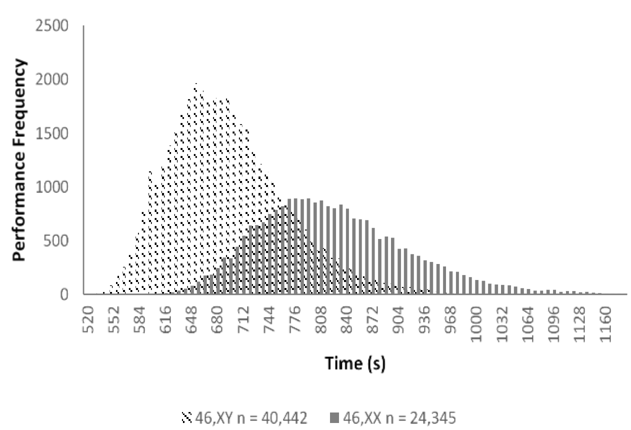
Note. Mean difference = 17.96%. Mode 46, XX = 161.8 46, XY = 134
Range 46, XX = 144.22, 46, XY = 110.37

1600 Meter Performance Distribution by Sex



Note. Mean difference = 17.81%. Mode 46, XX = 354.72, 46, XY = 287.79
Range 46, XX = 284.01, 46, XY = 225.38

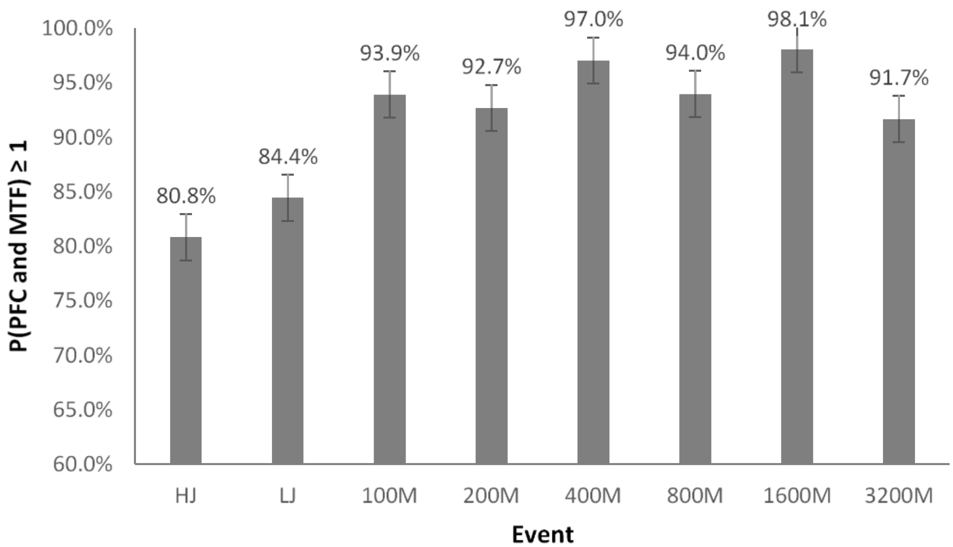
3200 Meter Performance Distribution by Sex



Note. Mean difference = 16.83%. Mode 46, XX = 805 46, XY = 662.17
Range 46, XX = 586.06, 46, XY = 500.99

The Monte Carlo computer generated simulation found that biological females, if assumptions hold, are likely to be beat by transgender biological males in every event. The assumptions were that transgender population density estimates (from the Williams Institute at UCLA) are true, representative of high school track and field athletes, and being transgender is an independent, uniformly distributed attribute among the boy sample. The Williams estimated percentage of transgender persons age 13 to 17 in the given states are: CA., 0.85%; FL., 0.78%; MN., 0.85%; NY., 0.79%; WA., 0.70%. **Assumptions holding, there is a simulated 81%-98% probability of transgender dominance occurring in the female track and field events.**

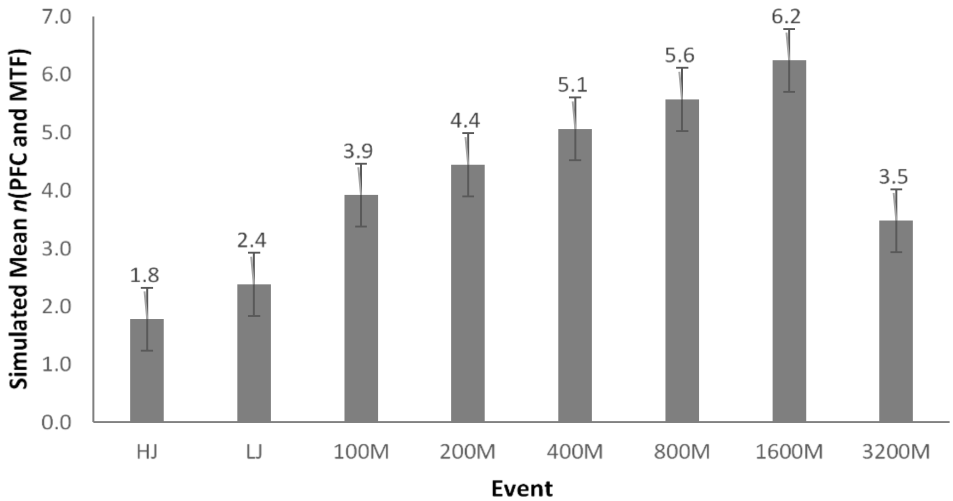
Probability of One or More 46,XY Potential Female Champions Being MTF Transgender



Note. Post hoc regression analysis of the results result in a non-significant relationship between P(*n*[PFC and MTF] $\geq$ 1) and distance (p = .44). R^2 = .10, F(1, 6) = .68, r = .32.

Additionally, in the simulation trials where there was at least one transgender athlete better than all the girls, there was an average of two to three trans champions (event dependent). Thus, in the majority of cases, the entire girls' podium (top performers in the state) would be transgender athletes.

Average Size of Simulated MTF Transgender Athletes atop the Female Standings



Note. Total simulations = 111, trials n = 1,110,000. Mean Size of n(PFC and MTF) $\geq$ 1 when P(n[PFC and MTF] $\geq$ 1). Post hoc regression analysis of the results reveal a non-significant relationship between mean size of n(PFC and MTF) $\geq$ 1 when P(n[PFC and MTF] $\geq$ 1) and distance (p = .56). R^2 = .06, $F(1, 6)$ = .38, r = .24.

Conclusion

Biology matters in sport performance. The data provides sufficient and strong evidence to support post-pubertal sex segregation in sport. If biological females are to win female events at the state level, policies should restrict participation to biological females only. Female sport is an invaluable asset and societal good. The findings provide critical data for policymakers to make informed, evidence-based decisions that protect and promote competitive female sport.

Appendix: Monte Carlo Simulation Model