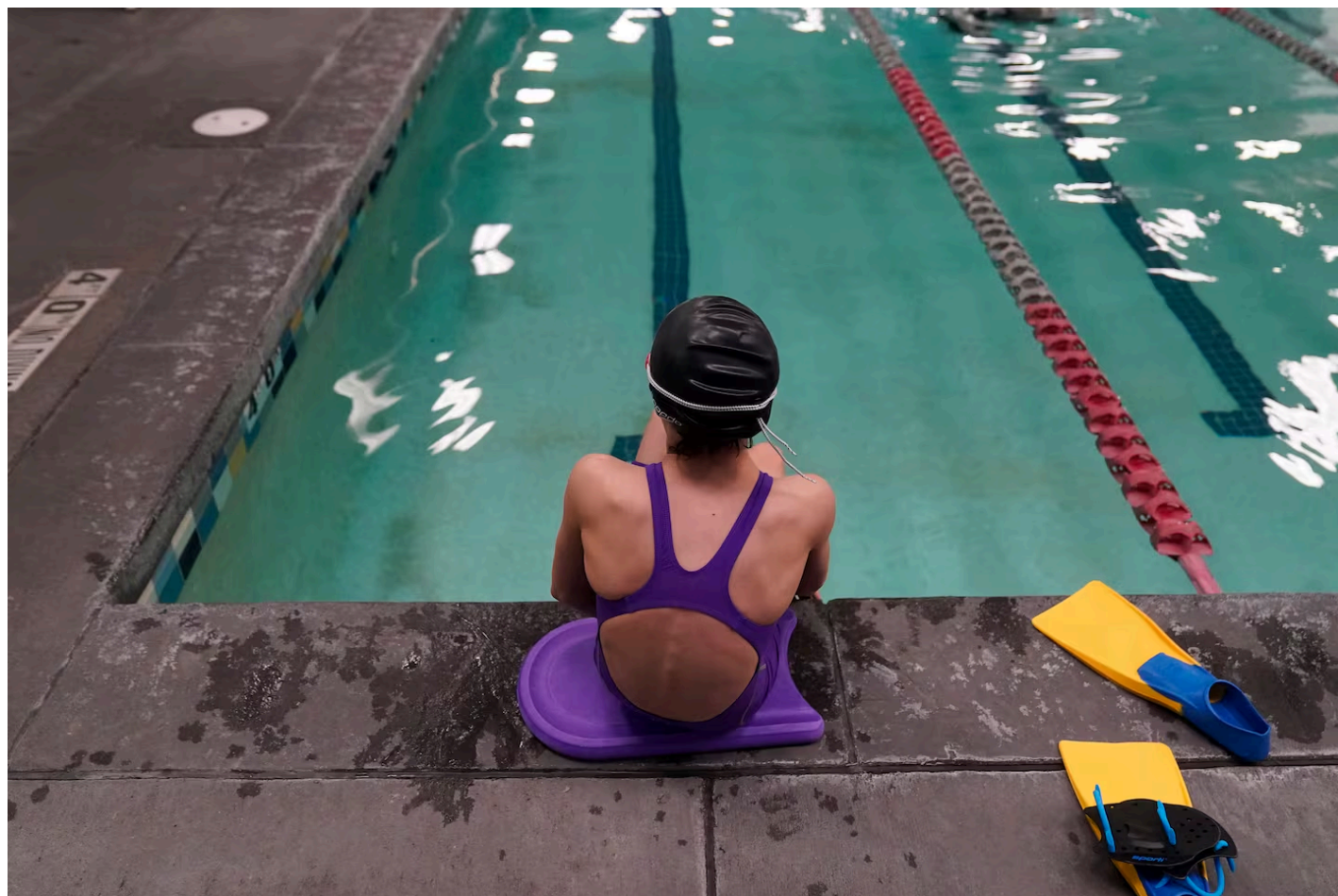


# Do trans female athletes competing in girls' and womens' sports have a competitive edge? Here's what the science says.

By [Kay Lazar](#), [Danny McDonald](#) and [Neena Hagen](#) Globe Staff, Updated November 20, 2024, 7:06 a.m.



A 12-year-old transgender girl who is a competitive swimmer seen at a pool in Utah in Feb. 2021. RICK BOWMER/ASSOCIATED PRESS

US Representative Seth Moulton's post-election remarks on transgender issues [ignited a firestorm](#), but also highlighted an issue that continues to bedevil researchers.

Do [transgender female athletes](#) competing in girls' and women's sports have a competitive edge? Or do the drugs they take to counter their male hormones truly level the playing field?

"I have two little girls," Moulton said in an [interview with The New York Times](#). "I don't want them getting run over on a playing field by a male or formerly male athlete, but as a Democrat, I'm supposed to be afraid to say that."

Scientists say the chances of Moulton's young daughters encountering a transgender athlete are remote. [Just 0.5 percent of the US population](#) is estimated to be transgender and a fraction of that fraction is believed to play competitive sports.

That makes it challenging for scientists to unravel the questions fueling the Moulton controversy.

"It's difficult to study a population who may not feel open coming to you or being involved in the research," said D. J. Oberlin, an exercise sciences and recreation assistant professor at City University of New York, Lehman College.

Oberlin has spent the past year trying to recruit men and women, both transgender and those whose gender corresponds to their sex at birth, for research that compares strength, flexibility, and aerobic capacity.

"Here in New York City, we are as open as anywhere in the country, and it's still incredibly difficult to recruit," Oberlin said. "I can't imagine what it must be like in other parts of the country."

Most of the small but growing body of studies that compare strength and stamina of transgender people to those who are not transgender have had small sample sizes, did not involve athletes, and did not include people younger than their 20s, making it hard to translate the findings to sports competition, especially among younger athletes.

But, in general, the studies that have been published indicate that, before puberty, differences in athletic performance between males and females are small or non-existent, depending on the activity being measured. During and after puberty, the gap in performance widens, but testosterone suppression in transgender females can narrow that gap over time.

Dr. Michael Joyner, a Minnesota-based physiologist who has been studying human performance since the 1980s, said small differences between the sexes are noticeable even in children between the ages of 3 and 5. Boys at that age on average perform slightly better than girls in exercises like grip strength and fitness tests. The differences are usually between 2 percent and 5 percent, he said.

“It’s not dramatic, but it’s consistently observable across populations,” he said.

When boys go through puberty, there is a steep increase in the amount of testosterone their bodies produce, a hormone that powers their faster and stronger athletic prowess. Puberty brings with it an “incredible diversion” in athletic performance, according to Joyner. The gap between boys and girls starts to widen at 13 or 14, said Joyner, and continues to widen in the following years. Teen-aged boys often test 10 percent to 20 percent faster and stronger than girls of the same age, Joyner said.

“You have a situation where a good high school male athlete would qualify for the Olympic finals for the females,” he said.

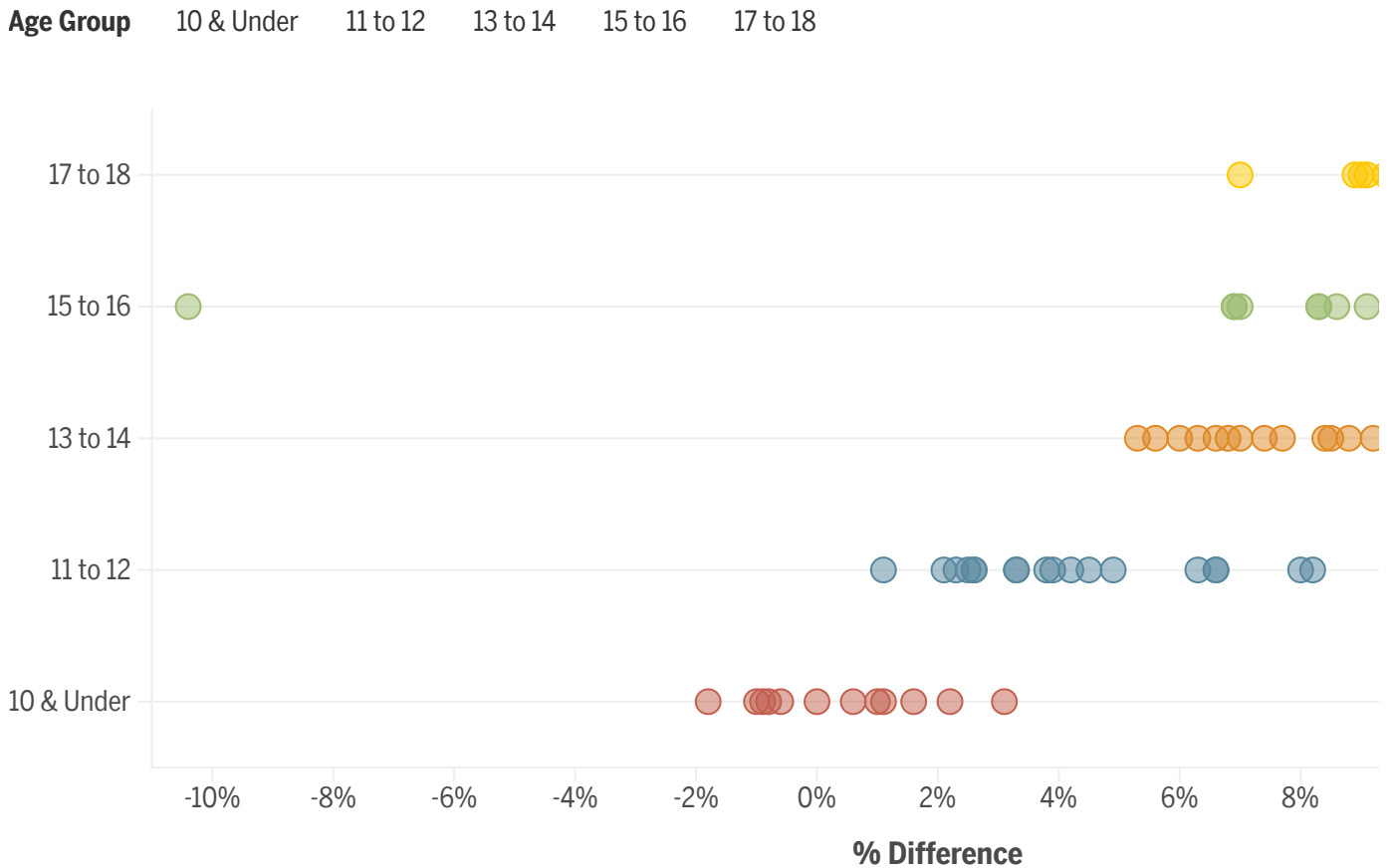
Of course, athletes differ in size even within genders, and some, but not all, studies have tried to account for that.

A Globe analysis of Massachusetts competitive swim race data found that from 1995 to 2024 there was virtually no difference in the record race times between girls and boys 10 and under. In some of the shortest races — the 50-meter backstroke and 50-meter butterfly — the girls actually outpaced the boys.

The boys began to pull ahead in the 11-to-12 age group, finishing every race in a record time that was shorter than the girls' record. By age 17 to 18, it took the girls 11 percent more time on average to finish the same race as the boys.

### Gender differences in swim race times

Percent difference in boys' and girls' record race time across events from 1995 to 2024, with higher percentages reflecting faster times for boys. Tap on or hover over dots to view details.



Source: [New England Swimming](#) • NEENA HAGEN/GLOBE STAFF

\* A Flourish scatter chart

In general, the studies that have been published on the physical impacts of gender-affirming hormones indicate that trans women appear to still have some competitive strength advantage over those who were born female even after one year of taking the hormones. After that initial year, the competitive advantages start to even out, although there is disagreement about how quickly that happens.

An Australian team of specialists on athletics, hormones, and transgender health issues reviewed much of the existing research and concluded [in a study earlier this](#) year that

non-athletic transgender women displayed no advantage in running times after two years of taking feminizing hormones. By four years, the advantage in the number of timed sit-ups also evened out. But trans women still maintained an advantage, albeit a declining one, in the number of push-ups they could perform.

A 2020 study on athletes in the US military reached a similar conclusion. It compared fitness test results and medical records of trans men and trans women who started gender affirming hormones while in the Air Force with all Air Force men and women under age 30. The scientists found that the 15-to-31 percent athletic advantage that trans women displayed over their female counterparts before starting gender affirming hormones declined with feminizing therapy. However, trans women still had a 9 percent faster mean run speed after a 1-year period of testosterone suppression.

Ada Cheung, an endocrinologist and associate professor at the University of Melbourne and lead author of the Australian study, said the findings still leave a lot of questions unanswered.

“We need longitudinal studies that measure physical performance like running race times or competition results (not just surrogate markers like muscle strength or muscle mass) that have adequate comparison groups in trans athletes compared to cisgender athletes,” she said. (The term cisgender refers to people whose gender corresponds to their birth sex.)

Those who regulate sports competitions are balancing inclusion versus fairness, said Joyner. The National Collegiate Athletics Association, for instance, requires athletes who are transitioning to female to undergo hormone-suppressing therapy to lower testosterone levels to even the biological playing field. ([The NCAA requires schools](#) to submit lab results that confirm a student athlete’s total serum testosterone level is within the allowable levels four weeks before competition begins.)

New England Pop Warner region director Pat Martel said in an e-mail that the organization has no rules specifically addressing trans youth athletes. All of [New](#)

[England Pop Warner](#)'s football programs are co-ed and range from 5 to 16 years old.

“At Pop Warner, we have both boys and girls participating in football and cheerleading,” said Martel. “All kids are welcome to play as long as they meet the age requirement.”

The Massachusetts Interscholastic Athletic Association, the organizing body for high school sports in the state, declined to comment for this story.

Dr. Christina Roberts, a pediatrician at the Icahn School of Medicine at Mount Sinai who led the 2020 US Air Force study, said the small advantages that remain among trans and cisgender women may make a real difference in competitions for which teams and athletes vie to advance or win.

“But at 13 or 14 years old, when a kid just wants to play softball, and where we are banning athletes, there are other things making big advantages like parents holding kids back a year so they can be bigger, or rich kids that can afford better training and poor kids can't,” said Roberts.

“Meanwhile science continues,” she said. “But I don't think science will ever be able to provide the answer to this because we are talking about such small numbers.”

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