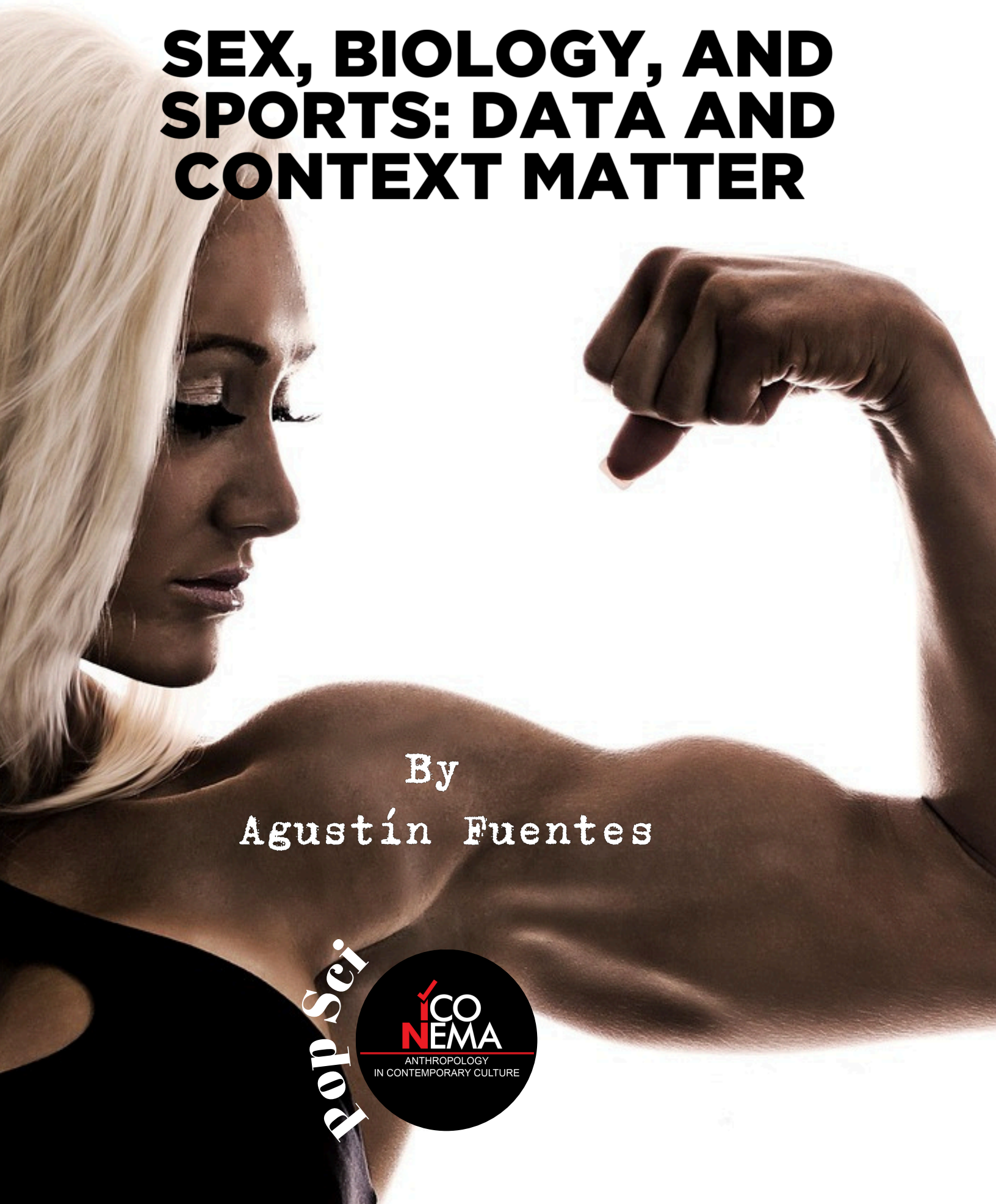
SEX, BIOLOGY, AND SPORTS: DATA AND CONTEXT MATTER



By
Agustín Fuentes

PodSci

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Despite what Trump's Executive Orders imply, and what many in the public are being led to believe, there are no easy or universal biological "rules" about sex in sports. But there are two things everyone should know. First, the contention that anyone assigned male at birth is always going to be better at sports than anyone assigned female at birth is simply not true. Second, for most people in most situations, a slight difference in athletic capacity rarely matters.

True, in elite sports issues of gender, sex, training, access, and equity, can be quite important. But most people who play sports are not elite athletes, and most sporting events—from pick-up games to school competitions to community leagues—are not at the level where a slight difference in one individual's performance capacity is going to make or break the outcome or seriously impact the experiences of everyone playing.

If government entities, and the public writ large, are genuinely interested in an accurate and comprehensive understanding of the relations between sex categories, biological variation, and sporting ability, then a basic understanding of the actual range of variation in sports related biology is and how it maps across everyone is the place to focus.

Everyone knows that humans come in a diversity of shapes and sizes. However, when discussing biological "differences," most people frame the discussion in terms of "average" individuals as compared to others. But to approach human biology scientifically, and effectively, one must consider the entire range of variation, not just the average of any given category. For example, while, on average, males are ~8% taller than females, most individuals are not average. Males and females (and those who don't fit neatly into these two categories) show a vast range of variation with substantial overlap. So, without knowing where any individual falls in that variation one cannot make a blanket statement about their abilities.

If you drew a random set of 50 individuals (25 males and 25 females) and lined them up by height the result would not be all males on one side and all females on the other. Rather, there'd (usually) be a majority of males in the taller half and a majority of females in the shorter half. But across the entire line up, the individuals would be mixed. To say that males are, on average, larger than females does not mean that every male is larger than every female. It simply projects that the averages in size between females and males, as categories, are separated by that percentage. It's not just height in this pattern of overlap either.

In a recent NHANES USA dataset (publicly accessible on the CDC website, but was taken down for a while during February 2025), non-pregnant females over 20 weighed between 110 and 263 lbs. and males over 20 between 136 and 287 lbs. As such, much of the variation — that space between 136-263 pounds—is an overlapping mix of those classified as females and males.

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The actual distribution of variation and patterns in human biology is complicated and not cleanly divided into two kinds of person. Yes, there are usually some key bodily differences between a man and a woman of the same height and weight. But what those differences are, how they developed, and what they mean for the ability to play any given sport are neither ubiquitous nor consistent across people.

Consider biological variation relative to the capacities for sports across kids and adults. During the pre-adolescence stage, humans vary a lot but overlap extensively—in height, leg length, body weight, fat content, muscle mass and strength. By the later teens and adulthood, average differences between males and females are more pronounced in upper-body than lower-body muscles. Interestingly, while both males and females can increase muscle size and strength with targeted training, increases in upper-body, but not lower-body, strength are relatively more substantial for young adult females than for young adult males, (likely due to the starting point differences). In addition, older adult females can often increase relative lower-body strength more than older adult males. Previous and ongoing physical activity and training impacts muscle development and performance in children and adults, so, some but not all of the variation in muscle performance may be reduced, or increased, via gendered norms and behaviors favoring enhanced or reduced physical exercise/activity.

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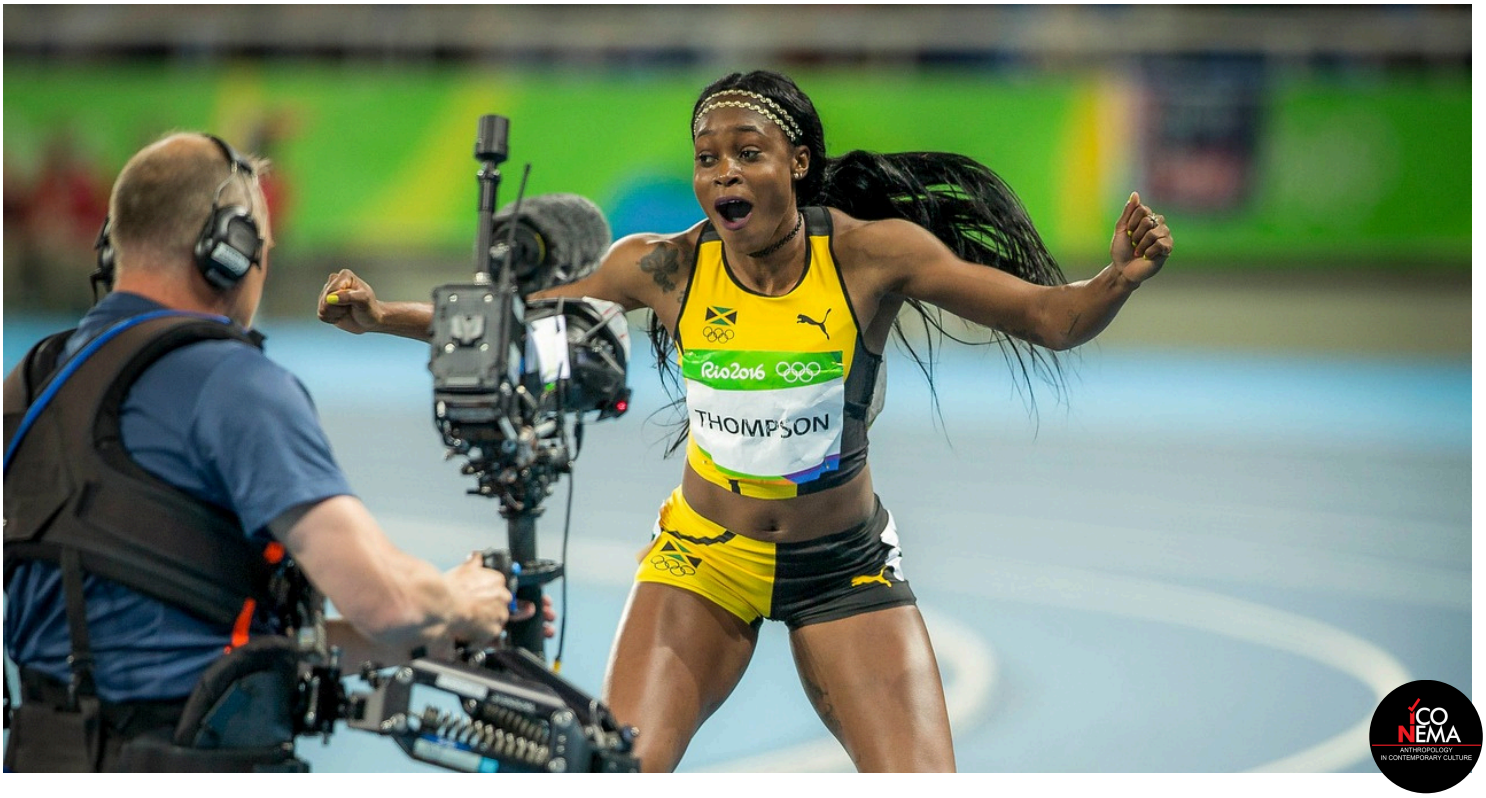

There is abundant evidence that, for boys, there is more focus on, and participation in, activities related to muscle development and training (like sports) than there is for girls and women. This cultural influence on bodies occurs even in elite athletes where women are often coached and trained to minimize, rather than maximize, bodily bulking up--appearing feminine is weighed against performance goals both because of cultural norms (a sense of the “right” body for women) and the importance of looking feminine to get endorsement deals. So, in practice, we currently we have no wholly accurate means by which to assess the total range of sports abilities across the range of bodies across most people because society shapes those classified as boys and girls differently in youth and as adults.

Clearly, certain body size/shapes and strength patterns are specific prerequisites in some sports, especially at elite levels. But at those levels, the vast majority of people, regardless of sex or gender classification, could not make the cut. For most people, exactly where they fall in the wide range of variation in bodies and training (top half, lower half, middle, extreme ends, etc.) may be more relevant than their classified sex, or gender in potential performance in any given sport. In fact, for children, most gendered divisions in sports do not come from biological necessity, they are cultural decisions, usually based on assumptions about limitations in girls’ abilities. And in some cases, the same is true for adults.

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The current focus on “sex” in sports by the Trump administration is less about biology and more about ideology, and a politics of exclusion and control. Of course, men and women are not the same and variation in reproductive biology structures important aspects of human bodies and lives. And, across humanity there are a diverse range of gender/sex experiences. The bottom line is that different bodies and different life experiences can influence one’s performance in any given sport. The distribution of human biological variation as it relates to sport abilities, and everything else, is neither simple nor cleanly divided between the categories of female and male, boy or girl, or man and woman.

As such, any serious interest and engagement with human bodies, gender, and sex diversity in most sports contexts must focus less on the acrimonious, and deceiving, framing of “an individual’s immutable biological classification as either male or female” and more on the actual data about human diversity. It’s well documented that being active and social— both facilitated by sports— relates to positive health outcomes for children and adults. Now more than ever we need increased access to health and well-being. It’s time to shift our attention away from a focus on only elite athletics and flawed, and harmful, ideological declarations and put societal time and energy into work to improve access for all to engage in sports as they wish and as best they can.

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