No. 24-43

In the Supreme Court of the United States

WEST VIRGINIA, ET AL., *Petitioners,*

v.

B.P.J., BY HER NEXT FRIEND AND MOTHER, HEATHER JACKSON

On Writ of Certiorari to the United States Court of Appeals for the Fourth Circuit

BRIEF OF *AMICUS CURIAE* THE AMERICAN COLLEGE OF PEDIATRICIANS IN SUPPORT OF PETITIONERS

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INTRODUCTION AND INTEREST OF *AMICUS CURIAE*[1]

Millions of American girls and women participate in competitive sports. From grade school teams to the Olympic Games, the separation of male and female divisions has been recognized as essential to fair competition. This structure reflects both common sense and biological reality: males, as a class, possess enduring advantages in speed, strength, endurance, and power. Until recently, no court had questioned that basic truth. But the Ninth and Fourth Circuits have now reached the radical conclusion that protecting girls' and women's sports by limiting them to females is itself against the law.

This issue is of great concern to the American College of Pediatricians (the College or ACPeds), one of the Nation's leading science-oriented medical organizations. The College is a national association of nearly 500 board-certified pediatricians and related specialists with active practices in 46 states, all dedicated to the health and well-being of children. Founded in 2002, the College is a scientific medical association committed to producing policy recommendations grounded in the best available research. Its mission is to ensure that all children reach their optimal physical and emotional health and well-being. Youth sports contribute to that well-being.

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[1] This brief was not authored in whole or in part by counsel for any party and no person or entity other than *amicus curiae* or its counsel has made a monetary contribution toward the brief's preparation or submission.

Amicus's members care for student-athletes every day and advise families and schools on training, injury risk, and healthy physical and social development. They treat all patients with dignity, without discrimination, and cannot endorse policies that deny biological facts or expose girls to avoidable harm. When males compete in female categories, girls predictably lose roster spots and scholarships, face unequal competition, and in some sports bear higher injury risk. Those are real medical and developmental harms to minors. ACPeds submits this brief to present the medical record on sex-based differences and to explain why sex-separated teams are evidence-based safeguards for fairness and equal opportunity.

SUMMARY

The Court is considering challenges to two state statutes, from Idaho and West Virginia, that protect girls' sports by relying on biological reality. For decades, it was universally recognized that separating male and female competition is necessary to ensure equal athletic opportunity, because males, as a class, possess enduring physical advantages in speed, strength, endurance, and power. The Fourth and Ninth Circuits cast aside that consensus, substituting ideology for science and treating subjective gender identity as if it could erase the immutable advantages of male physiology. Their decisions should be reversed.

I. Idaho and West Virginia reasonably classified sports participation by biological sex, an immutable and objectively verifiable trait. That choice reflects long-standing practice in athletics and common sense: males and females differ in ways that directly affect

performance, and preserving equal opportunity for girls requires sex-based teams. The courts below erred by collapsing biological sex into subjective gender identity, adopting the misleading rhetoric that sex is "assigned at birth," and crediting claims that sex can be "transitioned" in a way that eliminates physical differences. But sex is not assigned, and it cannot be changed. It is a stable biological reality, and grounding athletic classifications in that reality is necessary to maintain fairness.

II. The medical and physiological record confirms that males possess enduring advantages in strength, speed, and endurance that are not erased by hormones or surgery. These differences are driven by genetic programming, appear *in utero,* are amplified during infant "minipuberty," magnified by the surge of testosterone during adolescence, and persist even after suppression of testosterone or administration of estrogen therapy. Larger hearts and lungs, more fast-twitch muscle fibers, and denser bones give males structural and functional advantages that no medical intervention can undo. By reducing the analysis to pubertal testosterone, the courts below ignored the broader body of scientific evidence showing that sex-based differences are permanent, architectural, and significant in athletic performance.

III. The record of sports performance confirms what biology predicts: males consistently outperform females across both discrete metrics and competitive outcomes. Grip strength, knee extension torque, and VO_2 max all show substantial male advantages, which translate directly into faster sprint times, higher lifts, and superior endurance. Across disciplines, men

outperform women by margins ranging from 10% in swimming and rowing to over 50% in baseball pitching. And hormone suppression does not close the gap: even after years of treatment, male athletes retain strength and endurance levels above those of female peers.

While dismissing the well-documented physiological differences between males and females, the courts below embraced the unproven claim that identity and hormone therapy can erase sex-based advantages. But that is false: the evidence shows these differences are in fact sex-based, not hormone level-based, and those differences amply justify sex segregated sports—and associated intimate spaces such as locker rooms. Their decisions below thus prioritize gender ideology over biology. It cannot be true that providing girls with an equal opportunity to compete violates our guarantees of equality. The decisions below should be reversed.

ARGUMENT

Equal athletic opportunity for women depends on recognizing biological reality. Until the last decade, all have recognized that male and female competitions should be separated because men, as a class, possess enduring physical advantages in speed, strength, endurance, and power. Those advantages begin *in utero*, are present before puberty, and persist even after males are administered puberty blockers and testosterone suppressants. As this Court recently emphasized, some medical "treatments and procedures are uniquely bound up in sex." *United States* v. *Skrmetti*, 145 S. Ct. 1816, 1820 (2025). The

same is true in athletics, where sex-based physiological differences affect performance and cannot be erased by identity or intervention. Recognizing that reality does not violate the Constitution but upholds it.

Yet the courts below dismissed this reality. The Ninth Circuit suggested that Idaho's biologically-based definition of sex was an "oversimplification" because it should have included subjective, malleable "gender identity" in its definition of sex. *Hecox* v. *Little*, 104 F.4th 1061, 1076 (9th Cir. 2024) (internal citation omitted), *cert. granted mem.*, 145 S. Ct. 2871 (2025). The Fourth Circuit accepted claims that a male treated with puberty blockers and estrogen "possess[es] *no* inherent, biologically-based competitive advantages over cisgender girls." *B.P.J.* v. *West Virginia State Bd. of Educ.*, 98 F.4th 542, 559 (4th Cir. 2024) (consolidated action), *cert. denied sub nom. West Virginia Secondary Sch. Activities Comm'n* v. *B.P.J.,* 145 S. Ct. 568 (2024) *and cert. granted,* No. 24-44, 2025 WL 1829164 (July 3, 2025). Those conclusions rest on ideology, not evidence.

The courts mistakenly reduced the male athletic advantage to a single variable: pubertal (or circulating) testosterone, as if pubertal testosterone determines whether the individual is male or female. But that view ignores a host of other biological differences that shape athletic performance and do not depend on pubertal testosterone. Long before puberty, male genetics result in sex differences such as bone

shape and lung volume.[2] These features translate into superior oxygen transport, stronger muscle contraction, and greater torque in explosive movements.[3] They are written into the male body at every stage of development, even before birth, and cannot be erased by suppressing hormones during adolescence.

These advantages are evident across core performance metrics. Grip strength, a simple proxy for overall strength, sees males aged 18-24 at a 60% advantage over females.[4] Female triceps and chest strength is about half of males,[5] while males have a 28% advantage in lower body power as measured by knee extension torque.[6] In specific events, male advantages range from 11-13% in rowing, to a 50%

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[2] Alison K. Heather, *Transwoman Elite Athletes: Their Extra Percentage Relative to Female Physiology*, 26 Int'l J. Envt'l Rsch. & Pub. Health 1, 4 (2022), 10.3390/ijerph19159103.

[3] *Id.* at 4-5.

[4] Ying-Chih Wang et al., *Hand-Grip Strength: Normative Reference Values and Equations for Individuals 18 to 85 Years of Age Residing in the United States*, 48 J. Orthopaedic & Sports Physical Therapy 685, 688 tbl. 1 (2018), https://tinyurl.com/5chtkr5r.

[5] Gong Chen et al., *A Comparative Study on Strength between American College Male and Female Students in Caucasian and Asian Populations*, 21 Sport Sci. Rev. 153, 156 & tbls. 2-3 (2012), https://tinyurl.com/bdxsffa4.

[6] Nejc Šarabon et al., *Establishing Reference Values for Isometric Knee Extension and Flexion Strength*, 12 Frontiers in Physiology 767941, at 5 & tbl. 1 (2021), https://doi.org/10.3389/fphys.2021.767941.

advantage in baseball throwing velocity.[7] These are quantifiable, class-based differences.

Testosterone suppression does not eliminate these advantages. When males suppressed testosterone for twelve months and lost 4% of grip strength, their handgrip still exceeded that of more than 90% of females.[8] Likewise, long-term testosterone suppression left biological males with higher muscle mass than women, even though it was lower than that of other men.[9] This is due to "the large baseline differences in muscle mass between males and females" of approximately 40%.[10] Hormone therapy does not close the gap between male and female performance or turn a male into a female. And sex classifications grounded in biological differences do not violate federal law. *Cf. Michael M.* v. *Superior Ct. of Sonoma Cnty.*, 450 U.S. 464, 476 (1981) (statute did not unlawfully discriminate, because it "reasonably reflect[ed] the fact that the consequences * * * fall more heavily on the female than on the male").

To help the Court evaluate how the States' laws are tailored to ensuring equal opportunity for female

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[7] Emma N. Hilton & Tommy R. Lundberg, *Transgender Women in the Female Category of Sport: Perspectives on Testosterone Suppression and Performance Advantage*, 51 Sports Med. 199, 201-203 & fig. 1 (2021), doi: 10.1007/s40279-020-01389-3; Erratum, 51 Sports Med. 2235 (2021), doi: 10.1007/s40279-021-01480-3.

[8] See Miranda Scharff et al., *Change in grip strength in trans people and its association with lean body mass and bone density*, 8 Endocrine Connections 1020, 1026 (2019).

[9] Hilton & Lundberg, *supra* note 7, at 207.

[10] *Id*. at 207 & tbl. 1.

athletes, ACPeds will focus on (1) the States' legitimate choice to classify athletic participation by biological sex, an immutable and objectively discernible characteristic; (2) the medical and physiological evidence demonstrating that males retain enduring athletic advantages that cannot be erased by puberty blockers or hormone suppression; and (3) the record of sports performance, which confirms in practice what science shows in theory: that males consistently outperform females across events and metrics, even after hormone treatment.

Idaho and West Virginia have ensured equal opportunity for girls through a reality-based categorization. The decisions of the Fourth and Ninth Circuits should be reversed.

I. The Idaho and West Virginia Statutes Reasonably Classify Sports Participation on the Basis of Biological Sex

Both Idaho and West Virginia took the straightforward step of classifying sports teams based on biological sex. West Virginia requires teams to be designated male, female, or coed, and defines "[b]iological sex" as "an individual's physical form as a male or female based solely on the individual's reproductive biology and genetics at birth." W. Va. Code § 18-2-25d(b)(1)-(3). Similarly, Idaho's Fairness in Women's Sports Act provides that participation is determined by a student's "reproductive anatomy, genetic makeup, or normal endogenously produced testosterone levels." Idaho Code § 33-6203(3).

This is not a novel approach. For decades, states have sponsored separate teams for each sex in a wide

variety of athletic competitions. See 34 C.F.R. § 106.41(b) (reiterating that Title IX allows schools to operate "separate teams for members of each sex"). The statutes simply codify what has long been common sense: that equal opportunity in athletics requires separating competition on the basis of sex, because male physiology confers enduring advantages in speed, strength, and endurance.

Just last term, this Court recognized that in the "medical context * * * some treatments and procedures are uniquely bound up in sex." *Skrmetti*, 145 S. Ct. at 1820. So too in athletics, where the very purpose of separate male and female teams is to account for sex-based physiological differences that directly affect performance.

States that separate physical competitions by sex do not violate our guarantees of equal opportunity in sports. They ensure that opportunity is real for sex is an immutable, objectively discernible biological characteristic.

A. Sex is an Immutable, Objectively Discernible, Biological Characteristic.

Biological sex is immutable and identifiable. It is determined by physical, observable, and measurable features such as chromosomes and reproductive anatomy. It is "almost always easily identifiable at birth (if not before) based upon phenotypic expression of chromosomal complement"[11]—XX for female, and XY for male.

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[11] Am. Coll. of Pediatricians (ACPeds), *Mental Health in Adolescents with Incongruence of Gender Identity and Biological*

This case also involves a separate issue: gender identity. Gender identity is a psychological construct that reflects self-perception and cultural expectations rather than anatomy or genetics. "Gender does not exist in the body or in any bodily structure or process. This is in contrast to *sex*, which is determined exclusively by bodily data: genitals and chromosomes."[12]

The decisions below departed from this basic distinction between immutable biological sex and psychological gender identity. For instance, the Ninth Circuit suggested that Idaho's definition rested on an "oversimplification of the complicated biological reality of sex and gender," and asserted that "'a person's sex encompasses the sum of several biological attributes * * * *and gender identity*.'" *Hecox*, 104 F.4th at 1076 (emphasis added) (internal citation omitted). The Fourth Circuit determined it was discriminatory to define sex based on "'reproductive biology and genetics at birth'" because it "exclude[s] transgender girls from the definition of 'female.'" *B.P.J.*, 98 F.4th at 555-556 (quoting W. Va. Code § 18-2-25d(b)(1)). What both courts refused to recognize is that sex is biological and not influenced by a psychological concept of "gender identity." That is why "transgender

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Sex 2 (2024) (citing extensive scientific research), https://tinyurl.com/u5wrbak8.

[12] David Schwartz, *Clinical and Ethical Considerations in the Treatment of Gender Dysphoric Children and Adolescents: When Doing Less Is Helping More*, 20 J. Infant, Child & Adolescent Psych. 439, 439 (2021).

girls" (males) are not included in the definition of "female."

By conflating immutable sex with variable gender identity, the Fourth and Ninth Circuits improperly inserted ideology into a biological and medical definition. *Cf. Skrmetti*, 145 S. Ct. at 1851 (Barrett, J., concurring) ("[T]ransgender status does not turn on an immutable characteristic." (cleaned up)); accord *id.* at 1861 (Alito, J., concurring in part and concurring in the judgment) ("Transgender status is not 'immutable,' and as a result, persons can and do move into and out of the class."). Proper analysis of the question of sex classifications in sports requires an accurate approach.

B. Sex is not "assigned" at birth but rather observed and announced based on biological reality.

That approach includes the reality that "[p]ediatricians do not 'assign' an infant's sex; they announce it based upon the physical reality of the infant's body before them."[13] Sex is dimorphic and innate, determined at fertilization by chromosomal complement and revealed in distinctive reproductive anatomy and unambiguous genitalia. This biological reality is not altered by cultural perception, identity, or later psychological discomfort.

Describing sex as "assigned" falsely suggests that it is arbitrary. It is anything but. Biological sex is "a stable and universally applicable definition that

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[13] Am. Coll. of Pediatricians (ACPeds), *Sex is a Biological Trait of Medical Significance* 1 (Mar. 2021), https://tinyurl.com/28xjxwrv.

allows the consistent differentiation of males from females."[14] It is the reason that there are "variations seen in the safety and efficacy of drugs, biologics, and medical devices" between men and women. See *Skrmetti*, 145 S. Ct. at 1829-1830 (quoting FDA, *Sex as a Biological Variable* (Jan. 30, 2025)). And if sex were assigned arbitrarily at birth, it would not be marked by the sort of "obvious, immutable or distinguishing characteristics" that characterize a suspect class. *Cf. id.* at 1851 (Barrett, J., concurring) (cleaned up).

Yet both courts below adopted the misleading terminology that sex is "assigned at birth," rather than rooted in biological reality, observed and announced. The Ninth Circuit stated that "[a] person's 'sex' is typically assigned at birth based on an infant's external genitalia." *Hecox*, 104 F.4th at 1068. Likewise, the Fourth Circuit described West Virginia's statute as creating "a rule that people whose sex was assigned at birth as female may play on any team but people whose sex was assigned at birth as male may only play on male or co-ed teams." *B.P.J.*, 98 F.4th at 556.

People are not assigned a sex; they have one, and that biological reality creates real athletic advantages between the sexes.

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[14] *Id.* at 2.

C. "Transitioning" to a different sex is biologically impossible.

Sex, moreover, is not malleable. It is a biological and immutable characteristic determined at conception and revealed through chromosomal complement and corresponding reproductive anatomy. "From a purely scientific standpoint, human beings possess a biologically determined sex and innate sex differences. No sexologist could actually change a person's genes through hormones and surgery. Sex change is objectively impossible."[15]

Describing medical or surgical interventions as "sex changes" is thus scientifically inaccurate; they may alter outward appearance but not chromosomal reality. Proponents of "transitioning," typically concede that chromosomes and gonads remain unchanged. Like the Ninth Circuit below, they may attempt to redefine "gender" as a subjective identity distinct from biology, and then smuggle that definition into discussions of sex. See *Hecox*, 104 F.4th at 1076 (including gender identity in definition of sex); accord *B.P.J.*, 98 F.4th at 555-556.

But gender is a socially and politically constructed concept, not a biological trait. Linguistic moves do not alter scientific facts that have direct implications for sports. Athletic performance is tied to skeletal structure, muscle composition, lung capacity, and other features determined by sex, not by self-perception. A male athlete may undergo hormone suppression or surgeries, but his XY chromosomes

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[15] Am. Coll. of Pediatricians (ACPeds), *Gender Dysphoria in Children* 3 (Nov. 2018), https://tinyurl.com/mu5etsp9.

that result in larger bones, greater muscle mass, and other sex-based traits remain. The suggestion that medicine can erase or "transition" these biological realities is not science, but fanciful ideology.

II. The Medical and Physiological Record Demonstrates Material, Sex-Based Biological Differences Between Males and Females

Driven as it is by these scientific realities, the medical evidence makes plain that males retain significant physiological advantages over females in strength, speed, and endurance. Yet the decisions below downplayed this scientific consensus. The Ninth Circuit dismissed as a "false assumption" the claim that biological males have "physiological advantages" over "cisgender women." *Hecox*, 104 F.4th at 1082. The Fourth Circuit credited Respondent's assertions that males with the plaintiff's "background and characteristics possess *no* inherent, biologically-based competitive advantages over cisgender girls when participating in sports." *B.P.J.*, 98 F.4th at 559. In reaching this conclusion, the court relied on the fact the plaintiff was placed on puberty blockers at the beginning of Tanner Stage 2 and then on cross-sex hormones, thus holding that keeping the plaintiff out of girls' sports was not appropriate. *Id.* at 560-561. But neither hormone treatment makes the male plaintiff a female.

The reality is that male advantages arise before puberty, are amplified by puberty, and are not erased by medical interventions—including puberty blockers and exogenous estrogen.

A. Significant pre-pubertal differences between males and females reflect genetic programming and structural organization and are not contingent on pubertal testosterone

First, both decisions below rested on the mistaken idea that testosterone is the only factor tied to athletic advantage. See *Hecox*, 104 F.4th at 1075-1076 ("circulating testosterone is the one sex-related factor that a consensus of the medical community appears to agree actually affects athletic performance" (cleaned up)); *B.P.J.*, 98 F.4th at 560-561 (plaintiff had no "benefit from increased strength and speed" because he "has never felt the effects of increased levels of circulating testosterone" due to the administration of puberty blockers).

The medical record shows, however, that sex-linked genetic programming produces significant differences between boys and girls well before puberty, independent of testosterone exposure.

Genes found on sex hormones—not testosterone—primarily drive the differences between males and females. Many of these differences do not arise from hormonal exposure at all, but are a "direct result of the genetic differences between the two sexes."[16] At least three genetic mechanisms contribute to these sex-based differences: (1) the effects of sex chromosomes,

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[16] Comm. on Understanding Biology of Sex & Gender Differences, *Exploring the Biological Contributions to Human Health. Does Sex Matter?*, at 4 (Theresa M. Wizemann & Mary-Lou Pardue eds., 2001), https://tinyurl.com/2pzfxffp.

(2) sex-dependent genetic liability thresholds, and (3) sex-differential gene expression.[17]

Sex chromosomes associated with males and females contribute to sex-based differences.[18] The impact of the Y chromosome, for example, is not limited to the reproductive system. It determines male sex across multiple organs. Among females, X-chromosome inactivation exerts a genetic influence that males do not experience.[19] Because one X chromosome switches off at random in each female cell, women are less likely to suffer X-linked diseases like Hemophilia A and Duchenne Muscular Dystrophy, which mostly strike boys and men.[20]

Sex also shapes genetic risk through so-called "liability thresholds." This means that males and females face different odds of developing certain conditions.[21]

Finally, sex-differential gene expression contributes to many of the physiological differences between males and females. Researchers have

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[17] For an extended discussion, see generally ACPeds, *Sex is a Biological Trait of Medical Significance*, *supra* note 13.

[18] See *id.* at 2.

[19] *Id.* at 3.

[20] Genetic All., N.Y.-Mid-Atl. Consortium for Genetic & Newborn Screening Servs., *Understanding Genetics: A New York, Mid-Atlantic Guide for Patients and Health Professionals* 70-71 app. E (2009), https://tinyurl.com/5n98w4jv.

[21] See Lea K. Davis, *Bridging Molecular Genetics and Epidemiology to Better Understand Sex Differences in Attention-Deficit/Hyperactivity Disorder*, 83 Biological Psych. e55, e55 (2018).

identified at least 6,500 shared genes that are expressed differently in males and females.[22] Notably, the superior development and strength of the male skeletal muscles stem from this sex-differentiated gene expression.[23]

The upshot is that genetic differences between males and females are significant and objectively observable even before puberty. Puberty adds further changes through rising sex hormones.

B. Testosterone drives lasting male athletic advantages that begin *in utero* and continue through and beyond puberty.

Puberty magnifies the pre-existing biological gap between males and females. The surge of sex hormones, especially testosterone, reshapes the body in ways that drive lasting athletic advantages for males.

The two major sex-hormones that influence athletic performance are estrogen and testosterone. A meta-analysis of 51 studies showed that variations in estrogen levels likely only have trivial effects on athletic performance.[24] In contrast, it is well accepted that testosterone greatly influences athletic

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[22] Moran Gershoni & Shmuel Pietrokovski, *The landscape of sex-differential transcriptome and its consequent selection in human adults*, 15 BMC Biology, art. 7, at 2-3 (2017), https://doi.org/10.1186/s12915-017-0352-z.

[23] *Id.* at 3.

[24] See Kelly L. McNulty et al., *The Effects of Menstrual Cycle Phase on Exercise Performance in Eumenorrheic Women: A Systematic Review and Meta-Analysis*, 50 Sports Med. 1813, 1821 (2020).

performance. And as males age, sexual differences brought about by natural increased testosterone result in greater advantages in athletic performance that do not dissipate even with testosterone suppression before, during, or after puberty.[25]

Contrary to the idea that sex is "assigned" at birth, testosterone production begins in the male testes at nine weeks post conception and begins to decrease around twenty weeks.[26] This rise in testosterone contributes to the development of the male reproductive organs and helps organize the male brain. The female fetus is exposed to testosterone, but at much lower levels.[27]

Studies show that fetal testosterone leaves lasting marks on the brain. For instance, "variation in fetal testosterone (FT) predicts later gray matter volume of specific brain regions in a direction that is congruent with sexual dimorphism observed in a large independent sample of age-matched males and

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[25] Hilton & Lundberg, *supra* note 7, at 200-201.

[26] See Rudolfo Ray & Chrystèle Racine, *Sexual Differentiation, in* Endotext, at tbl. 1 (Kenneth R. Feingold et al. eds., updated July 24, 2025), https://www.ncbi.nlm.nih.gov/books/NBK279001/; see also *ibid.* ("In the human fetus, Leydig cells can be identified in the interstitial tissue by the beginning of the 8th week—after testicular cords have completely formed—and soon begin to produce testosterone, which plays an essential role in the stabilization of Wolffian ducts and the masculinization of external genitalia." (citations omitted)).

[27] See, *e.g.*, Michael V. Lombardo et al., *Fetal Testosterone Influences Sexually Dimorphic Gray Matter in the Human Brain*, 32 J. Neurosci. 674, 679 (2012) (observing "robust sex differences" in fetal testosterone measured in amniotic fluid, attributable to the fetus), https://tinyurl.com/52exvwb7.

females."[28] In other words, testosterone exposure before birth helps shape male and female brains differently, leaving structural differences that persist later in life.

Testosterone continues to drive sex-based differences after birth. During a developmental stage known as "minipuberty," there is an increase in serum testosterone in infant boys with a peak at one to three months after birth, followed by a decline to prepubertal levels by six to nine months.[29] Infant girls at the same age experience an increase in estrogen. As a result of "minipuberty," by mid-childhood, girls have accumulated more body fat than boys, and this persists and increases during puberty.[30]

By age eighteen, male testosterone levels have surged, rising more than thirty-fold during puberty.[31] After puberty, male circulating testosterone concentrations are 15 times greater than those of females at any age. The result is a clear male advantage in muscle mass, strength and circulating

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[28] *Id.* at 674.

[29] See Sandra K. Hunter et al., *The Biological Basis of Sex Differences in Athletic Performance: Consensus Statement for the American College of Sports Medicine*, 55 Med. & Sci. Sports & Exercise 2328, 2337 (2023), https://tinyurl.com/yj29967d [hereinafter "Hunter et al., *Biological Basis*"].

[30] *Id.* at 2338.

[31] *Id.* at 2338 & fig. 7.

hemoglobin levels even after adjusting for sex differences in height and weight.[32]

C. Puberty blockers and exogenous estrogen do not eliminate male biological advantages.

Both courts below adopted the mistaken premise that suppressing testosterone eliminates male athletic advantages.

The Ninth Circuit credited testimony that a male who "received hormone therapy to lower [his] circulating levels of testosterone would likely not have 'physiological characteristics' that would lead to enhanced athletic prowess when compared to a cisgender woman." *Hecox*, 104 F.4th at 1084. Similarly, the Fourth Circuit emphasized that the plaintiff had "never experienced elevated levels of circulating testosterone" because he received puberty blockers, and concluded that hormone therapy would cause him to develop "physical changes to [his] bones, muscles, and fat distribution that are typically experienced by cisgender girls." *B.P.J.*, 98 F.4th at 560-561.

But that is not true. Males experience increased circulating testosterone from their testes beginning at eight weeks post conception,[33] and go through a surge

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[32] See David J. Handelsman et al., *Circulating Testosterone as the Hormonal Basis of Sex Differences in Athletic Performance*, 39 Endocrine Revs. 803, 805 (2018).

[33] R. Ann Word et al., *Testosterone synthesis and adenylate cyclase activity in the early human fetal testis appear to be independent of human chorionic gonadotropin control*, 69 J. Clinical Endocrinology & Metabolism 204, 204 (1989).

of testosterone during "minipuberty" at one to three months after birth, which differentiates the fat distribution of boys from girls.[34] The lower courts offered nothing to suggest why, from a constitutional perspective, putting a child on puberty blockers and cross-sex hormones entitles the child to be considered of the opposite sex other than to suggest a "no harm, no foul" approach to competition, which is not a constitutional standard.

Recent research shows there are differences in athletic abilities between boys and girls even before puberty. Brown et al. evaluated finalist times from the USA Track and Field National Youth Outdoor Championships and the National Junior Olympic Championships for the years 2016-2023 for various running distances in the 8 and under age group as well as the 9-10-year-old age group.[35] In the younger age group, males were faster than females in all events by 4.0% to 6.7%).[36] Specifically, males were faster in the 100m (4.0%), 200m (4.7%), 400m (5.3%), 800m (6.7%), and 1500m (6.1%).[37] Similarly, boys were faster than girls in all events in the 9-10-year-old age group. "In each distance and age group between 2016 and 2023,

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[34] Hunter et al., *Biological Basis*, *supra* note 29, at 2337-2338.

[35] Gregory A. Brown et al., *Sex-based differences in track running distances of 100, 200, 400, 800, and 1500m in the 8 and under and 9–10-year-old age groups,* 24 European J. Sport Sci. 217, 217 (2024), https://onlinelibrary.wiley.com/doi/epdf/10.1002/ejsc.12075.

[36] *Ibid.*

[37] *Ibid.*

the individual fastest male was faster than the individual fastest female by 3.7 +/- 2.3%."[38]

Another research project in 2025 evaluated "sex-based differences in aerobic running performance at 1600 m for children aged 6-12 yr" while also studying whether sex-based differences in participation affected the results.[39] Utilizing the runnercard.com website, they evaluated the running velocities and participation for 3,621 children and found "male children were faster * * * than female children * * * at every grade level, with an average difference of 7.7%[.]"[40] Their finding "points to an innate physiological difference underpinning the sexual dimorphism of children."[41]

Additionally, a cross-sectional study of 312 prepubescent children's physical fitness (aerobic fitness, strength, flexibility, speed, agility, and balance) revealed that boys had higher scores in all tests, except balance and flexibility.[42] The greatest sex differences were found in the explosive strength of upper and lower limbs.[43]

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[38] *Ibid.*

[39] Mandy W. Christensen & Christine M. Griffiths, *Sex Differences in 1600-m Running Performance and Participation for Children Aged 6-12 yr*, 3 Exercise Sport & Movement e00051, at 1 (2025), https://tinyurl.com/3xt75tst.

[40] *Ibid.*

[41] *Id.* at 5.

[42] Carlos C. Marta et al., *Physical Fitness Differences Between Prepubescent Boys and Girls*, 26 J. Strength & Conditioning Rsch. 1756, 1756 (2012).

[43] *Id.* at 1763.

Since there are around 6,500 genes that are expressed differently between males and females, an estimated 3,000 of which likely influence the composition and function of skeletal muscle, the "minipuberty" of males soon after birth may be responsible for these prepubertal sex-related differences.[44] Given these differences in athletic performance between prepubertal boys and girls, there are legitimate concerns that biological males who have their puberty blocked will still have innate advantages over females in athletic performance.

Further, the plaintiffs' claims defy what we see with our eyes, what we know from common sense, and what the scientific evidence plainly shows. Suppressing testosterone in adolescence cannot undo the male body already shaped by genes and early development.

In short, obvious anatomical differences between males and females cannot be eliminated by puberty blockers. These differences impact the body's response to acute exercise, training, and athletic performance beginning in infancy and throughout adulthood. Testosterone's impact on the brain, skeletal structure,

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[44] Hilton & Lundberg, *supra* note 7, at 200-201; see also *id.* at 201, citing a study of over 85,000 Australian children between 9 and 17 years demonstrated differences between young boys and girls, with 9-year-old boys running faster than girls in short sprints (9.8%), running faster in the longer distance one mile (16.6%), and jumping farther from a standing start (9.5%). In addition, the boys could complete 33% more push-ups in 30 seconds and had a more powerful grip by 13.8%, and other international studies.

muscle mass, muscle fiber type, muscle memory, and cardiorespiratory system is architectural.

In layman's terms, these changes are permanent and not modifiable, and therefore they do not change with sex-hormone supplementation or suppression. In medical terms, "superior anthropometric, muscle mass and strength parameters achieved by males at puberty, and underpinning a considerable portion of the male performance advantage over females, are not removed by the current regimen of testosterone suppression permitting participation of transgender women in female sports categories."[45] Males do not become females, and after about a year of hormone treatment, transgender individuals develop body composition (levels of fat and lean muscle) that falls between that of male and female peers matched for body size.[46]

The permanent structural differences between males and females are numerous and significant. To identify a few, males are generally taller than females and have greater lean body mass, lower percentage of fat, and longer upper and lower limbs with larger and denser bones.[47] Even at birth, the average male is heavier and taller than the average female. And this advantage, for most athletic endeavors, continues throughout life.

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[45] *Id.* at 209.

[46] Natalie J. Nokoff et al., *Body Composition and Markers of Cardiometabolic Health in Transgender Youth Compared With Cisgender Youth*, 105 J. Clinical Endocrinology & Metabolism e704, e712-e713 (2020).

[47] Hunter et al., *Biological Basis*, *supra* note 29, at 2335.

Variation in muscle mass between males and females is also a permanent difference that cannot be reversed by hormone treatment. "Males have larger, stronger, faster, and more powerful skeletal muscles than females[.]"[48] Muscle mass compared to body mass is generally greater in men than in women. And males possess a more even distribution of muscle mass between their upper and lower body. These anatomical differences provide greater leverage for muscular limb power exerted in jumping, throwing, and other explosive power activities. Consequently, "[t]he muscle mass and limb power of males can be twice that of females,"[49] an advantage retained even years after hormone therapy.[50]

Additional anatomical differences between males and females include males having a higher proportion of fast twitch muscles, males having a narrower pelvis, allowing for greater generation of force during extension—improving their ability to squat, kick, or pedal—and males having a larger lung capacity, leading to greater cardiovascular ability.

These permanent sex-based differences demonstrate that the gap between males and females in athletic ability cannot be erased by sex-hormone treatment. Consider lung size, which allows males to take in more oxygen, meaning more fuel for muscles during exercise. Males' larger lung and airway size

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[48] *Id.* at 2334.

[49] *Id.* at 2335.

[50] *Id.* at 2345.

emerges by age 14, resulting in life-long greater maximum expiratory flows than females.[51]

More general metrics, like mean run speed, are also impacted. In one longitudinal study, males who receive cross-sex hormones "still had a 9% faster mean run speed after the 1 year period of testosterone suppression that is recommended by World Athletics for inclusion in women's events."[52]

The Ninth and Fourth Circuits erred in treating testosterone suppression as a reset button that erases male advantage and effectively turns a boy into a girl. The scientific record demonstrates the opposite: males retain permanent structural and physiological differences that make them, as a class, stronger, faster, and more powerful than females.

III. The Record of Sports Performance Demonstrates Material, Sex-Based Biological Differences Between Males and Females

Discrete biological features detailed above, including muscle mass, lung capacity, skeletal structure, and hormonal profile create significant male physical advantages. These advantages manifest both through discrete measurements such as grip

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[51] Juan G. Ripoll et al., *Sex differences in pediatric airway anatomy*, 105 Experimental Physiology 721, 722 (2020).

[52] Timothy A. Roberts et al., *Effect of gender affirming hormones on athletic performance in transwomen and transmen: implications for sporting organisations and legislators*, 55 British J. Sports Med. 577, 577 (2020), https://tinyurl.com/yc5afcx3.

strength, as well as performance outcomes such as swim heat times.

Yet the courts below ignored this evidence. The Ninth Circuit was satisfied that not "all transgender women, including those like [the plaintiff] who receive hormone therapy, have a physiological advantage over cisgender women." *Hecox*, 104 F.4th at 1085; accord *B.P.J.*, 98 F.4th at 559 (Fourth Circuit).

No accurate understanding of fair competition can rest on this absurd foundation, which contravenes the scientific evidence.

A. Males demonstrate higher performance across diverse sports-related metrics.

First, across core measures of strength, power, and oxygen delivery, males show higher values.

Muscle fibers. "[M]ales persist in possessing a larger area of type II fibers compared with females[.]"[53] Type II muscle fibers are the body's "fast-twitch" fibers that generate quick, powerful bursts of strength necessary for sprinting, jumping, or throwing. Because men have more of these fibers, and the fibers themselves are larger, they can produce more force at higher speeds. The result is that female upper body strength measures in the range of 50–60% of males.[54]

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[53] Hunter et al., *Biological Basis, supra* note 29, at 2335.

[54] See*, e.g.*, Chen et al., *Comparative Study*, *supra* note 5, at 156 & tbls. 2-3 (female triceps strength 48-53% of males; female chest strength 39-41% of males); accord Hunter et al., *Biological Basis*, *supra* note 29, at 2335 (collecting sources).

Grip strength. Grip strength is an effective, simple measurement of overall strength and power. In a comparison of males and females age 18-24, males had a median grip strength of 47.8 kg, while women of the same age had a median grip strength of 28.4 kg.[55] This amounts to an almost 60% difference.

Knee extensions. The quadriceps drive knee extension, which is critical for sprinting, jumping, cycling, and nearly every explosive lower-body movement in sport. Data from a large meta-analysis show that teenage boys held a roughly 26% advantage over teenage girls in average produced knee extension torque.[56]

Cross-lift performance. Controlled comparisons of trained male and female athletes confirm the male advantage in strength and power even when adjusting for body size and other variables. In one study, researchers measured lower-body power through jumping tests, upper-body power with the bench press, and overall strength with repetitions in the bench press, deadlift, and squat. Even after accounting for body mass and muscle thickness, men outperformed women on every measure of strength and power, with differences large enough that the researchers concluded they were "significantly different"—meaning could not be explained by chance.[57]

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[55] Wang et al., *Hand-Grip Strength*, *supra* note 4, at 688 tbl. 1.

[56] Šarabon et al., *supra* note 6, at 6.

[57] Sandro Bartolomei et al., *A Comparison between Male and Female Athletes in Relative Strength and Power Performances*, 6 J. Functional Morphology & Kinesiology, art. 17, at 5-6 & tbl. 2 (2021).

Unsurprisingly, these measurable advantages in muscle power, grip strength, and leg torque translate into advantages in actual sports performance, from sprint times to lifting totals.

B. Biological males show performance advantages across a broad range of sports.

The measurable male physical advantages outlined above also manifest in actual sports performance outcomes across disciplines. Research on world records, elite competitions, and controlled comparisons consistently shows males outperforming females.

In sports that rely on skill, such as archery, the competitive difference between the sexes is minimal but that does not mean that sex segregated categories offends the Constitution or does not further fair competition. The reality remains that "the top adult males almost always outperform the top females in events that rely on muscle power, strength, speed, and/or endurance."[58]

Competitive running is particularly suited to objective comparison. In 2019, "[o]ver 10,000 men (including boys [less than eighteen-years-old]) ran faster than the three fastest recorded women in that year" in the 400-m dash.[59]

A separate two-decade review of Olympic running events compared the top twenty male and female

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[58] Hunter et al., *Biological Basis*, *supra* note 29, at 2329.

[59] *Id.* at 2329.

finishers in races from 100 meters to 10,000 meters. The analysis showed consistent male advantages across sprint, middle-distance, and long-distance events, each tied to different physiological factors. The authors identified males' larger muscle volumes for sprints, superior anaerobic reserves for middle-distance running, and higher VO_2 max for male marathoners. The authors concluded that, at best, "[s]ex gaps as low as 10-11% are biologically possible for the best male and female runners" and that "females historically and presently are the disadvantaged sex within sport."[60]

A comprehensive cross-sport review of elite-level sport also shows that sex-based performance gaps vary by discipline but are present across the board.[61] The smallest gaps appeared in rowing, swimming, and running, where men maintained a still significant 11-13% advantage over women. The gap widens to 16% in cycling and 18% in jumping events.[62] The disparity grows larger in sports that rely heavily on upper-body strength, because men have greater absolute muscle mass in the arms and shoulders, longer limbs, and superior torque production in throwing, punching, and pushing movements. Not surprisingly, the study documented male advantage exceeding 20% in tennis serve speed and more than 50% in the velocity of

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[60] Lydia C. Hallam & Fabiano T. Amorim, *Expanding the Gap: An Updated Look Into Sex Differences in Running Performance*, 12 Frontiers in Physiology 1, 9 & tbl. 1 (2022), https://doi.org/10.3389/fphys.2021.804149.

[61] Hilton & Lundberg, *supra* note 7, at 209.

[62] *Id.* at 201-203 & fig.1.

pitched baseballs.[63] The authors conclude that "there are few sporting disciplines where males do not possess performance advantage over females[.]"[64]

Across disciplines, the data point to the same conclusion: when sports rely on strength, speed, power, or endurance, males as a class are advantaged over females.

C. Testosterone suppression does not eliminate male performance advantages.

Both the Ninth and Fourth Circuits accepted the claim that suppressing testosterone erases male athletic advantages. See *Hecox*, 104 F.4th at 1084; *B.P.J.*, 98 F.4th at 560-561 (claiming that by not going through male puberty due to puberty blockers and hormone treatments, the male plaintiff did not obtain any physiological advantage over the plaintiff's female peers). But that reasoning confuses a relative reduction of competitive advantage among males with the elimination of the absolute advantage over females. It is true that males who suppress testosterone see decreased performance compared to other males. But the relevant point for this case is that males that have undergone hormone suppression *remain stronger, faster, and more explosive than females* because of their male genetics, as discussed above. And, of course, they are still males competing in girls' sports.

Remember that grip strength is a simple but powerful proxy for overall muscular strength. Males

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[63] *Ibid.*

[64] *Id.* at 201.

who suppressed testosterone for twelve months saw a 4% decrease in grip strength.[65] Yet those individuals maintained a significant advantage over females: even after hormone therapy reduced their handgrip strength to the 25th percentile for males, their strength remained over the 90th percentile for females.[66] That means an unexceptional male rises to the top decile of females *even when actively suppressing his testosterone.*

The same is true of heart and lung endurance. The Air Force measures cardiorespiratory fitness through a 1.5 mile run in its Physical Fitness Assessment.[67] On that test, biological men who underwent hormone therapy "retain[ed] an advantage in endurance * * * over female controls for over 2 years after starting" hormones.[68] Receiving estrogen did worsen the biological males' run times, yet even then they "remained faster than [biological women] at all time points."[69] In other words, even after hormone therapy, males still had greater endurance capacity than women, though less than other males.

Males also retain superior oxygen-carrying capacity even after hormone suppression. Testosterone increases hemoglobin, which boosts the blood's ability to deliver oxygen to working muscles

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[65] See Scharff et al., *supra* note 8, at 1026.

[66] *Ibid.*

[67] See U.S. Dep't A.F., DAFMAN No. 36-2905, Department of the Air Force Physical Fitness Program § 3.1.1 (2022) (also allowing a 20 meter High Aerobic Multi-shuttle Run).

[68] Roberts, *supra* note 52, at 582.

[69] *Id.* at 580.

and is central to endurance performance.[70] While testosterone suppression may be able to eliminate a male's hemoglobin advantage over females,[71] even then, other factors including "total blood volume, heart size and contractility" result in aerobic capacity advantages for males who have suppressed testosterone over biological females.[72] Even if medicine can narrow one biological factor, the multitude of other male advantages ensures that males retain performance advantages over females, even after those males have undergone testosterone suppression.

In short, testosterone suppression simply cannot eliminate the athletic performance advantages that males carry over females. Nor can it transition a male into a female.

CONCLUSION

Idaho and West Virginia protect the opportunity for girls to compete on a fair playing field. The statutes rest on science and common sense that shows that males retain enduring athletic advantages that hormone suppression and surgeries cannot erase. The contrary rulings below erase the foundation of fair competition in service of unscientific ideology.

The judgments of the Ninth and Fourth Circuits should be reversed.

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[70] Hunter et al., *Biological Basis, supra* note 29, at 2336.

[71] See Louis J. G. Gooren & Mathijs C. M. Bunck, *Transsexuals and competitive sports,* 151 European J. Endocrinology 425, 426-427 (2004).

[72] Hilton & Lundberg, *supra* note 7, at 208.

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