Nos. 24-38 & 24-43

In the Supreme Court of the United States

BRADLEY LITTLE, GOVERNOR OF IDAHO, ET AL.,
Petitioners,

v.

LINDSAY HECOX, ET AL.,
Respondents.

WEST VIRGINIA, ET AL.,
Petitioners,

v.

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

On Writs of Certiorari to the United States Courts of Appeals for the Ninth and Fourth Circuits

BRIEF OF INTERESTED SPORTS PHYSIOLOGISTS AS *AMICI CURIAE* IN SUPPORT OF PETITIONERS

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INTEREST OF *AMICI CURIAE*

Amici curiae are renowned scientists, academics, and researchers who have dedicated their careers to researching sports physiology.[1] They have particular experience in the area of sex-based differences in athletic performance.

Dr. Gregory A. Brown, PhD, FACSM, is a Professor of exercise science in the Department of Kinesiology and Sport Sciences at the University of Nebraska at Kearney. He focuses his teaching and research primarily on the anatomical and physiological factors that influence health and human performance. His research evaluates sex-based differences in sports performance, the effects of nutritional supplements on the physiological response to exercise, the physiological responses to various types of exercise, and effective teaching in the exercise science program. He is a member of the American College of Sports Medicine, the National Strength and Conditioning Association, the Association of American Educators, and the National Association of Scholars. He has also been recognized as a Fellow of the American College of Sports Medicine for his research endeavors in the field of exercise science.

Dr. Mandy W. Christensen, PhD, is an Assistant Professor in exercise sciences and the Internship Coordinator in the Department of Exercise Sciences at

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[1] Pursuant to Supreme Court Rule 37.6, *amici curiae* state that no counsel for any party authored this brief in whole or in part and no entity or person, aside from *amici curiae* or their counsel, made any monetary contribution intended to fund the preparation or submission of this brief.

Brigham Young University. She is the co-founder of the BYUMove student exercise initiative. Her research interests include sex differences in athletic performance and how college campuses implement exercise-as-medicine. She is a former NCAA Division I women's basketball player and has coached women's basketball on the collegiate, high school, and primary school levels and girls' cross country on the high school level. Dr. Christensen is a member of the American College of Sports Medicine. She earned her Bachelor of Science degree from the University of Maryland Baltimore County and a Master of Science degree from Brigham Young University. She earned a PhD in Exercise Science from Brigham Young University in 2005.

Dr. Brandon S. Shaw, PhD, PhD, FHEA, from the University of Essex, has a distinguished tenure in sport and exercise sciences. He is an internationally recognized academic leader and healthcare professional with over 20 years of global experience spanning higher education, research, and strategic governance. He has previously served as a Board Member and Audit Chair of the South African Medical Research Council ("SAMRC") and a Professor and Vice-Dean: Research at the University of Johannesburg. He is currently a Visiting Research Fellow in Public Health at the University of the Free State. His research focuses on developing scalable approaches to prevent and manage non-communicable diseases ("NCDs") through lifestyle medicine, as well as advancing youth sport participation with an

emphasis on physical activity engagement, health promotion, and athletic performance.

Dr. Ina Shaw, PhD, from the University of Essex, is a notable scholar and internationally recognized expert in exercise science, NCD prevention, and physical activity promotion. She currently serves as Lead of the Clinical Exercise and Rehabilitation Cluster ("CERC") and Visiting Research Fellow in Public Health at the University of the Free State. She has an extensive record of academic and industry leadership, having previously held senior positions in higher education and industry. Her leadership extends beyond academia, with a record of impactful industry collaborations and being an advisor to multiple global initiatives, including the US National Physical Activity Plan SPORT Sector, and the National Youth Sports Health and Safety Institute. She has also held honorary professorial appointments at numerous universities. Her research centers on strategies for preventing and managing NCDs throughout the lifespan, alongside promoting and enhancing youth participation in physical activity and sports.

This case implicates basic scientific questions about how biological differences between men and women contribute to athletic performance. As leading sports physiologists, *amici curiae* have a strong interest in advising the Court about the biological differences between males and females that exist at

all stages of development and result in a male athletic advantage—both before and after puberty.[2]

INTRODUCTION AND SUMMARY OF ARGUMENT

Women's sports exist because men and women are not biological or athletic equals. The separation of sports and teams by sex has long been recognized as necessary to preserve opportunities for girls and women to train, compete, and succeed on equal footing. Without such separation, female athletes would be displaced from podiums, rosters, and scholarships. Without a protected female sporting category, athletes such as Martina Navratilova, Venus and Serena Williams, Katie Ledecky, Jackie Joyner-Kersee, Valarie Allman, Alex Morgan, Megan Rapinoe, and Caitlin Clark likely would never have attained championship status. Their extraordinary performances would have been eclipsed by male competitors whose inherent anatomical and physiological advantages are insurmountable for females. That fundamental truth is confirmed by decades of scientific research demonstrating that male athletic advantages exist from childhood, are rooted in biology, and persist despite medical interventions.

The decisions below disregarded that record. The Ninth Circuit treated biological sex as a mere

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[2] This brief uses the terms "man," "boy," and "male" to refer to biological males based on reproductive biology and genetics as determined at birth. It uses the terms "woman," "girl," and "female" to refer to biological females based on reproductive biology and genetics as determined at birth. And it uses the term "transgender" to refer to people who are males or females but identify as a member of the opposite sex.

oversimplification, dismissing the overwhelming evidence that male bodies confer enduring athletic advantages. The Fourth Circuit likewise discounted this evidence, insisting the only purpose of West Virginia's statute was to exclude boys who identify as transgender. In doing so, both courts ignored the science, misapplied this Court's equal-protection precedents, and elevated identity over biology.

Under a proper application of intermediate scrutiny, the scientific record shows that the States' interests are compelling. Protecting the integrity of women's sports is not a matter of stereotype or tradition, but of anatomy and physiology. Intermediate scrutiny allows legislatures to rely on these real, observable differences. When males and females are not similarly situated in athletic performance, laws that classify by sex are both permissible and necessary to protect equal athletic opportunity for women.

The laws enacted by Idaho and West Virginia are substantially related to that goal. They respond directly to the extensively documented biological differences between male and female athletes, which appear in youth competitions, intensify at puberty, and persist despite the use of puberty blockers (*i.e.*, GnRH agonists), testosterone suppression, and cross-sex hormones. By demanding perfect tailoring and disregarding the class-wide evidence, the Fourth and Ninth Circuits imposed a standard more exacting than intermediate scrutiny and impossible to satisfy.

This Court should reject those errors. The Constitution does not forbid laws grounded in

biological reality. It permits States to protect female athletes from displacement by male competitors, and it allows legislatures to secure a level playing field for women. The judgments below should be reversed.

ARGUMENT

I. Biological differences primarily explain why men consistently outperform women in physical performance and athletics, including before puberty and despite so-called "gender affirming hormone therapy."

A. Men's athletic performance exceeds women's.

The scientific starting point is the biological reality that sex in humans is binary and dimorphic: male anatomy and physiology are organized around the production of small gametes (sperm), and female anatomy and physiology are organized around the production of large gametes (ova). This fundamental distinction influences every system in the body.[3] Leading scientific organizations—including the Endocrine Society,[4] American Physiological Society,[5]

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[3] Wolfgang Goymann et al., *Biological Sex Is Binary, Even Though There Is a Rainbow of Sex Roles: Denying Biological Sex Is Anthropocentric and Promotes Species Chauvinism*, BioEssays, Feb. 2023, at 2-4.

[4] Aditi Bhargava et al., *Considering Sex as a Biological Variable in Basic and Clinical Studies: An Endocrine Society Scientific Statement*, 42 Endocrine Revs. 219, 221-22 (2021).

[5] Kalpit Shah et al., *Do You Know the Sex of Your Cells?*, 306 Am. J. Physiology-Cell Physiology C3, C4 (2014).

National Institutes of Health,[6] and American College of Sports Medicine[7]—have affirmed that sex is determined at conception, is dichotomous, shapes physiology and anatomy, and has a profound impact on physical and sports performance. Disorders of sexual development that cause birth sex to appear ambiguous are rare, occurring in approximately 0.02% of births.[8] Such disorders are distinct from transgender identity, which has no demonstrated biological basis.[9] Moreover, individuals with such disorders remain either male or female.

Men outperform equally aged, talented, and trained women in virtually all athletic events. That male athletic advantage exists at all levels—from youth sports to elite competition. And it is often so large as to be insurmountable for comparably aged, trained, and talented women. The scientific research confirms each of these facts.

Men are stronger than women. Depending on the muscle groups and exercises being compared, men are

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[6] Virginia M. Miller, *Why Are Sex and Gender Important to Basic Physiology and Translational and Individualized Medicine?*, 306 Am. J. Physiology-Heart & Circulatory Physiology H781, H782 (2014).

[7] 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. in Sports & Exercise 2328, 2328-30 (2023).

[8] Leonard Sax, *How Common Is Intersex? A Response to Anne Fausto-Sterling*, 39 J. Sex Rsch. 174, 175 (2002).

[9] Bhargava et al., *supra*, at 226.

as much as 40-120% stronger than women.[10] Men have roughly 60-100% greater arm strength and 25-60% greater leg strength.[11] This strength difference means that men are able to lift more weight than women[12] and punch harder than women.[13]

Men run faster and jump higher and farther than women. Researchers have reported a male speed advantage of roughly 10-13%.[14] That is an immense

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[10] James L. Nuzzo, *Narrative Review of Sex Differences in Muscle Strength, Endurance, Activation, Size, Fiber Type, and Strength Training Participation Rates, Preferences, Motivations, Injuries, and Neuromuscular Adaptations*, 37 J. Strength & Conditioning Rsch. 494, 496-501 (2022).

[11] David J. Handelsman et al., *Circulating Testosterone as the Hormonal Basis of Sex Differences in Athletic Performance*, 39 Endocrine Revs. 803, 812 (2018).

[12] 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, 203 (2021) (male Olympic weightlifters lift weights 30-40% heavier than female Olympic weightlifters of the same body weight); Daniel J. van den Hoek et al., *Normative Data for the Squat, Bench Press and Deadlift Exercises in Powerlifting: Data from 809,986 Competition Entries*, 27 J. Sci. & Med. in Sport 734, 736 (2024) (finding that men are able to lift more in the sport of powerlifting).

[13] Jeremy S. Morris et al., *Sexual Dimorphism in Human Arm Power and Force: Implications for Sexual Selection on Fighting Ability*, J. Experimental Biology, Jan. 2020, at 4.

[14] *See, e.g.*, Handelsman et al., *supra*, at 813 (male advantage of about 10% by age 17); Romuald Lepers et al., *Trends in Triathlon Performance: Effects of Sex and Age*, 43 Sports Med. 851, 852-53 (2013) (women 20-30% slower than men at distances

advantage. For example, in the 2024 Men's Summer Olympics, an advantage of roughly 4% would have bumped an individual American male runner from *not even qualifying* for the 100-meter event to winning the gold medal.[15] And men enjoy an even greater advantage in jumping, outperforming similarly aged women by 40-173%.[16] These differences mean that

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greater than 100 km); Valérie Thibault et al., *Women and Men in Sport Performance: The Gender Gap Has Not Evolved Since 1983*, 9 J. Sports Sci. & Med. 214, 217 (2010) (male advantage of 10% across multiple Olympic events); Espen Tønnessen et al., *Performance Development in Adolescent Track and Field Athletes According to Age, Sex and Sport Discipline*, PLoS One, June 2015, at 1-2 (male advantage of 10-12% in running events after puberty).

[15] *Compare Qualifying Information*, USA Track & Field, https://perma.cc/N8F4-FFWK (requiring a time of 10.20 seconds to qualify), *with Paris 2024: Athletics Men's 100M Results*, Olympic Games Paris 2024, https://tinyurl.com/3624r27u (showing a time of 9.79 seconds won gold).

[16] Am. Coll. Sports Med., ACSM's Guidelines for Exercise Testing and Prescription at 104 (12th ed. 2025).

men outperform women in track and field[17] as well as in sports such as volleyball[18] and basketball.[19]

Men also have faster reaction times than women.[20] And men throw, hit, and kick faster and

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[17] *See, e.g.*, Gregory A. Brown et al., *Comparison of Running Performance Between Division and Sex in NCAA Outdoor Track Running Championships 2010-2019*, 54 Med. & Sci. in Sports & Exercise 623, 623 (2022) (across running events at NCAA outdoor track championships, first place man average of 14.1% faster than first place woman); Hunter et al., *supra*, at 2333-34 (men are faster than women by 9.2-20.2% across more than a dozen running and walking events and jump higher and farther than women in jumping events).

[18] *See, e.g.*, Tine Sattler et al., *Vertical Jump Performance of Professional Male and Female Volleyball Players: Effects of Playing Position and Competition Level*, 29 J. Strength & Conditioning Rsch. 1486, 1489-91 (2015) (men jump an average of 50% higher than females during an "attack" at the net).

[19] *Compare* Emily Dozier, *WNBA Players Who Can Dunk: Brittney Griner Stands Alone in 2024 with Record-Setting Rim Prowess*, Sporting News (May 14, 2024), https://perma.cc/G4W8-EA9U (eight WNBA players have dunked a basketball in the regulation ten-foot hoop), *with* Shaker Samman, *These Men Can't Dunk*, Sports Illustrated (Feb. 22, 2021), https://tinyurl.com/3skwvj6u (ability to dunk appears to be almost universal among NBA players).

[20] *See, e.g.*, Pedro Ángel Latorre-Roman et al., *Reaction Times of Preschool Children on the Ruler Drop Test: A Cross-Sectional Study with Reference Values*, 125 Perceptual & Motor Skills 866, 870-72 (2018) (by age four or five, in a ruler-drop test, boys exhibit 4-6% faster reaction times than girls); Espen Tønnessen et al., *Reaction Time Aspects of Elite Sprinters in Athletic World Championships*, 27 J. Strength & Conditioning Rsch. 885, 885-87, 889-90 (2013) (finding 6% male advantage in reaction times of world-class sprinters).

farther than women. This gives men an advantage in sports such as baseball,[21] field hockey,[22] tennis,[23] golf,[24] and soccer.[25]

B. The difference is primarily biological.

The male athletic advantage is primarily rooted in fundamental biological differences between men and women.[26] Men are anatomically and

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[21] *See, e.g.*, Yungchien Chu et al., *Biomechanical Comparison Between Elite Female and Male Baseball Pitchers*, 25 J. Applied Biomechanics 22, 24-29 (2009) (men throw baseballs 35% faster than women); Jerry R. Thomas & Karen E. French, *Gender Differences Across Age in Motor Performance: A Meta-Analysis*, 98 Psych. Bulletin 260, 276 (1985) (by age 12, boys throw 3.5-4 standard deviation units faster than girls).

[22] *See, e.g.*, Hilton & Lundberg, *supra*, at 203 ("[G]aps between fastest recorded . . . field hockey drag flicks exceed 50%.").

[23] *See, e.g.*, *id.* at 201-03 ("The gap between fastest recorded tennis serve is 20%.").

[24] *See, e.g.*, *id.* at 202 (men achieve ball speeds off the tee more than 16% faster than women); Kelsey J. Marshall, *Effects of Flexibility and Balance on Driving Distance and Club Head Speed in Collegiate Golfers*, 10 Int'l J. Exercise Sci. 954, 957 (2017) (as compared to male collegiate golfers, female collegiate golfers have an average drive distance that is 16.5% shorter, a maximal drive distance that is 11.1% shorter, an average club head speed that is 20.4% slower, and a maximum club head speed that is 15.3% slower).

[25] *See, e.g.*, Keiko Sakamoto et al., *Comparison of Kicking Speed Between Female and Male Soccer Players*, 72 Procedia Eng'g 50, 53-55 (2014) (men kick the ball with an average of 20% greater velocity than women).

[26] *See, e.g.*, Hunter et al., *supra*, at 2328 ("Biological sex is a primary determinant of performance in many athletic events and physical tasks.").

physiologically different from women. Those differences are what largely drive the male athletic advantage.

Men are taller than women.[27] In many sports, height itself provides a competitive advantage. Basketball is an obvious example, where male basketball players are on average taller (and heavier) than female basketball players.[28] But height also matters considerably in volleyball[29] and swimming.[30]

Men also have "distinctively greater bone size, strength, and density than do women of the same age."[31] Greater leg and arm length provide obvious advantages in several sports, such as "greater leverage for muscular limb power exerted in jumping,

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[27] Max Roser et al., *Human Height*, Our World in Data (Jan. 2024), https://perma.cc/4U39-JPW8 (average height for women is 5 feet 3 inches and average height for men is 5 feet 7.5 inches).

[28] *See, e.g.*, Jennifer B. Fields et al., *Seasonal and Longitudinal Changes in Body Composition by Sport-Position in NCAA Division I Basketball Athletes*, Sports, Aug. 2018, at 3 (comparing male and female guards and forwards in NCAA Division I basketball).

[29] *Compare* Stefania Toselli & Francesco Campa, *Anthropometry and Functional Movement Patterns in Elite Male Volleyball Players of Different Competitive Levels*, 32 J. Strength & Conditioning Rsch. 2601, 2603-04 (2018) (primary difference between elite and sub-elite volleyball players is 3 cm in height).

[30] *See, e.g.*, Robin Pla et al., *Bayesian Approach to Quantify Morphological Impact on Performance in International Elite Freestyle Swimming*, BMJ Open Sport & Exercise Med., Oct. 2019, at 1 ("Taller swimmers have a higher probability to swim faster.").

[31] Handelsman et al., *supra*, at 818.

throwing, or other explosive power activities."[32] And larger bones also allow for greater muscle mass.[33] Men's broader shoulders, for example, result in greater upper body strength and thus provide an advantage in sports like boxing, weightlifting, and skiing.[34]

Men also have a different bone configuration from women. Research shows that the shape of the female pelvis results in "decreased joint rotation and muscle recruitment ultimately making women slower."[35] Female feet are shaped differently from male feet, "particularly at the arch, the lateral side of the foot, the first toe, and the ball of the foot."[36] Foot size and architecture are critical to sports performance because men's larger feet provide a greater base of support, enhance dynamic balance, and enable more effective use of ankle strategies for postural control, thereby improving stability during athletic movements.[37]

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[32] *Id.*

[33] Taryn Knox et al., *Transwomen in Elite Sport: Scientific and Ethical Considerations*, 45 J. Med. Ethics 395, 397 (2019) ("The larger surface area of bone accommodates more skeletal muscle so, for example, men have broader shoulders allowing more muscle to build.").

[34] *Id.*

[35] *Id.*

[36] Roshna E. Wunderlich & Peter R. Cavanagh, *Gender Differences in Adult Foot Shape: Implications for Shoe Design*, 33 Med. & Sci. in Sports & Exercise 605, 605 (2001).

[37] *See* Hai Qiu & Shuping Xiong, *The Influence of Foot Sizes on Human Balance*, Proceedings of the Human Factors and Ergonomics Society 57th Annual Meeting, at 920 (2013).

Several other anatomical and physiological differences likewise contribute to the male athletic advantage. Men have greater muscle mass and a higher proportion of fast twitch muscle fibers than women.[38] Power, defined as the ability to rapidly produce force, is a critical determinant of sports performance. Because of their greater muscle mass and higher proportion of fast twitch muscle fibers, men generate substantially higher power outputs than women, even after accounting for differences in body mass.[39] Men have a lower proportion of body fat than women,[40] which gives men an advantage "in sports in which speed, strength and recovery are important."[41] And men release energy to muscles at a higher rate than women, in part because men have larger lungs and a larger trachea to take in more oxygen[42] as well as a larger heart to circulate oxygenated blood at a greater rate.[43]

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[38] *See, e.g.*, James L. Nuzzo, *Sex Differences in Skeletal Muscle Fiber Types: A Meta-Analysis*, 37 Clinical Anatomy 81, 85 (2023).

[39] Nat'l Strength & Conditioning Ass'n, NSCA's Essentials of Strength Training and Conditioning at 145 (4th ed. 2016) ("[W]omen's power output relative to body weight was about 63% of men's.").

[40] *See, e.g.*, Knox et al., *supra*, at 397.

[41] *Id*.

[42] *See* Hilton & Lundberg, *supra*, at 201 (larger trachea); Knox et al., *supra*, at 397 (larger lungs).

[43] *See* Hilton & Lundberg, *supra*, at 201-02 (reporting that men on average pump 30% more blood through their circulatory system per minute than women); Knox et al., *supra*, at 397 ("The

C. The difference exists pre-puberty.

Puberty typically begins around age 10 for girls and around age 11.5 for boys.[44] Although the male athletic advantage is more pronounced after puberty, it exists from early childhood.[45] The male athletic advantage in muscular strength, muscular endurance, and running speed even prior to puberty has been well documented for decades.

1. Boys consistently outperform girls in physical fitness testing even before puberty. For example, boys aged nine to ten outperformed similarly aged girls in sit-ups, standing long jump, shuttle run, 50-yard dash, 600-yard run, and nine-minute run in the Youth Fitness Test.[46] Similarly, boys aged 6 to 17 scored higher than similarly aged girls in curl-ups, pull-ups,

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female heart size is, on average, 85% that of a male resulting in the stroke volume of women being around 33% less.").

[44] Hunter et al., *supra*, at 2338.

[45] *See, e.g.*, Gaston Beunen & Martine Thomis, *Muscular Strength Development in Children and Adolescents*, 12 Pediatric Exercise Sci. 174, 176 (2000) ("During childhood and adolescence boys have greater strength per unit of body size, especially in the upper body and trunk, than girls."); Michael J. Joyner et al., *Evidence on Sex Differences in Sports Performance*, 138 J. Applied Physiology 274, 274 (2025) ("These sex differences in athletic performance exist before puberty and increase dramatically as puberty progresses.").

[46] Expert Decl. of Gregory A. Brown ("Brown Report") ¶ 116, *Soule v. Conn. Ass'n of Schs., Inc.*, No. 3:20-cv-201-SVN (D. Conn.), https://tinyurl.com/4dcr4x7n. The Youth Fitness Test was first developed in the 1950s by the American Association for Health, Physical Education, and Recreation and was later updated in the 1960s and 1970s. *Id.*

shuttle run, and mile run in the U.S. Presidential Fitness Test.[47] The only domain in which girls outperformed boys was flexibility, typically measured by the sit-and-reach test. Taken together, these normative standards consistently demonstrate a male advantage in muscle strength, muscle power, muscular endurance, cardiorespiratory endurance, and speed—all of which are critical determinants of sports performance.

Research from other countries analyzing data from school-based fitness testing likewise shows the athletic advantage of prepubertal boys. Greek fitness testing showed that six-year-old boys outperformed six-year-old girls by 16.6% on a shuttle run and by 9.7% in the standing long jump.[48] Australian fitness testing "showed that, compared with 9-year-old females, 9-year-old males were faster over short sprints (9.8%) and 1 mile (16.6%), could jump 9.5% further from a standing start (a test of explosive power), could complete 33% more push-ups in 30 s[econds] and had 13.8% stronger grip."[49] European fitness testing showed that nine-year-old boys

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[47] *Id.* ¶¶ 118-19. The U.S. Presidential Fitness Test was administered nationally from 1966 to 2013. *Id.* ¶ 118.

[48] Konstantinos D. Tambalis et al., *Physical Fitness Normative Values for 6-18-Year-Old Greek Boys and Girls, Using the Empirical Distribution and the Lambda, Mu, and Sigma Statistical Method*, 16 Eur. J. Sport Sci. 736, 738-41 (2016).

[49] Hilton & Lundberg, *supra*, at 201 (citing Mark J. Catley & Grant R. Tomkinson, *Normative Health-Related Fitness Values for Children: Analysis of 85347 Test Results on 9-17-Year-Old Australians Since 1985*, 47 Brit. J. Sports Med. 98 (2013)).

outperformed nine-year-old girls by 6.5-9.7% in the standing broad jump, 11.4-16.1% in handgrip, and 45.5-49.7% in the bent-arm hang.[50] Turkish fitness testing showed that boys as young as nine run faster in repeated sprint testing than similarly aged girls.[51] Additional studies from multiple nations reaffirm the same conclusion: boys, even before puberty, hold measurable advantages in physical fitness over girls.[52]

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[50] Grant R. Tomkinson et al., *European Normative Values for Physical Fitness in Children and Adolescents Aged 9-17 Years: Results from 2 779 165 Eurofit Performances Representing 30 Countries*, Brit. J. Sports Med., Nov. 2017, at 4-6; *see also* P. De Miguel-Etayo et al., *Physical Fitness Reference Standards in European Children: The IDEFICS Study*, 38 Int'l J. Obesity S57, S57 (2014) (in fitness testing of European children aged 9 to 10.9, "boys performed better than girls in speed, lower- and upper-limb strength and cardiorespiratory fitness").

[51] İbrahim Can et al., *Age- and Sex-Specific Differences in Repetitive Sprinting in 9-14-Year-Olds Living in Turkey*, BMC Public Health, Feb. 2025, at 11; *cf.* Grant R. Tomkinson et al., *International Normative 20 m Shuttle Run Values from 1 142 026 Children and Youth Representing 50 Countries*, 51 Brit. J. Sports Med. 1545, 1549 (2017) (boys aged 9 to 17 from countries around the world outperformed similarly aged girls in the 20-meter shuttle run).

[52] *See, e.g.*, Cristina Cadenas-Sanchez et al., *Physical Fitness Reference Standards for Preschool Children: The PREFIT Project*, 22 J. Sci. & Med. in Sport 430, 432-34 (2019) (among Chilean preschoolers, boys performed better on handgrip strength, standing long jump, and 20-meter sprint than girls); Samuel Manzano-Carrasco et al., *Differences in Body Composition and Physical Fitness Parameters Among Prepubertal and Pubertal Children Engaged in Extracurricular Sports: The Active Health Study*, 32 Eur. J. Pub. Health i67, i68-

The fact that prepubertal boys have for decades consistently outperformed girls of the same age in tests of cardiorespiratory fitness, muscular strength, muscular endurance, speed, and power—and across so many different countries and cultures—confirms that these sex-based differences are primarily biological and not cultural. *See also infra* p.21.

2. Despite these well-documented differences in physical fitness between boys and girls, sex-based differences in competitive performance before puberty have been largely overlooked by scholarly inquiry because boys and girls typically competed separately and high-stakes competition rarely emerged until adolescence. However, real-world performance data from track and field competitions reveal the prepubertal male athletic advantage. USA Track & Field data for all-time best performances indicate that boys outperform girls in the youngest age group for

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i69 (2022) (among Spanish prepubertal children, boys outperformed girls on tests of countermovement jump, handgrip strength, and 20-meter shuttle run); Abel L. Toriola & Nicholas U. Igbokwe, *Age and Sex Differences in Motor Performance of Pre-School Nigerian Children*, 4 J. Sports Sci. 219, 223-25 (1986) (among Nigerian children aged three to five, boys consistently outperformed girls on tests of catching, standing long jump, tennis ball throw, and speed run); Jérémy Vanhelst et al., *Normative Health-Related Fitness Values for French Children: The Diagnoform Programme*, 30 Scan. J. Med. & Sci. in Sports 690, 693-94 (2020) (among French children aged 6 to 11, boys outperformed girls on tests of cardiorespiratory fitness, muscular endurance, and speed).

which records are kept (eight-and-under).[53] Amateur Athletic Union ("AAU") data for all-time best performances in the AAU Junior Olympic Games likewise indicate that boys outperform girls in the youngest age group for which records are kept (eight-and-under).[54]

Real-world performance data from swimming competitions are in accord. USA swimming data for all-time best performances indicate that boys outperform girls in nearly all short-course and long-course events in the youngest age group for which records are kept (ten-and-under).[55] So too do AAU data for all-time best swimming performances in the eight-and-under and ten-and-under age groups.[56]

In spite of decades of evidence from physical fitness testing and athletic records, some still claim that sex-based sports performance differences before puberty are "minimal" or nonexistent.[57] Such characterizations are outdated. Recent research—published within the past two years—provides

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[53] Brown Report ¶ 161; *see also id.* ¶ 162 (reaching same conclusion when evaluating USA Track & Field Junior Olympic Championships data); *id.* ¶¶ 164-67 (reaching same conclusion when evaluating USA Track & Field data for certain years and geographies).

[54] *Id.* ¶ 163.

[55] *Id.* ¶¶ 173-74.

[56] *Id.* ¶ 176.

[57] *See, e.g.*, Hunter et al., *supra*, at 2338; Joshua D. Safer, *Fairness for Transgender People in Sport*, J. Endocrine Soc., Mar. 2022, at 1.

compelling evidence that, even before puberty, boys run and swim faster and jump and throw farther than similarly aged girls in competition.[58]

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[58] *See, e.g.*, Mira A. Atkinson et al., *Sex Differences in Track and Field Elite Youth*, 56 Med. & Sci. in Sports & Exercise 1390, 1390-94 (2024) (prepubertal boys outperformed similarly aged girls in the 100-meter, 200-meter, 400-meter, and 800-meter running, long jump, and high jump events); Gregory A. Brown et al., *Sex-Based Differences in Shot Put, Javelin Throw, and Long Jump in 8-and-Under and 9-10-Year-Old Athletes*, Eur. J. Sport Sci., Jan. 2025, at 1 ("[I]n elite competition, males in the 8-and-under and 9-10-year-old age groups typically performed long jump and throw the shot put and javelin farther than females of the same age."); Gregory A. Brown et al., *Sex-Based Differences in Swimming Performance in 10-Years-Old-and-Under Athletes in Short Course National Competition*, Eur. J. Sport Sci., Jan. 2025, at 8-9 (boys aged ten and under swam faster than similarly aged girls in 8 out of 12 short-course swimming events, with no sex-based differences in the remaining 4 events); 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 Eur. J. Sport Sci. 217, 217 (2024) ("[I]n elite competition, males in the 8 and under and 9-10-year-old age groups typically run faster than females of the same age by 2.9%-6.7% for running distances of 100, 200, 400, 800, and 1500m."); Mandy W. Christensen & Christine M. Griffiths, *Sex Differences in 1600-m Running Performance and Participation for Children Aged 6-12 Yr.*, Exercise, Sport & Movement, Summer 2025, at 1 ("Male children are faster than female children at running 1600 m at ages 6-12 yr" by 7.7%.); Jessica J. James et al., *Sex-Based Differences in the Representation of Top Youth Athletes*, 57 Med. & Sci. in Sports & Exercise 1523, 1523 (2025) ("Females were no longer represented within the top 10 performances starting at ~12 y[ears] in running and ~13 y[ears] in swimming and no longer represented within the top 100 starting at ~14 y[ears] in running and ~15 y[ears] in swimming."); Tommy R. Lundberg &

Some may claim that because a higher proportion of boys participate in sports than girls, increasing girls' participation rates will erase the prepubertal sex-based difference in performance. However, recent empirical data show that boys aged 6 to 12 run an average of 7.7% faster than girls in a 1600-meter race.[59] The authors of that study created a mathematical model "to equalize both participation and performance between the sexes" so they could "test[] the potential effect of female participation on the performance difference."[60] Applying that model, they found that "in a general population of school-aged children, sex differences in aerobic performance were not influenced by the lower female participation percentage. Rather, the[ir] findings suggest that the differences are the result of physiological differences between the sexes."[61] Furthermore, although girls outnumber boys in competitive children's swimming, boys are faster than girls in most events by age ten with no event showing an advantage for girls.[62]

Justin Menickelli, *Sex Differences in Disc Golf Performance: Implications for Eligibility Criteria for Women's Competitions*, Eur. J. Sport Sci., July 2025, at 1 ("In junior [disc golf] competitions, boys showed higher ratings and better performance than girls, with clear differences already observed at age 10.").

[59] Christensen & Griffiths, *supra*, at 1.

[60] *Id.* at 3.

[61] *Id.* at 4.

[62] *See* Brown et al., *Sex-Based Differences in Swimming Performance*, *supra*, at 8-9 (boys in the ten-and-under age group swam faster than girls of the same age in 8 out of 12 short-course

D. The difference cannot be erased by medical interventions.

Despite the use of puberty blockers, testosterone suppression, and cross-sex hormones, anatomical and physiological differences that confer a male performance advantage remain.

1. Many of the anatomical and physiological differences between boys and girls develop in utero and continue through early childhood. Boys have more lean mass and less fat mass from birth.[63] Boys have

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swimming events, with no sex-based differences in the remaining 4 events); Jonathon W. Senefeld et al., *Sex Differences in Youth Elite Swimming*, PLoS One, Nov. 2019, at 1 (at age ten, the top five boys were 2.5% faster than the top five girls and the 10th-50th ranked boys were 1% faster than the girls); *see also* David J. Handelsman, *Sex Differences in Athletic Performance Emerge Coinciding with the Onset of Male Puberty*, 87 Clinical Endocrinology 68, 69-70 (2017) (as compared to prepubertal girls, prepubertal boys swam 1-2% faster in most events—and also ran 3% faster and jumped 5.8% farther).

[63] Alison M. McManus & Neil Armstrong, *Physiology of Elite Young Female Athletes*, 56 Med. & Sport Sci. 23, 28 (2011) ("At birth, boys tend to have a greater lean mass than girls" and "[t]his difference remains small but detectible throughout childhood with about a 10% greater lean mass in boys than girls prior to puberty."); *see also* Shanlee M. Davis et al., *Sex Differences in Infant Body Composition Emerge in the First 5 Months of Life*, 32 J. Pediatric Endocrinology & Metabolism 1235, 1235 (2019) (at birth and age five months, infant boys have larger total body mass, body length, and fat-free mass than infant girls).

stronger bones by age six.[64] And boys also have advantages in heart and lung size and function.[65]

2. Despite the use of puberty blockers, testosterone suppression, and cross-sex hormones, a residual male advantage in athletic and physical performance remains due to these irreversible biological and anatomical differences.

Puberty blockers do not, for example, eliminate the difference in lean body mass between boys and

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[64] Carolina Medina-Gomez et al., *Bone Mass and Strength in School-Age Children Exhibit Sexual Dimorphism Related to Differences in Lean Mass: The Generation R Study*, 31 J. Bone & Mineral Rsch. 1099, 1099 (2016) ("bone sexual dimorphism is already present at 6 years of age, with boys having stronger bones than girls"); *see also* Jack Wang, *Correlations Between Skeletal Muscle Mass and Bone Mass in Children 6-18 Years: Influences of Sex, Ethnicity, and Pubertal Status*, 63 Growth, Dev. & Aging 99, 99 (1999) (at age six, boys have higher skeletal muscle mass than girls).

[65] McManus, *supra*, at 32 ("There are clear differences in cardiac function at rest and during exercise between girls and boys, with differences apparent even prior to puberty."); *see also* S. Eiberg et al., *Maximum Oxygen Uptake and Objectively Measured Physical Activity in Danish Children 6-7 Years of Age: The Copenhagen School Child Intervention Study*, 39 Brit. J. Sports Med. 725, 725 (2005) (six- and seven-year-old boys have a higher aerobic capacity than similarly aged girls).

girls.[66] Nor do they erase male height advantages[67] or male strength advantages.[68] Put simply, there is no evidence showing that puberty blockers can erase the male athletic advantage.

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[66] *See, e.g.*, Maartje Klaver et al., *Early Hormonal Treatment Affects Body Composition and Body Shape in Young Transgender Adolescents*, 15 J. Sexual Med. 251, 255 (2018) (showing that boys who identify as transgender still had a higher lean body mass than girls after two years of puberty blockers); Natalie J. Nokoff et al., *Body Composition and Markers of Cardiometabolic Health in Transgender Youth on Gonadotropin-Releasing Hormone Agonists*, 6 Transgender Health 111, 116 (2021) (showing that teenage boys who identify as transgender who were on puberty blockers had more lean body mass and less fat mass than teenage girls).

[67] *See, e.g.*, Lidewij Sophia Boogers et al., *Transgender Girls Grow Tall: Adult Height Is Unaffected by GnRH Analogue and Estradiol Treatment*, 107 J. Clinical Endocrinology & Metabolism e3805, e3814 (2022) (finding that puberty blockers followed by cross-sex hormone therapy has "little effect on adult height"); Silvia Ciancia et al., *Early Puberty Suppression and Gender-Affirming Hormones Do Not Alter Final Height in Transgender Adolescents*, 189 Eur. J. Endocrinology 396, 399 (2023) (similar); Caroline Schulmeister et al., *Growth in Transgender/Gender-Diverse Youth in the First Year of Treatment with Gonadotropin-Releasing Hormone Agonists*, 70 J. Adolescent Health 108, 112 (2022) (determining that youth who were on puberty blockers "have growth rates comparable to those of prepubertal children").

[68] *See, e.g.*, Lidewij Sophia Boogers et al., *Shaping the Skeleton: Impact of GnRH Analogue and Sex Hormone Therapy on Skeletal Dimensions in Transgender Individuals*, 110 J. Clinical Endocrinology & Metabolism e1411, e1413-14, e1416-17 (2025) (shoulder width—which is linked to muscle mass—is greater in men who identify as transgender who were on puberty blockers than in women).

Nor do testosterone suppression therapies erase the innate biological advantages that males have over females in sports. For example, these therapies cannot overcome the inherent advantages that males have in lean body mass,[69] grip strength,[70] or maximum oxygen uptake,[71] among many others.

II. The Fourth and Ninth Circuits were wrong to ignore this science.

A. Differences in athletic performance are primarily biological.

Scientific research demonstrates that males consistently outperform females in virtually every measure of athletic performance. Across all ages, sports, and competition levels, males run faster, jump higher, lift more weight, and generate more power

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[69] *See, e.g.*, Leonardo Azevedo Mobilia Alvares et al., *Cardiopulmonary Capacity and Muscle Strength in Transgender Women on Long-Term Gender-Affirming Hormone Therapy: A Cross-Sectional Study*, 56 Brit. J. Sports Med. 1292, 1296 (2022); Matthias K. Auer et al., *Effects of Sex Hormone Treatment on the Metabolic Syndrome in Transgender Individuals: Focus on Metabolic Cytokines*, 103 J. Clinical Endocrinology & Metabolism 790, 793-95 (2018).

[70] *See, e.g.*, Blair Hamilton et al., *Strength, Power and Aerobic Capacity of Transgender Athletes: A Cross-Sectional Study*, 58 Brit. J. Sports Med. 586, 586 (2024); 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, 1022-24 (2019).

[71] *See, e.g.*, Gustavo A. Cortes-Puentes et al., *Cardiopulmonary Exercise Testing in Transgender and Gender-Diverse Patients: The Influence of Sex and Gender on Predicted Aerobic Capacity*, CHEST Pulmonary, June 2024, at 7.

than comparably trained females. *See supra* pp.6-11, 15-21.

The courts below disregarded these realities. The Ninth Circuit dismissed the science, claiming that defining sex by biology is "likely an oversimplification of the complicated biological reality of sex and gender." *Hecox v. Little*, 104 F.4th 1061, 1076 (9th Cir. 2024). The Fourth Circuit similarly erred, claiming that West Virginia's law served the "sole purpose" of "prevent[ing] transgender girls from playing on girls teams." *B.P.J. v. W. Va. State Bd. of Educ.*, 98 F.4th 542, 550 (4th Cir. 2024). That framing disregards the substantial evidence showing that humans are either male or female, *see supra* pp.6-7, and that biological males possess enduring performance advantages over females that persist regardless of gender identity or medical intervention, *see supra* pp.22-25. By rejecting biology as the basis for sex distinctions in athletics, both courts ignored the facts.

The biological and anatomical differences between males and females are not marginal. Male advantages in speed often exceed 10%, while advantages in jumping and throwing can be many times greater. *See supra* pp.8-11. Even before puberty, boys run faster than girls, swim faster than girls, and throw farther than girls. *See supra* pp.15-21. In sports where victory is decided by fractions of a second or inches, these differences are decisive.

The Ninth Circuit nonetheless discounted these male advantages, suggesting instead that "biological sex" is merely a "concept . . . designed precisely by the Idaho legislature to exclude transgender and intersex

people." *Hecox*, 104 F.4th at 1076. The Fourth Circuit erred too, by crediting evidence that males who identify as transgender lack "inherent, biologically-based competitive advantages over cisgender girls when participating in sports." *B.P.J.*, 98 F.4th at 559.

The Fourth and Ninth Circuits were also wrong to conclude that these innate differences appear only after puberty or can be erased by medical interventions. For example, the Ninth Circuit faulted Idaho for not relying on "circulating testosterone levels" rather than sex itself. *Hecox*, 104 F.4th at 1082. The Fourth Circuit likewise downplayed biology, holding that the State failed to show pre-pubertal males enjoy "a meaningful competitive athletic advantage over cisgender girls." *B.P.J.*, 98 F.4th at 561. Both courts thus disregarded the unrefuted scientific evidence that male advantages exist from early childhood and persist despite hormone suppression or other medical interventions.

B. Under intermediate scrutiny, sex-based classifications grounded in biology are valid and substantially related to important governmental objectives.

This Court has long held that sex-based classifications are subject to intermediate scrutiny. *See, e.g.*, *United States v. Skrmetti*, 145 S. Ct. 1816, 1828-29 (2025); *United States v. Virginia*, 518 U.S. 515, 524 (1996). Such classifications are constitutional if they "serve[] 'important governmental objectives and [if] the discriminatory means employed' are 'substantially related to the achievement of those objectives.'" *Miss. Univ. for Women v. Hogan*, 458 U.S.

718, 724 (1982) (citation omitted). The laws at issue here satisfy that test.

Protecting the equal athletic opportunities of women and girls is an important and compelling governmental interest. That is because, "[w]ithout a gender-based classification in competitive contact sports, there would be a substantial risk that boys would dominate the girls' programs and deny them an equal opportunity to compete in interscholastic events." *O'Connor v. Bd. of Educ. of Sch. Dist. 23*, 449 U.S. 1301, 1307 (1980) (Stevens, J., in chambers). Laws that separate sports by biological sex are substantially related to that interest because, as the record and the science confirm, males as a class retain decisive performance advantages over females, and this advantage exists both pre-puberty and regardless of medical interventions.

The Ninth Circuit nonetheless held that Idaho's Fairness in Women's Sports Act "does not advance" these interests because "it is not substantially related to its stated goals of equal participation and opportunities for women athletes." *Hecox*, 104 F.4th at 1083. That reasoning turned intermediate scrutiny into something closer to strict scrutiny, faulting Idaho for not adopting alternative approaches (such as reliance on circulating testosterone levels) that the court thought would better "balance transgender inclusion." *Id.* at 1090. But this Court has made clear that intermediate scrutiny does not require States to choose the "most scientifically advanced method" of regulation, only one that "represents a reasonable conclusion by the legislature." *Tuan Anh Nguyen v.*

INS, 533 U.S. 53, 63 (2001). The Ninth Circuit erred by requiring more.

The Fourth Circuit made similar errors in rejecting West Virginia's Save Women's Sports Act. It required the State to prove that B.P.J. still had a "meaningful competitive athletic advantage over cisgender girls." *B.P.J.*, 98 F.4th at 561. By narrowing the inquiry to one athlete's circumstances, the panel disregarded the settled principle that intermediate scrutiny assesses the relationship of a classification "to the overall problem the government seeks to correct, not on the extent to which it furthers the government's interests in an individual case." *Ward v. Rock Against Racism*, 491 U.S. 781, 801 (1989). In other words, unlike the Fourth Circuit's decision below, "[n]one" of this Court's "gender-based classification equal protection cases have required that the statute under consideration . . . be capable of achieving its ultimate objective in every instance." *Tuan Anh Nguyen*, 533 U.S. at 70.

By demanding perfect tailoring and disregarding class-wide evidence of the male athletic advantage, both the Ninth Circuit and the Fourth Circuit misapplied intermediate scrutiny. That standard requires a substantial fit, not individualized proof or the least restrictive means. When the analysis is properly applied, laws that designate sports by biological sex easily satisfy the Constitution: they directly advance the State's paramount interest in preserving fair competition and equal opportunities for women.

CONCLUSION

The judgments of the courts of appeals should be reversed.

Respectfully submitted.

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SEPTEMBER 2025