No. 24-30399

In the United States Court of Appeals for the Fifth Circuit

STATE OF LOUISIANA, ET AL.,
Plaintiffs–Appellees,

v.

U.S. DEPARTMENT OF EDUCATION, ET AL.,
Defendants–Appellants.

SCHOOL BOARD RAPIDES PARISH,
Plaintiff–Appellee,

v.

U.S. DEPARTMENT OF EDUCATION, ET AL.,
Defendants–Appellants.

On Appeal from the United States District Court
for the Western District of Louisiana,
Case Nos. 3:24-CV-563 & 1:24-CV-567

BRIEF OF *AMICUS CURIAE*
PHYSIOLOGISTS IN SUPPORT OF APPELLEES
AND AFFIRMANCE OF THE COURT BELOW

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CERTIFICATE OF INTERESTED PARTIES

The undersigned counsel of record certifies that *amicus curiae* physiologists, Kenneth Dormer, Ph.D., Maurice H. Laughlin, Ph.D., and David Horton, Ph.D., have an interest in the outcome of this case. Amicus curiae are individuals and thus have no corporate disclosures. *Amici* are unaware of any persons with any interest in the outcome of this litigation other than the signatories to this brief and their counsel, and those identified in the party and amicus briefs filed in this case. These representations are made in order that the judges of this court may evaluate possible disqualification or recusal.[1]

Dated: September 26, 2024

/s/ John G. Knepper
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[1] No part of this brief was authored by counsel for any party, and no person or entity other than *amicus curiae* or their counsel made any monetary contribution to its preparation or submission. All parties received notice and have consented to the timely filing of this *amicus* brief.

TABLE OF CONTENTS

TABLE OF AUTHORITIES

Cases

Statutes

Other Authorities

INTEREST OF AMICUS CURIAE

Amicus curiae Kenneth Dormer, Ph.D., Maurice H. Laughlin, Ph.D., and David Horton, Ph.D., are physiologists. *Amici* are researchers and educators in the study of how the systems of the human body interact and how these systems differ between men and women. As experts in this field, Amici have a professional responsibility to provide courts with reliable scientific information. Amici are deeply concerned that, despite claims to the contrary by Defendants/Appellants, the new Title IX regulations will eliminate the ability of educational institutions to provide sex-segregated athletic opportunities. Amici are uniquely positioned to provide this Court with critical insight as to why the sex-blind approach that underlies the logic of the new regulation will result in negative consequences for biological women and why recent claims—about medical interventions such as testosterone suppression—will not prevent biological males from destroying one of the great successes of Title IX.

ARGUMENT

I. Introduction

"Sometimes the grossest discrimination can lie in treating things that are different as though they were exactly alike." *Jenness v. Fortson*, 403 U.S. 431, 441-42 (1971). Such is the flaw with the new Title IX rule before this Court. The new Title IX regulations expand the scope of that law beyond its text and its purpose. More than that, by demanding that education be sex blind, the rule actively harms women in contexts where sex matters.

The rise of women's athletics in the United States is one of the crowning achievements of Title IX. Athletics are not discussed in the text of Title IX, although Congress tasked the Executive Branch with issuing regulations on the subject. *See* Pub. L. 93-380, § 844, 88 Stat. 484 (Aug. 21, 1974) ("The Secretary shall prepare and publish … proposed regulations implementing the provisions of Title IX of the Education Amendments of 1972 relating to the prohibition of sex discrimination in federally assisted education programs, which shall include with respect to intercollegiate athletic activities reasonable provisions considering the nature of particular sports."). From the very beginning, Title IX

regulations have authorized schools to offer separate-sex teams "where selection for such teams is based upon competitive skill or the activity involved is a contact sport" while requiring that the schools "provide equal athletic opportunity for members of both sexes." 34 C.F.R. 106.41. Congress held hearings on these Title IX regulations and left them in place. *See North Haven Bd. of Ed. v. Bell*, 456 U.S. 512, 531-33 (1982).

The Parties have briefed how the new regulations—despite protests to the contrary—affect women's athletics as a legal matter. *See* Brief of Rapides Parish Sch. Bd. (Docket No. 129) at 5-7. Amici will not belabor the legal argument here. As physiologists, however, Amici have an extensive understanding of the *practical effect* of Title IX on athletics.

Men, adolescent boys, and male children have an advantage over equally aged, gifted, and trained women, adolescent girls, or female children in almost all athletic events. This advantage arises from male physiology, anatomy and biochemistry. Men, adolescent boys, and prepubertal male children can run faster, output more muscular contractive power, jump higher, and possess greater muscular endurance than women, adolescent girls, and prepubertal female children. These advantages become greater during and after male puberty, but they exist

before puberty. This is true at an elite, collegiate, scholastic, or recreational level.

There is no published scientific evidence that the administration of puberty blockers to males before puberty eliminates the pre-existing athletic advantage that prepubertal males have over prepubertal females in virtually all athletic events.

Although androgen deprivation (that is, testosterone suppression) may modestly decrease some physiological advantages that men and adolescent boys have over women and adolescent girls, it cannot fully or even largely eliminate physiological advantages once an individual has passed through male puberty.

In sports, sex and sex-linked physical traits are outcome-determinative. As such, the United States' revolutionary redefinition of Title IX will inevitably extinguish, not promote, women's athletics. Despite claims by the United States that this difficult issue has been deferred to a future rulemaking, the new regulation dismantles Title IX's existing sex-segregated architecture, mandating the inclusion of males who identify as girls or women into women's sports.

II. Men and women are physically different from conception.

Although sex and gender are used interchangeably in common conversation, government documents, and in the scientific literature, the American Psychological Association defines sex as "physical and biological traits" that distinguish between males and females whereas gender "refers especially to social or cultural traits," although this distinction can be blurred in the use of the terms. "Sex", American Psychological Association, APA Dictionary of Psychology (https://dictionary.apa.org, accessed September 25, 2024).

The concept that sex is an important biological factor determined at conception is a well-established, medically scientific fact that is supported by statements from a number of respected organizations including, but not limited to, the Endocrine Society, Aditi Bhargava, et al., *Considering Sex as a Biological Variable in Basic and Clinical Studies: An Endocrine Society Scientific Statement*, 42 Endocrine Rev. 219-258 (2021), the American Physiological Society, Kalpit Shah, et al., *Do you know the sex of your cells?* Am. J. Physiology-Cell Physiology 2014 Jan. 1, 306(1):C3-18, the Institute of Medicine, and the National Institutes of Health, Virginia Miller, Review, *Why are sex and gender*

important to basic physiology and translational and individualized medicine? Am. J. Physiology-Heart & Circulatory Physiology, 2014 March, 306(6): H781-82.

Every cell has a genetic sex-code and every system in the body is influenced, either directly or indirectly, by sex. Indeed, "sex often influences gender, but gender cannot influence sex." Bhargava, *Considering Sex* at 228. "[S]ex determination begins with the inheritance of XX or XY chromosomes" *Id.* at 221. And "Phenotypic sex differences develop in XX and XY embryos as soon as transcription begins. The categories of X and Y genes that are unequally represented or expressed in male and female mammalian zygotes … cause phenotypic sex differences" *Id.* at 222.

Scientists who have examined "18,670 out of 19,644 informative protein-coding genes in men versus women" have reported that "there are over 6500 protein-coding genes with significant S[ex] D[ifferential] E[xpression] in at least one tissue. Most of these genes have SDE in just one tissue, but about 650 have SDE in two or more tissues, 31 have SDE in more than five tissues, and 22 have SDE in nine or more tissues." Moran Gershoni & Shmuel Pietrokovski, *The Landscape of sex-*

differential transcriptome and its consequent selection in human adults, 15:7 BMC BIOL 2-3 (2017). Body tissues affected by a person's sex include not just breast mammary tissue, but also skeletal muscle, skin, the thyroid gland, the pituitary gland, subcutaneous adipose, the lung, and heart's left ventricle.[2] "Y chromosome harbors male-specific genes, which either solely or in cooperation with their X counterpart, and independent or in conjunction with sex hormones have a considerable impact on basic physiology and disease mechanisms in most or all tissues development." Raheleh Heydari, et al., *Y chromosome is moving out of sex determination shadow*, 12 Cell & Bioscience 4 (2022).

For skeletal muscle alone, one research group concluded that "[m]ore than 3,000 genes have been identified as being differentially expressed between male and female skeletal muscle." K.M. Haizlip, et al., *Sex-based differences in skeletal muscle kinetics and fiber-type composition*. 30 Physiology (Bethesda) 30 (2015). The differences in genetic expression between males and females influence the skeletal

2 All of these tissues are also involved in the different exercise responses of males and females. For example, biological males sweat more from skin and, therefore, can thermoregulate better than females.

muscle fiber composition (i.e. fast twitch and fast twitch sub-type and slow twitch), the skeletal muscle fiber size, the muscle contractile rate, and other aspects of muscle function that influence athletic performance.

III. Biological men, adolescent boys, and prepubescent boys have well-documented performance advantages over females that affect athletic competitions.

Men are on average larger, stronger, and faster than women. Although this maxim is common human experience and knowledge, it is also supported by science. Men, adolescent boys, and prepubertal male children substantially outperform comparably aged women, adolescent girls and prepubertal female children in competitions involving running speed, swimming speed, cycling speed, jumping height, jumping distance, and strength (to name a few, but not all, of the performance differences). Science makes clear that these performance advantages are inherent to the biological differences between the sexes. 'Advantage' in this sense does not reflect a normative judgment. Rather, the female physique is inescapably different from the male physique, which in turn affects the body's biomechanics and biokinetics.

Men are stronger. Men have 60%-100% greater arm strength than women. David Handelsman, et al., *Circulating Testosterone as the*

hormonal basis of sex differences in athletic performance, 39 Endocrine Reviews 812 (2018). Grip strength is often used as a proxy for strength more generally. In one study, men showed on average 57% greater grip strength than women. Richard Bohannon, et al., *Handgrip strength: a comparison of values obtained from the NHANES and NIH toolbox studies*, 73 Am. J. Occ. Therapy 9 (2019). In a study of 1,654 healthy men, 533 healthy women aged 20-25 years and 60 "highly trained elite female athletes from sports known to require high hand-grip forces (judo, handball)," the authors observed that "[t]he results of female national elite athletes even indicate that the strength level attainable by extremely high training will rarely surpass the 50th percentile of untrained or not specifically trained men." D. Leyk, et al., *Hand-grip strength of young men, women and highly trained female athletes*, 99 Eur. J. Appl. Physiology 415 (2007).

Men have in the neighborhood of 25%-60% greater leg strength than women. Handelsman, *Circulating Testosterone* at 812. Men exhibit 54% greater knee extension torque and this male leg strength advantage is consistent across the lifespan. J.A. Neder, et al., *Reference values for concentric knee isokinetic strength and power in nonathletic men and*

women from 20 to 80 years old, 29 J. Orth. & Sports Phys. Therapy 120-21 (1999).

This strength advantage is not simply confined to differences in muscle tissue. An individual's punching power reflects a combination of many muscle groups as well as weight and speed. Even moderately trained males generated 162% greater punching power than females, despite the fact that men do not possess this large an advantage in any single bio-mechanical variable. Jeremy Morris, et al., *Sexual dimorphism in human arm power and force: implications for sexual selection on fighting ability*. J. of Experimental Bio. 223 (Jan 23, 2020).

Men run faster. Multiple authors report a male speed advantage of 10%-13% in a variety of events. Handelsman, *Circulating Testosterone* at 813. As any serious runner will recognize, a 10% advantage in running is an overwhelming difference. "[A]pproximately 10,000 males have personal best times that are faster than the current Olympic 100m female champion." Emma Hilton & Tommy Lundberg, *Transgender women in the female category of sport: Perspectives on testosterone suppression and performance advantage*, 51 Sports Medicine 199, 204

(2021). Even "schoolboys"–defined as age 15 and under–have beaten the female world records in running, jumping, and throwing events. *Id.*

Men jump higher and farther. Despite their substantially greater body weight, males enjoy an even greater advantage in jumping than in running, in the range of 15-20%. Handelsman, *Circulating Testosterone* at 813 (looking at youth and young adults). The combined male advantage of body height and jump height means, for example, that a total of seven women in the WNBA have ever dunked a basketball in the regulation 10-foot hoop, while the ability to dunk appears to be almost universal among NBA players.

Men throw, hit, and kick faster and farther. Strength, arm-length, and speed combine to give men a large advantage over women in throwing. One study of elite male and female baseball pitchers showed that men throw baseballs 35% faster than women—81 miles/hour for men versus 60 miles/hour for women. Yungchien Chu, *Biomechanical comparison between elite female and male baseball pitchers*, 25 J. of App. Biomechanics 22 (2009). By age 12, "boys' throwing velocity is already between 3.5 and 4 standard deviation units higher than the girls'." J.R. Thomas & K.E. French, *Gender differences across age in motor*

performance: a meta-analysis. 98 Psych. Bulletin 260, 276 (1985). By age seventeen, the average male can throw a ball farther than 99% of seventeen-year-old females. Michael P. Lombardo, et al., *On the evolution of the sex differences in throwing: throwing as a male adaptation in humans*, 93 Quarterly Rev. of Bio. 91 (2018).

Men are also able to kick balls harder and faster. A study comparing collegiate soccer players found that males kick the ball with an average 20% greater velocity than females. Keiko Sakamoto, et al., *Comparison of kicking speed between female and male soccer players*. 72 Procedia Eng. 50 (2014).

Males exhibit faster reaction times (fast twitch muscles)–an attribute not obviously related to strength or metabolism. "Reaction time in sports is crucial in both simple situations such as the gun shot in sprinting and complex situations when a choice is required. In many team sports this is the foundation for tactical advantages which may eventually determine the outcome of a game." The existence of a sex-linked difference in reaction times is consistent over a wide range of ages and athletic abilities. Dominika Dykiert, *Sex differences in reaction time mean and intraindividual variability across the life span*, 48

Developmental Psychology 1262 (2012). At age 4 to 5, in a ruler-drop test, males exhibit 4% to 6% faster reaction times than females. Pedro Angel 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 (2018).

IV. Superior physical performance by men reflects measured physiological differences.

No single physiological characteristic explains the measured advantages that men enjoy in athletic performance. Rather, a number of physiological factors are at play, creating synergy and magnified athletic advantages.

Men are taller and heavier than women, so in some sports, such as basketball and volleyball, size provides the competitive advantage. Helping to illustrate the inherent height difference between men and women, the 95th percentile for body height for women is 178.9 cm (5 feet 9 inches), which is only 0.5 cm taller than the 50th percentile for men (178.4 cm; and also 5 feet 9 inches), while the 95th percentile for body height for men is 193.6 cm (6 feet 4 inches). Max Roser, et al., Our World

in Data, "Human Height" *available at* ourworldindata.org/human-height (2013, rev. 2024) (last visited September 25, 2024).

Males have larger and longer bones, stronger bones, and different bone configurations. "Sex differences in height anatomy have been the most thoroughly investigated measure of bone size, as adult height is a stable, easily quantified measure in large population samples. Extensive twin studies show that adult height is highly heritable with predominantly additive genetic effects that diverge in a sex-specific manner from the age of puberty onwards." Handelsman, *Circulating Testosterone* at 818. "[O]n average men are 7% to 8% taller with longer, denser, and stronger bones, whereas women have shorter humerus and femur cross-sectional areas being 65% to 75% and 85%, respectively, those of men." *Id.*

Greater height, leg, and arm lengths themselves provide obvious advantages in many, if not most sports. "The major effects of men's larger and stronger bones would be manifest via their taller stature as well as the larger fulcrum with greater leverage for muscular limb power exerted in jumping, throwing, or other explosive power activities." *Id.* There are even sex-based differences in foot size and shape. "For a man and a

woman, both with statures of 170 cm (5 feet 7 inches), the man would have a foot that was approximately 5 mm longer and 2 mm wider than the woman." R.E. Wunderlich & P.R. Cavanagh, *Gender differences in adult foot shape: implications for shoe design*, 33 Med. & Sci. in Sports & Exercise 605, 607-08 (2001).

But male bone structure provides other, less obvious, advantages. Larger bones provide the mechanical framework for larger muscle mass. "From puberty onwards, men have, on average, 10% more bone providing more surface area. The larger surface area of bone accommodates more skeletal muscle so, for example, men have broader shoulders allowing more muscle to build." Taryn Knox, et al., *Transwomen in elite sport: scientific & ethical considerations*, 45 J. Med Ethics 395, 397 (2019). "On average, women have 50% to 60% of men's upper arm muscle cross-sectional area and 65% to 70% of men's thigh muscle cross-sectional area, and women have 50% to 60% of men's upper limb strength and 60% to 80% of men's leg strength. Young men have on average a skeletal muscle mass of >12 kg greater than age-matched women at any given body weight." Handelsman, *Circulating Testosterone* at 812.

In contrast, females have a larger proportion of body fat. So, at the same time that women have smaller muscles, they have proportionately more body fat, which is in general a negative for athletic performance and heat dissipation. Men with higher muscle mass and less body fat will normally be stronger kilogram for kilogram than women. Knox, *Transwomen in elite sport* at 397. This is true even for elite female athletes. Romuald Lepers, et al., *Trends in triathlon performance: effects of sex & age*, 43 Sports Med 851, 853 (2013).

Energy production in the muscles depends on the body's ability to deliver oxygen to the muscles for the complex chain of biochemical reactions that enable skeletal and cardiac contractile force (energy). Men have multiple physiological and biochemical adaptations that give a large advantage in oxygen delivery.

"[L]ung capacity [is] larger in men because of a lower diaphragm placement due to Y-chromosome genetic determinants." Knox, *Transwomen in elite sport* at 397. Supporting this larger lung capacity, men have a "greater cross-sectional area of the trachea"; that is, they have a larger opening that moves more air in and out of the lungs at one time. Hilton, *Transgender women in the female category* at 201. Male

lungs also provide superior oxygen exchange for a given volume: "The greater lung volume is complemented by testosterone-driven enhanced alveolar multiplication rate during the early years of life. Oxygen exchange takes place between the air we breathe in and the capillary flow in the alveoli, so more alveoli allow more oxygen to pass into the bloodstream. Such greater lung capacity allows more air to be inhaled with each breath. This is coupled with an improved uptake system allowing men to absorb more oxygen." Knox, *Transwomen in elite sport* at 397.

"Once in the blood, oxygen is carried by hemoglobin. Hemoglobin concentrations are directly modulated by testosterone so men have higher levels and can carry more oxygen than women." *Id.* "It is well known that levels of circulating hemoglobin are androgen-dependent and consequently higher in men than in women by 12% on average…. Increasing the amount of hemoglobin in the blood has the biological effect of increasing oxygen transport from lungs to tissues, where the increased availability of oxygen enhances aerobic capacity." Handelsman, *Circulating Testosterone* at 816. "It may be estimated that as a result the average maximal oxygen transfer will be ~10% greater in men than in

women, which has a direct impact on their respective athletic capacities." *Id.*

The male metabolic advantage is further augmented by the fact that men circulate more blood per second than women. "Oxygenated blood is pumped preferentially to active skeletal muscle by the heart. The left ventricle chamber of the heart is the reservoir from which blood is pumped to the body. The larger the left ventricle, the more blood it can eject with each heartbeat, and therefore, the more blood can be delivered to the skeletal muscle and lungs with each heartbeat, a physiological parameter called 'stroke volume'. The female heart size is, on average, 85% that of a male resulting in the stroke volume of women being around 33% less." Knox, *Transwomen in elite sport* at 397. Men on average can pump 30% more blood through their circulatory system per minute ("cardiac output") than can women. Hilton, *Transgender women in the female category* at 202.

Finally, at the cell level, "there is experimental evidence that testosterone increases … mitochondrial biogenesis, myoglobin expression, and IGF-1 content, which may augment energy production

and power generation of skeletal muscular activity." Handelsman, *Circulating Testosterone* at 811.

One widely accepted measurement that reflects the combined effects of all these respiratory, cardiovascular, and metabolic advantages is called "V02max": the maximum rate at which an individual can consume oxygen during aerobic exercise. Looking at 11 separate studies, including both trained and untrained individuals, men have a 50% higher V02max than women on average, and a 25% higher V02max in relation to body weight. R.R. Pate & A Kriska, *Physiological basis of the sex difference in cardiorespiratory endurance*, 1 Sports Med. 87, 92 (1984).

V. Biological differences between men and women in physical ability exist even before puberty.

Some assume that boys exhibit no significant exercise performance advantage over girls before puberty. This is false. At birth, boys tend to have a greater lean mass than girls. This difference remains small but detectable throughout childhood with about a 10% greater lean mass in boys than girls prior to puberty. Alison M. McManus & Neil Armstrong, *Physiology of elite young female athletes*. 56 J. Med. & Sport Sci. 23, 28

(2011). "Young girl athletes are not simply smaller, less muscular boys." *Id.* at 23.

While boys' physiological and performance advantages increase rapidly from the beginning of puberty until around age 17-19, significant physiological differences and significant male athletic performance advantages in certain areas exist before the developmental changes associated with male puberty occur.

At birth, girls have more body fat and less fat-free mass than boys. For example, one evaluation of 376 prepubertal boys and girls found that the boys had 21.6% more lean mass, and 13% less body fat (expressed as percent of total body mass) than the girls. Matthew J.D. Taylor, et al., *Vertical jumping and leg power normative data for English school children aged 10-15 years*. 28 J. of Sports Sci. 867 (2010).

Large studies have also shown the difference in athletic ability. One study examined a data set in Greece with 424,328 test performances by children as young as 6 years old. The data included standing long jump (a measure of lower body muscle power), sit and reach (a measure of flexibility), timed 30-second sit ups (a measure of abdominal and hip flexor muscle endurance), 10 x 5-meter shuttle run (a measure of speed

and agility), and the multi-stage 20-meter shuttle run (a measure of aerobic performance). Konstantinos Tambalis, et al., *Physical fitness normative values for 6-18-year-old Greek boys and girls, using the lambda, mu, and sigma statistical method*, 16 Eur. J. of Sports Sci. 736, 738 (2016). "For each of the fitness tests, performance was better in boys compared with girls ($p < 0.001$), except for the S[it and] R[each] test ($p < 0.001$)." *Id.* at 739.

As older adults may remember, the Presidential Fitness Test was widely used in U.S. schools from the late 1950s until 2013. For both the 50th percentile (The National Physical Fitness Award) and the 85th percentile (Presidential Physical Fitness Award), with the exception of curl-ups in 6-year-old children, boys outperformed girls. The difference in pull-ups for the 85th percentile for ages 7 through 17 are particularly informative with boys outperforming girls by 100% – 1200%, highlighting the advantages in upper body strength in males. This information is available widely, including at https://tinyurl.com/5sm66vza (visited September 25, 2024).

Boys also enjoy an advantage in throwing well before puberty. "Boys exceed girls in throwing velocity by 1.5 standard deviation units as

early as 4 to 7 years of age. The boys exceed the girls [in throwing distance] by 1.5 standard deviation units as early as 2 to 4 years of age." Thomas, *Gender differences* at 266. This means that the average 4- to 7-year-old boy can out-throw approximately 87% of all girls of his age.

VI. Testosterone or puberty suppression does not alter or prevent the male advantage in athletic performance.

While boys exhibit some performance advantage even before puberty, this male advantage increases rapidly as boys undergo puberty. Multiple studies (along with common observation) document that the male performance advantage begins to increase during the early years of puberty, and then increases rapidly across the middle years of puberty (about ages 12-16). Handelsman at 812-813.

Even though high (that is, normal male) levels of testosterone lead to physiological changes during male puberty, it does not follow that a later reduction in testosterone levels will reverse these changes. While some normal male characteristics can be changed by means of testosterone suppression, others cannot be. All reliable evidence indicates that males retain large athletic advantages even after long-term testosterone suppression.

Multiple studies have found that muscle mass decreases modestly or not at all in response to testosterone suppression. "[H]ealthy young men did not lose significant muscle mass (or power) when their circulating testosterone levels were reduced to 8.8 nmol/L (lower than the 2015 IOC guideline of 10 nmol/L) for 20 weeks." Knox, *Transwomen in elite sport* at 398. "In spite of muscle surface area reduction induced by androgen deprivation, after 1 year the mean muscle surface area in male-to- female transsexuals remained significantly greater than in untreated female-to-male transsexuals." Louis Gooren, *The significance of testosterone for fair participation of the female sex in competitive sports*, 13 Asian J. of Andrology 653 (2011).

Hand grip strength is a well-accepted proxy for general strength. Multiple studies report that males retain a large advantage in hand strength even after testosterone suppression to female levels. One study found that males who underwent standard testosterone suppression protocols lost only 7% hand strength after 12 months of treatment, and only a cumulative 9% after two years. E. Van Caenegem, et al., *Preservation of volumetric bone density and geometry in cross-sex hormonal therapy: a prospective observational study*. 26 Osteoporos Int.

35, 42 (2015). Given that on average men exhibit 60% greater hand grip strength than women, such a small decrease would not eliminate the male advantage. Another study, looking at teen males undergoing testosterone suppression, "noted no change in grip strength after hormonal treatment (average duration 11 months) of 21 transgender girls." Hilton, *Transgender women in the female category* at 207.

Another study found that three years after surgical castration, preceded by at least two years of testosterone suppression, biologically male subjects had 33% less bicep strength than healthy male controls. Bruno Lapauw, *Body Composition, volumetric and areal bone parameters in male-to-female transsexual persons.* 43 Bone 1016, 1018 (2008). Again, however, healthy men exhibit between 89% and 109% greater arm strength than healthy women. Even with a reduction, these biological males have a very large residual arm strength advantage over biological women.

A longitudinal study that tracked 11 males from the start of testosterone suppression through 12 months after treatment initiation, found that isometric strength levels measured at the knee "were maintained over the [study period]." Anna Wiik, et al., *Muscle strength,*

size, and composition following 12 months of gender-affirming treatment in transgender individuals. 105 J. of Clinical Endocrin. & Metab. 805, 808 (2020). At the conclusion of the one-year study, "the absolute levels of strength and muscle volume were greater in [male-to-female subjects]" than in cisgender women who had not undergone any hormonal therapy." *Id.* In fact, "muscle strength after 12 months of testosterone suppression was comparable to baseline strength. As a result, transgender women remained about 50% stronger than … a reference group of females." Hilton, *Transgender women in the female category* at 207 (summarizing Wiik).

Indeed, very few male physiological advantages are even partially reversible by testosterone suppression once an individual has passed through male puberty. Some of the irreversible (normal) physiological developments include the skeletal anatomical configuration (longer and larger bones) that gives height, weight, and leverage advantages to men. There is also no literature suggesting that testosterone suppression affects the male cardiovascular advantage, including diaphragm placement, lung and trachea size, and heart size and pumping capacity.

VII. Conclusion

The physiological differences between males and females result in males having a significant performance advantage over similarly gifted, aged, and trained females in nearly all athletic events before, during, and after puberty. There is no scientific evidence that any amount or duration of cross-sex hormone therapy (puberty blockers, androgen inhibitors, or cross-sex hormones) eliminates these physiological advantages.

Since the enactment of Title IX in 1972, women's sports teams have flourished, allowing women to compete against other women, including in sports for which a school does not offer a men's team. The sex-blind approach advocated by the new regulation would harm women, not help them. It would return our nation to a time when women were allowed to participate in sports so long as they were comfortable playing against (and losing to) men.

As Professor Lawrence Tribe has noted, "[e]quality can be denied when government fails to classify, with the result that its rules or programs do not distinguish between persons who, for equal protection purposes, should be regarded as differently situated." Lawrence H. Tribe, American Constitutional Law 1438 (2d ed. 1988). "So it was with the

majestic equality of French law, which Anatole France described as forbidding rich and poor alike to sleep under the bridges of Paris." *Id.* And such is the case here.

The concept of "sex-blind" education in the new regulation, without any exception for athletics (because there is no such exception in Title IX, and one cannot be added by regulation), would be an abandonment of Title IX's commitment to equality and women's rights.

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Respectfully submitted.

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CERTIFICATE OF COMPLIANCE

I certify that this brief complies with the type-volume limitations of Fed. R. App. P. 29(a) and 29(b) because it contains 4,929 words, excluding portions exempted by Fed. R. App. P. 32(f), according to the count of Microsoft Word.

I certify that this brief complies with the typeface requirements of Fed. R. App. P. 32(a)(5)-(6) because it has been prepared in a proportionally spaced typeface in 14-point font.

/s/ John G. Knepper
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CERTIFICATE OF SERVICE

I certify that on September 26, 2024, I caused the foregoing to be filed through this Court's CM/ECF system, which will serve a notice of electronic filing on all registered users.

/s/ Walker D. Moller
Walker D. Moller

Counsel for Amicus Curiae