

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 HER 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 PRACTICING PEDIATRIC
ENDOCRINOLOGISTS AND PEDIATRICIANS AS
AMICI CURIAE IN SUPPORT OF RESPONDENTS**

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INTEREST OF AMICI CURIAE¹

Amici curiae are physicians with extensive clinical experience and expertise in pediatric endocrinology and the medical care of transgender adolescents. Collectively, amici have treated thousands of transgender adolescents, including many who have been treated with puberty-blocking medication and hormone therapy. Their clinical practice and research provide them with detailed knowledge of the physiological effects of these medical interventions on transgender girls, including effects relevant to athletic performance and participation in school sports. Amici submit this brief to provide the Court with accurate medical information about pediatric endocrinology and the individualized nature of gender transition medical care for transgender adolescents.²

- **Dr. Kate Millington** is a board-certified pediatric endocrinologist and Assistant Professor of Pediatrics at the Warren Alpert Medical School of Brown University. She earned her MD from the Perelman School of Medicine at the University of Pennsylvania, completed her pediatric residency at the Boston Combined Residency Program (Boston Children's Hospital and Boston Medical Center), and

¹ No counsel for a party authored any part of this brief or made any monetary contribution to it. No one in addition to amici and their counsel made a monetary contribution to the preparation and submission of this brief. *See* Rule 37.6.

² All amici sign this brief in their individual capacities based on their clinical expertise and experience. They do not purport to represent the views of their affiliated institutions.

completed her fellowship in pediatric endocrinology at Boston Children's Hospital. Dr. Millington's clinical and research work centers on the care of transgender and gender diverse youth.

- **Dr. Frances Lim-Liberty** is a board-certified pediatric endocrinologist who received her medical degree from Rush Medical College. She completed her residency and chief residency at UCSF Benioff Children's Hospital Oakland and her fellowship at Ann & Robert H. Lurie Children's Hospital of Chicago. She serves as Medical Director of the Pediatric and Adolescent Transgender Program and the Young Adult Transgender Program at Dartmouth Health Children's, where she works closely with families with gender diverse individuals in multidisciplinary settings.
- **Dr. Kara Connelly** is a board-certified pediatric endocrinologist at Oregon Health & Sciences University. She has been practicing pediatric endocrinology for over 15 years and specializes in caring for youth with gender dysphoria and differences in sexual development. She has cared for over 1,000 patients with gender dysphoria.
- **Dr. Daniel Shumer** is a board-certified pediatric endocrinologist and Associate Professor of Pediatrics at the University of Michigan. He received his bachelor's degree from Northwestern University

and his medical degree from the Feinberg School of Medicine at Northwestern University. He completed his pediatric residency at Vermont Children's Hospital at the University of Vermont, where he also served as Chief Resident, and completed his fellowship training in pediatric endocrinology at Boston Children's Hospital while concurrently completing a Master of Public Health at Harvard T.H. Chan School of Public Health. Dr. Shumer's research has specifically focused on improving physical and mental health disparities in gender diverse youth and adolescents, and he has clinical expertise in gender-affirming care, disorders of sex development, and general pediatric endocrinology.

- **Dr. Robert Gensure** is a board-certified pediatric endocrinologist with an MD and PhD from Tulane University School of Medicine. He completed his residency in pediatrics and fellowship in pediatric endocrinology at Massachusetts General Hospital. Dr. Gensure practices at Dartmouth Health Children's and serves as Chief of the Division of Pediatric Endocrinology. He is licensed to practice in New Hampshire and Massachusetts and has published over 40 peer-reviewed articles.
- **Dr. Morissa Ladinsky** is a Professor of Pediatrics at Stanford University School of Medicine and Children's Health. She

is a clinician, lead attending physician, and medical educator with 31 years of frontline experience treating children and adolescents, including over 10 years of care delivery on regional teams caring for transgender youth referred for the management of gender dysphoria. She has cared for hundreds of transgender adolescents while training medical and behavioral health providers nationwide in the care of gender dysphoric youth.

- **Dr. A. Kade Goepferd** is a board-certified pediatrician and Adjunct Assistant Professor of Pediatrics at the University of Minnesota Medical School. Dr. Goepferd received a medical degree from the University of Minnesota Medical School and completed pediatric residency at the University of Minnesota. Dr. Goepferd founded and served as Medical Director of Children's Minnesota Gender Health Program, an integrated multispecialty clinic serving transgender and gender diverse children and youth in a five-state region, and currently serves as Chief Education Officer and Clinical Director of Equity and Inclusion at Children's Minnesota. Dr. Goepferd has extensive clinical experience caring for transgender and gender diverse youth and has provided training to healthcare providers nationwide on gender-affirming care.

In this brief, amici bring their expertise to bear to help the Court understand the state of scientific knowledge concerning the nature and extent of biological differences between males and females as they pertain to athletic performance, whether those differences confer inherent advantages in prepubescent males that bear on the safety and fairness of athletic competition, and how the administration of puberty-blocking medication and hormone treatments to transgender females at the outset of puberty affects those purported advantages.

As amici explain below, there is no scientific basis for excluding a transgender girl from playing on girls' sports teams if, because of the administration of puberty blockers and hormone treatments as part of her treatment for gender dysphoria, she has not experienced endogenous male puberty. In the course of explaining why this is so, amici also correct many of the overbroad and incomplete statements about the existing research contained in the Brief of Professors Richard J. Aucus, *et al.*, as *Amici Curiae* in Support of Neither Petitioners Nor Respondents (the "Professors Brief" or "Prof. Br."). The Professors Brief conflates transgender girls who medically transition at the onset of puberty with those who transition much later in adolescence or as adults. But treating the two situations as the same is inconsistent with the science, which tells us that, with respect to relative advantages in athletic performance between transgender girls and other girls, the timing of a transgender girl's transition is critical. Transgender girls who do not experience endogenous male puberty have no significant biological athletic advantages over other girls.

SUMMARY OF ARGUMENT

There is no clear difference in athletic performance between prepubescent males and prepubescent females. Males must experience endogenous puberty to acquire the significant athletic advantages that manifest during puberty and in adulthood. The clear scientific consensus is that what accounts for the observed differences in athletic performance between adult men and women is the difference in circulating testosterone levels between the sexes and their effects over time. It is their significantly higher levels of testosterone that make men as a group bigger, stronger, and faster than women as a group. But those higher testosterone levels manifest themselves during endogenous puberty. Prepubescent males and females have overlapping levels of testosterone, which is consistent with the lack of clear differences in athletic performance between prepubescent boys and girls. The differences in relative levels of circulating testosterone – and accompanying male advantages in athletic performance – emerge during puberty.

A transgender girl who begins the administration of puberty suppressing medication at the onset of puberty, followed by hormone replacement therapy, as part of her treatment for gender dysphoria will not experience male puberty and will not develop the elevated levels of circulating testosterone that non-transgender boys do. Instead, she will experience female puberty, and her hormonal profile, physical and physiological characteristics will be very similar to those of non-transgender girls. As a result, that same transgender girl will not enjoy the testosterone-driven “male athletic advantage” over

non-transgender girls that boys acquire because of puberty. Nor will she possess any inherent physical advantage carried over from earlier stages of childhood, because prepubescent boys have no inherent biological advantages over prepubescent girls that impact athletic performance.

In sum, there is no scientific justification for concluding that transgender girls who never experience endogenous male puberty pose safety or unfair competition risks to non-transgender girls. As a result, there is no scientific justification for banning all transgender girls from playing middle and high school sports on girls' sports teams.

ARGUMENT

I. Testosterone Exposure During Puberty and Over Time Is the Driver of the Athletic Advantage Between Males and Females.

We begin by discussing adults in order to lay the foundation for explaining why middle schoolers cannot merely be considered little adults (which is how the Professors Brief implicitly treats them). There is no question that, on average, adult males enjoy very significant biologically-rooted advantages over adult females in athletic contests. Males have superior muscle mass (giving them greater strength and speed), larger skeletal frames and stronger bones, larger hearts and more red blood cells (thereby enhancing their efficiency of blood circulation and oxygen uptake), and larger lung size. These physical and physiological attributes give adult males advantages over adult females in terms of strength, speed, reach, handgrip, and endurance. These

advantages appear empirically in comparisons of adult male and female performance in the same sports, where males consistently post stronger results than females.

There is a clear scientific consensus that the biological explanation for these physical advantages in adult males is the substantially higher circulating levels of testosterone present in men and the impact those higher testosterone levels have over time. Both males and females produce testosterone, but during normal puberty, concentrations of testosterone in males eventually reach levels that are at least fifteen times greater than concentrations in healthy females. Genital and pubic hair development, along with deepening of the voice, typically occurs before increased muscle mass and other secondary sex characteristics. For many boys, increased muscle mass is among the latest characteristics to emerge as testosterone levels increase. The increased testosterone level in adult males is what produces their greater muscle mass, larger and stronger hearts, etc. And these male advantages increase over time the longer a male is exposed to higher testosterone levels.

The leading study in this field is a 2018 paper by Professor Handelsman and others. See David J. Handelsman et al., *Circulating Testosterone as the Hormonal Basis of Sex Differences in Athletic Performance*, 39 Endocrinology Rev. 803 (2018). After taking a hard look at the available research, Handelsman and his co-authors concluded that the “evidence makes it highly likely that the sex difference in circulating testosterone of adults explains most, if not all, of the sex differences in

sporting performance.” *Id.* at 823. The higher testosterone levels that begin circulating in males during endogenous puberty are what develop and maintain the masculine physical characteristics discussed above that give adult males such significant athletic advantages relative to adult females. *Id.* at 805, 816. As Handelsman and his co-authors note, “[t]he basis for the sex difference in muscle mass and strength is the sex difference in circulating testosterone” *Id.* at 816. These findings are well within the mainstream of the scientific consensus that the biological cause of the differences in athletic performance between adult males and females is the increase in circulating testosterone levels in males that begins during puberty. Importantly, the same evidence rules out genetics – and in particular the presence of the Y chromosome in birth males – as the basis for adult male athletic advantage. *Id.* at 820 (summarizing the evidence that supports rejecting the Y chromosome as the driver of physiological characteristics).

The Professors Brief does not appear to disagree with this consensus. *See* Prof. Br. at 11-13 and n.3. Instead, the Professors Brief merely emphasizes that some “important physiological adaptations” in males result from “prolonged exposure to male-range testosterone concentrations,” which may make it difficult to fully erase those adaptations merely by suppressing testosterone levels. *Id.* at 13 n.3. Amici agree that growth of muscle mass and strength in males continues into adulthood and is caused by continued exposure to testosterone. That is why 25-year-old men and 16-year-old boys do not perform the same athletically

despite having the same circulating testosterone levels. Persons who have been exposed to normal male testosterone levels for less time will have less muscle mass development than those who have been exposed to those levels for a longer duration (with the caveat that exercise and training also contribute to muscle mass growth, including in birth females).

But the effect of the duration of exposure to testosterone is only relevant to transgender women who transition in adulthood after having experienced endogenous male puberty and (possibly) adolescents who transition in the middle of puberty. It is of no relevance to a transgender girl who begins receiving puberty blockers before she has experienced male puberty, followed by hormone treatments, and thus is never exposed to “male-range testosterone concentrations” during puberty. Transgender women who transition as adults are simply not biologically comparable to transgender girls who medically transition at the onset of puberty.

II. Transgender Girls Who Receive Puberty Blockers at the Onset of Puberty, Followed by Hormone Replacement Therapy, Do Not Have the Same Anatomical and Physiological Characteristics of Non-Transgender Boys, Especially With Respect to Circulating Testosterone Levels.

The standards of care for adolescents with gender dysphoria are set forth in the evidence-based guidelines published by the World Professional Association for Transgender Health and the Endocrine Society. See E. Coleman et al., *Standards*

of Care for the Health of Transgender and Gender Diverse People, Version 8, 23(S1) Int'l J. Transgender Health S51 (2022); Wylie C. Hembree et al., *Endocrine Treatment of Gender-Dysphoric/Gender-Incongruent Persons: An Endocrine Society Clinical Practice Guideline*, 102(11) J. Clinical Endocrinology & Metabolism 3869 (2017), <https://pubmed.ncbi.nlm.nih.gov/28945902/>. Under the guidelines, treatment is individualized and may – or may not, depending on the individual – involve prescribing gonadotropin-releasing hormone agonists (“puberty blockers”) and cross-sex hormones. Coleman, *supra* at S100. Under the current standards of care, gender dysphoric adolescents for whom such treatments are suitable may begin receiving puberty blockers at the onset of puberty (technically, when they reach Tanner Stage 2). *Id.* at S111. For a transgender girl (male at birth), this is long before the increased testosterone levels and resulting growth in muscle mass and strength normally occur during endogenous puberty. *See id.* at S113. A transgender girl who begins receiving puberty blockers at Tanner Stage 2 will not experience endogenous male puberty. *See id.* The puberty-blocking medication will thus prevent her from experiencing the increases in testosterone levels and corresponding growth of typically-male physical and physiological characteristics described above that would otherwise occur had she remained untreated for gender dysphoria. *Id.* at S114.

If that same transgender girl then receives hormone replacement therapy under the standards of care, the hormones administered to her as part of treatment will cause her to undergo female puberty

consistent with her female gender identity. This process typically results in transgender girls developing many of the anatomical and physiological characteristics of non-transgender girls, including female pelvic geometry, bone size, and skeletal structure. Maria A.T.C. Van Der Loos et al., *Development of Hip-Bone Geometry During Gender-Affirming Hormone Therapy in Transgender Adolescents Resembles That of the Experienced Gender When Pubertal Suspension Is Started in Early Puberty*, 36 J. Bone Miner. Res. 931-41 (2021); *see also* Martje Klaver et al., *Early Hormonal Treatment Affects Body Composition and Body Shape in Young Transgender Adolescents*, 15 Sexual Med. 251, 254-55 (2018) (primarily finding that young transgender girls receiving puberty blockers and hormone therapy have the same body fat as non-transgender girls and a body composition much closer to non-transgender girls than non-transgender boys, with the earlier administration of puberty blockers yielding more pronounced results in this regard).

Thus, a transgender girl who received puberty blockers at the onset of puberty and then received hormone therapy will not have the same physiology as non-transgender boys who are experiencing endogenous male puberty, or even of prepubertal non-transgender boys. She instead will share the physiological (and some anatomical) characteristics of non-transgender females who are experiencing endogenous female puberty. She will not have the same circulating levels of testosterone as a non-transgender male who has experienced or is experiencing puberty. Instead, her circulating testosterone level will be no different from that of

other girls. Human biology and biochemistry dictate this result, which is consistent with our extensive clinical experience treating collectively hundreds of transgender girls with these medications. To assert otherwise is to make an argument that is grounded in neither science nor clinical reality.

The evidence also does not support the existence of clear differences between the athletic performance of prepubescent boys and girls that are somehow maintained in transgender girls despite the suspension of male puberty.

III. Prepubescent Boys Do Not Have Significant Athletic Advantages Over Prepubescent Girls.

There is no clear difference in the athletic performance between prepubescent boys and prepubescent girls.

The Professors Brief suggests that birth males obtain an athletic advantage from testosterone exposure in utero or during “mini puberty,” which lasts for several months after birth. Prof. Br. at 10-11. The evidence does not bear this out. It is true that in a male fetus, testosterone production will peak during the first trimester at approximately 10-14 weeks of gestation in order to support development of the male genitals. *See, e.g.,* Marianne Becker & Volker Hesse, *Minipuberty: Why Does it Happen?*, 93 Hormone Rsch. Pediatrics 76 (2020). It then declines over the remaining course of pregnancy and is completely suppressed at birth. During mini puberty, testosterone production will increase again in male infants for a short period of time, usually peaking at age 1-2 months. By six months of age, testosterone in

males returns to prepubertal levels. *Id.* at 78-79. Mini puberty does not result in any clinically visible physical changes except for a possible transient increase in testicular volume. In addition, concentrations of luteinizing hormone (which stimulates testosterone production) and testosterone during minipuberty actually “correlate negatively with body weight and body mass index (BMI) until the age of six years.” *Id.* at 80 (also noting that “[d]ata on the influence of minipuberty on growth velocity are conflicting”). After mini puberty, testosterone levels in healthy boys and girls overlap and do not diverge again until puberty.

There is no empirical research linking testosterone production in utero or during mini puberty to any long-lasting anatomical or physiological impact other than assistance in the growth and development of male genitalia. Nor is there any empirical evidence linking early-age testosterone production to enhanced athletic performance later in life or to the possession of an inherent athletic advantage in prepubescent boys. The Professors Brief’s positing the existence of such a connection rests on pure speculation and has no basis in empirical science.

Furthermore, that speculation is not borne out by the existing literature, which has consistently shown that there are no significant differences in athletic performance between prepubescent boys and girls. David J. Handelsman, *Sex Differences in Athletic Performance Emerge Coinciding With the Onset of Male Puberty*, 87 *Clinical Endocrinology* 68, 70-71 (2017) (“The gender divergence in athletic performance begins at the age of 12-13 years.”) (cited

in Prof. Br. at 15); Jonathan W. Senefeld et al., *Sex Differences in Youth Elite Swimming*, 14(11) PLOS ONE 1, 1-2 (2019) (concluding from study of pre-adolescent swimmers that, even among elite swimmers, “girls are faster, or at least not slower, than boys prior to the performance-enhancing effects of puberty”). Particularly when variables such as age, location and socioeconomic factors are controlled for, “[a]cross all measures of physical performance, there was one consistent finding. There was no statistical difference in the capabilities of girls and boys until high-school age” Marnee McKay et al., *When it Comes to Sport, Boys “Play Like a Girl”*, The Conversation (Aug. 3, 2017) (relevant tests included long jump, muscle strength, walking, jumping and balancing); see also Marnee J. McKay et al., *Normative Reference Values for Strength and Flexibility of 1,000 Children and Adults*, 88(1) *Neurology* 36, 36-43 (2017).

These results are consistent with the scientific consensus that circulating testosterone levels (and their effects over time) are what account for the differences in athletic performance between males and females. Boys and girls diverge with respect to athletic performance during puberty, when circulating testosterone levels between males and females no longer overlap – unless, of course, puberty in transgender girls has been suspended by the administration of puberty blockers.

CONCLUSION

Transgender girls who begin puberty blockers at the onset of puberty followed by hormone therapy as treatment for gender dysphoria, and who thus experience neither endogenous male puberty nor the accompanying elevated concentrations of circulating testosterone, have no inherent “male advantage” over non-transgender girls in middle school and high school athletics. The contention that such an advantage exists has no scientific basis. There is no scientific justification for banning transgender girls who are not experiencing, and will not experience, endogenous male puberty from playing middle and high school sports on girls’ sports teams.

Respectfully submitted,

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