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 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 FOR *AMICI CURIAE* PROFESSORS JOANNA HARPER, PHILIP CHILIBECK AND CAROL EWING GRABER

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INTEREST OF AMICI CURIAE

Amici are world-renowned researchers in the field of Exercise Science and related disciplines. Their work is cited widely in the top peer-reviewed journals in their subject areas. Litigants in domestic and international tribunals, including in these cases, also discuss their work.[1]

Amici participate in their individual professional capacities and do not speak on behalf of their employers. They are interested in ensuring the record in these cases reflects the scientific consensus on the core question of whether boys have an athletic advantage over girls before puberty, among other issues relevant to this litigation.

The following Amici submit this brief:

Joanna Harper is an adjunct professor at the International Centre for Olympic Studies at Western University in London, Canada. She earned a Ph.D. studying the performance of transgender athletes at Loughborough University in the UK.

Dr. Harper has published several papers on transgender athletes, including the first peer-reviewed study examining the performance of transgender athletes. She is the author of the Rowman and Littlefield book Sporting Gender.

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[1] Pursuant to Rule 37.6, *amici curiae* certify that no counsel for a party authored this brief in whole or in part and that no person or entity, other than *amici* or their counsel, has made a monetary contribution to the preparation or submission of this brief. Sup. Ct. R. 37.6.

Dr. Harper has worked with international and national sports-governing bodies on eligibility policy for transgender and intersex athletes. She speaks frequently at international conferences on transgender and intersex athletes.

Dr. Harper's interest in transgender athletic performance grew out of her own gender transition and the subsequent speed loss that she encountered as a sub-elite distance runner.

Philip Chilibeck is a professor in Kinesiology at the University of Saskatchewan in Canada and past president of the Canadian Society for Exercise Physiology. He received his Ph.D. from Western University (1996), his M.Sc. from McMaster University (1992), and his B.Sc. from the University of Ottawa (1990). He did a post-doctoral fellowship at the University of Alberta from 1996-1997. His research area involves exercise and nutrition for health and performance. He has worked with populations ranging from people with osteoporosis, diabetes, endocrine disorders, and hypertension, to elite athletes including world champion masters track and field athletes, soccer players, powerlifters, and rugby players. He has received funding from the Canadian Institutes of Health Research, and the Heart and Stroke Foundation of Canada to support his research. He has over 220 scientific publications. He is a Fellow of the Canadian Society for Exercise Physiology, editor-in-chief of the journal Applied Physiology Nutrition and Metabolism and sits on the editorial board of the European Journal of Applied Physiology.

Carol Ewing Garber, Ph.D., FAHA, FACSM, FNAK, FCEPA is Professor of Kinesiology and Movement Sciences and Education in the Department of Biobehavioral Sciences at Teachers College, Columbia University, where she also serves as the Director of the Applied (Exercise) Physiology Laboratory and Director of the EXerT Clinic for Exercise Prescription. She has served as the Director of the Graduate Program of Applied (Exercise) Physiology for 17 years. Formerly, she served on the faculty of the Bouvé College of Health Sciences at Northeastern University and the Alpert School of Medicine at Brown University She earned the B.S. with Distinction in Education (1975), and the M.A. (1983) and Ph.D. (1990) in Exercise Physiology from the University of Connecticut, Storrs, CT. She is Treasurer and a Past President of the American College of Sports Medicine (ACSM). She is a Registered Clinical Exercise Physiologist, and her research and clinical practice focuses on the benefits of movement and exercise in the prevention and treatment of a wide array of chronic diseases and conditions (physical and mental health) across the lifespan. She has over 150 scientific publications. She is lead author of the current (2011) American College of Sports Medicine (ACSM) Position Stand, *"Quantity and quality of exercise for developing and maintaining cardiorespiratory, musculoskeletal, and neuromotor fitness in apparently healthy adults: guidance for prescribing exercise"* and a co-author of the previous

1998 ACSM position stand on the same topic. She is also the author of the chapters on exercise prescription in three editions (8-10th editions) of the internationally-renowned publication, *"ACSM's Guidelines for Exercise Testing and Prescription."* She is the senior author of the ACSM consensus paper, *entitled, "Updating ACSM's Recommendations for Exercise Preparticipation Health Screening,"* and senior author of an upcoming ACSM consensus paper, "*Updating ACSM's Recommendations for Exercise Preparticipation Health Screening."* She has been elected to fellowship to ACSM, American Heart Association, National Academy of Kinesiology, and the Clinical Exercise Physiology Association. She is a recipient of the ACSM Citation Award, the New England ACSM Honor Award, a Fulbright Scholar, among other awards recognizing her contributions to science and her profession. She is an associate editor of the journal, Frontiers in Sports and Active Living, and she serves on the editorial boards of Medicine and Science in Sports and Exercise, the Journal of Cardiopulmonary Rehabilitation, and Kinesiology Today.

SUMMARY OF THE ARGUMENT

According to the scientific consensus, there are no clear sex-based differences in athletic performance before the onset of puberty. Expert reports and briefs submitted in this litigation purporting to show otherwise contain serious scientific flaws and should be discounted.

ARGUMENT

I. THERE ARE NO CLEAR SEX-BASED DIFFERENCES IN ATHLETIC PERFORMANCE CAUSED BY INNATE BIOLOGY BEFORE THE ONSET OF PUBERTY

The scientific consensus is that there are no clear biologically based sex differences in athletic performance before the onset of puberty. [2] The American College of Sports Medicine ("ACSM") is the preeminent professional association for sports scientists in the world. The ACSM developed a consensus statement entitled "The Biological Basis of

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[2] *See, e.g.*, David J. Handelsman, *Sex differences in athletic performance emerge coinciding with the onset of male puberty*, 87 Clin Endocrinol 68–72 (2017); David J. Handelsman et al., *Circulating Testosterone as the Hormonal Basis of Sex Differences in Athletic Performance*, 39 Endocrine Revs. 803–29 (2018); Jonathon W. Senefeld et al., *Sex differences in youth elite swimming*, 14 PLoS One e0225724 (2019); Satoshi Mizuguchi et al., *Performance Comparisons of Youth Weightlifters as a Function of Age Group and Sex*, 6J Funct Morphol Kinesiol 57 (2021); R. Bethene Ervin et al., *Strength and Body Weight in US Children and Adolescents,* 134(3) Pediatrics e782–89 (2014); Weiyun Chen et al., *Health-related physical fitness and physical activity in elementary school students*, 18 BMC Pub. Health 195 (2018); Vicente Martínez-Vizcaíno et al., *Effectiveness of a school-based physical activity intervention on adiposity, fitness and blood pressure: MOVI-KIDS study*, 54 Brit. J. Sports Med. 279–285 (2019); Marnee J. McKay et al., *Normative reference values for strength and flexibility of 1,000 children and adults*, 88 Neurology 36–43 (2017).

Sex Differences in Athletic Performance: Consensus Statement for the American College of Sports Medicine,"[3] which includes a discussion of potential pre-pubertal differences between the sexes in athletic performance. This consensus statement states that "there are no clear sex differences in athletic performance and fitness assessments before the onset of puberty." Hunter et al., *supra*, at 2338.

While some studies have found small differences between the performance of boys and girls, none of those studies controlled for social factors, such as greater societal encouragement of athleticism in boys and greater opportunities for boys to play sports.[4] These studies also do not control for any differences in athletic training between boys and girls. Because the studies did not control for these factors, the data in these studies does not conclusively prove that biological differences rather than social factors were a cause of any small differences in pre-pubertal athletic performance between boys and girls.[5]

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[3] 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 2328-2360 (2023).

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

[5] Hunter et al., *supra*, at 2332; *see, e.g.*, U.S. Dep't Health & Hum. Servs., The National Youth Sports Strategy, 35–37 (2019), https://odphp.health.gov/sites/default/files/2019-10/National_Youth_Sports_Strategy.pdf (finding rates of participation in team sports or sports lessons "are lower among

II. THE *AMICUS* BRIEF OF PROFESSORS IN SUPPORT OF NEITHER PETITIONERS NOR RESPONDENTS PRESENTS ARGUMENTS THAT ARE SCIENTIFICALLY FLAWED AND SHOULD BE DISCOUNTED[6]

A. The Professors Provide No Scientific Support for the Proposition that Boys have an Innate Biologically Based Pre-Pubertal Athletic Advantage over Girls

The Professors try to link mini-puberty in male infants to an alleged physiological difference between boys and girls in athletic performance before puberty. There is no scientific basis for the Professors' claim that boys gain an athletic advantage over girls based on exposure to testosterone during mini-puberty in

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girls"); Aspen Inst. Project Play, Youth Sports Facts: Participation Rates, https://projectplay.org/youth-sports/facts/participation-rates (showing that in 2023, 41% of boys aged 6-17 played sports on a regular basis, compared to only 35.6% of girls); Ellen J. Staurowsky et al., *50 Years of Title IX: We're Not Done Yet*, Women's Sports Found. 20 (May 2022), https://www.womenssportsfoundation.org/wp-content/uploads/2022/05/Title-IX-at-50-Report-FINALC-v2-.pdf (showing that from 2018–2019, fifty-seven percent of high school athletics participation opportunities went to boys, compared to forty-three percent that went to girls, representing one million more opportunities for boys than girls).

6 This Section refers to the *amicus* brief submitted by Professors Richard J. Auchus, David J. Handelsman, Sandra K. Hunter, Michael J. Joyner, Benjamin D. Levine, and Virginia M. Miller in support of neither petitioners nor respondents in this case (hereafter "Profs.' Br.").

infancy. No research has linked this brief exposure to elevated testosterone during mini-puberty to any lasting physiological impact, much less to an increase in athletic ability of youth before puberty. Nor is there any credible scientific basis even to hypothesize such an impact. In fact, the Professors acknowledge that "the period between the end of male mini puberty and the onset of male adolescent puberty" is the one period of time during which there is "overlap in circulating testosterone concentrations between healthy males and females." (Profs.' Br. at 11).

The Professors erroneously claim research demonstrates there are biological sex differences in performance that are "distinct from any effects of socialization." *Id.* at 15 (citing sources). In fact, the sources the Professors cite do not support this assertion. *See, e.g.*, Carole Hooven, *Testosterone: The Story of the Hormone that Dominates and Divides Us* 94–97 (2021) (not discussing athletic performance between boys and girls); David J. Handelsman, *Sex Differences in Athletic Performance Emerge Coinciding with the Onset of Male Puberty*, 87 Clin. Endocrinol. 68-71 (2017) (discussing strong scientific consensus for more than three decades that the group-based differences in athletic ability between males and females begins with male puberty).

Moreover, the Professors themselves recognize that "males typically run, jump, throw, and engage in rough-and-tumble play more than females." (Profs.' Br. at 15.) Yet they do not mention that every study

regarding athletic performance between pre-pubertal boys and girls has failed to control for social factors.

The Professors also refer to two papers published this year regarding hand-grip strength and upper and lower limb strength, suggesting that the papers show biologically based differences. (Profs.' Br. at 15-16) (citing James Nuzzo*, Sex Differences in Grip Strength from Birth to Age 16: A Meta-Analysis,* 25 Eur. J. Sports Sci. e12268 (2025); James Nuzzo & Matheus D. Pinto*, Sex Differences in Upper- and Lower-Limb Muscle Strength in Children and Adolescents: A Meta-Analysis*, 25 Eur. J. Sports Sci. e12282 (2025)). But as the authors of these studies make clear, "the current research does not reveal the cause of the sex difference in grip strength in children and adolescents." Nuzzo*, Sex Differences in Grip Strength,* 25 Eur. J. Sports Sci. at 12 (2025).[7] In addition, it is

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[7] Lastly, these papers are meta-analyses that were not conducted according to proper scientific methods for meta-analyses. Meta-analyses depend on the papers included in the analysis, and there are well-established guidelines meta-analyses must follow to be considered rigorous and replicable. In both articles, however, the authors acknowledge that they did not follow these guidelines, and that as a result their findings are likely not reproducible. Specifically, the studies the authors included in their analysis, and the method they used to select them, is not transparent; as a result, other scholars cannot reproduce their search. *See* Nuzzo*, Sex Differences in Grip Strength*, 25 Eur. J. Sports Sci. at 12 ("[The study] did not explicitly follow PRISMA guidelines . . . [the literature search] did not follow a formal flow diagram. Thus, replication of the search will be difficult."); Nuzzo & Pinto, *Sex Differences in*

considered within the range of normal for male puberty to begin at nine years old, and these papers include individuals nine and older. Because individuals who have undergone male puberty were included, these studies cannot be used to discuss athletic performance *before* puberty. Finally, these papers discuss discrete physical capacities, which do not necessarily equate with athletic advantage. For example, several studies in the exercise science field have determined that hand grip strength is a poor indicator of overall athletic ability.[8]

The Professors next discuss two different papers regarding athletic performance of youth in track and

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Upper- and Lower-Limb Muscle Strength, 25 Eur. J. Sports Sci. at 8 ("The current study has limitations. First, the literature search did not follow a formal flow diagram. Consequently, replication of the search is probably not possible."). This method is improper because it can lead to a biased study sample while obscuring its bias. Because of this core deficiency, both studies should be rejected.

[8] Erkan Demirkan et al., *Comparison of Physical and Physiological Profiles in Elite and Amateur Young Wrestlers*, 29 J. Strength Cond. Res. 1876–1883 (2015); Luis M. Massuca, et al.,. *Attributes of Top Elite Team-Handball Players*. 28(1) J. Strength Cond. Res. 178–186 (2013) (hand grip strength not included in predictors that significantly contribute to predict the probability of an athlete being a top elite player); R. Razman et al., *Anthropometric and strength characteristics of tenpin bowlers with different playing abilities*, 29 Biol. Of Sport 33–38 (2012); Águeda Gutiérrez-Sánchez et al., *Importance of hand-grip strength as an indicator for predicting the results of competitions of young judokas*, 7 Sci. Mar. Arts 167–172 (2011).

field and cross-country to attempt to demonstrate that boys have an athletic advantage over girls before puberty. (Profs. Br. at 16-17) (citing Mira A. Atkinson et al., *Sex Differences in Track and Field Elite Youth*, 56 Med. & Sci. in Sports & Exercise 1390 (2024); Gregory A. Brown, Brandon S. Shaw & Ina Shaw, *Sex-based differences in shot put, javelin throw, and long jump in 8-and-under and 9-10- year-old athletes*, 25 Eur. J. Sport Sci. e12241 (2024)). Neither paper shows or even claims to show that pre-pubertal boys have a biologically based athletic advantage over pre-pubertal girls. To the contrary, Mira Atkinson's paper states, "[T]here is some evidence that male youth spend more time engaging in physical activity and, particularly, higher-intensity physical activity compared with female youth. These potential sex differences in engagement of physical activity . . . could contribute to sex differences in athletic performance. Notably, physical fitness is found to be significantly associated with time engaged in physical activity in youth." (Atkinson, *supra*, at 1396.) Gregory Brown's paper similarly asserts, "the present data do not preclude the possibility that social and cultural factors can also contribute to the sex-based differences in shot put, javelin throw, and long jump performance in children age 10-and-under." (Brown et al., *supra*, at 8.)

These studies also fail to support the Professors' assertions regarding an alleged pre-pubertal athletic advantage of boys over girls. Both studies include individuals nine and older and therefore necessarily

include individuals who have started to undergo male puberty. In addition, these studies rely on data from the top performers in a particular event or from the championship competitions. These datasets are not representative of the relevant population in these cases, which is all school athletes, because they include only the top performers.[9]

In sum, there is no scientific evidence that boys have an innate athletic advantage over girls before puberty.

B. The Professors Provide No Scientific Evidence that Transgender Girls who Take Puberty-Delaying Medication at the Onset of Male Puberty and Later Take Estrogen Hormone Therapy Have an Unfair Athletic Advantage

The Professors provide no scientific support for the proposition that transgender girls who receive puberty-blocking medication at the onset of male

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[9] The same critiques apply to Gregory Brown's additional papers on the topic. *See* 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. Sports Sci. 217–225 (2024) (assessing "[f]inalist times from the USA Track and Field National Youth Outdoor Championships and National Junior Olympic Championships"); Gregory A. Brown et al., *Sex-based differences in swimming performance in 10-years-old-and-under athletes in short course national competition*, 25 Eur. J. Sports Sci. e12237 (2025) (analyzing "the top eight performances for both sexes from the National Club Swimming Association Age Group Championships").

puberty and later receive hormone therapy have an unfair athletic advantage over others girls.

They discuss several studies regarding transgender women who transitioned *as adults* and have therefore undergone male puberty. While we disagree with the Professors' characterization of those studies, some of which were drafted by *amici* to this brief,[10] these studies have no relevance to transgender girls who have received puberty suppressing medication before adolescent puberty. The adult women in the cited studies did not transition until well after puberty and experienced exposure to testosterone over an extended time. In sharp contrast, transgender *girls* who receive puberty suppressing medication at the onset of male puberty do not go through puberty and are not exposed to the heightened level of testosterone associated with male puberty.

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[10] Joanna Harper et al., *How does hormone transition in transgender women change body composition, muscle strength and haemoglobin? Systematic review with a focus on the implications for sport participation*, 55 Brit. J. Sports Med. 865–872 (2021) (assessing effects of hormone treatment on adult transgender women over time); Joanna Harper et al., *Longitudinal Performance Changes in Transgender Women Athletes Pre and Post Gender Affirming Hormone Therapy*, 25 Eur. J. Sports Sci. e70036 (2025) (assessing athletic performance in adult transgender women ages 18-50).

CONCLUSION

For the foregoing reasons, the Court should affirm the decisions of the United States Court of Appeals for the Fourth and Ninth Circuits.

Respectfully submitted,

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