

IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF WEST VIRGINIA
CHARLESTON DIVISION

B.P.J, by her next friend and mother,
HEATHER JACKSON

Plaintiff,

v.

WEST VIRGINIA STATE BOARD OF
EDUCATION, HARRISON COUNTY BOARD
OF EDUCATION, WEST VIRGINIA
SECONDARY SCHOOL ACTIVITIES
COMMISSION, W. CLAYTON BURCH in his
official capacity as State Superintendent,
DORA STUTLER in her official capacity as
Harrison County Superintendent, and THE
STATE OF WEST VIRGINIA

Defendants

and

LAINY ARMISTEAD

Defendant-Intervenor.

Case No. 2:21-cv-00316

Hon. Joseph R. Goodwin

**STATE OF WEST VIRGINIA AND DEFENDANT-INTERVENOR LAINY ARMISTEAD'S
JOINT MOTION TO SUPPLEMENT THE EXPERT REPORT OF DR. GREGORY A. BROWN**

INTRODUCTION

The scientific evidence that male performance advantage in athletics is substantial and durable—with or without testosterone suppression or puberty blockers—is even clearer today than it was when Dr. Gregory Brown produced his expert report in February 2022. In the intervening months, the peer-reviewed literature has increased, and athletic organizations across the globe have adjusted their policies to more closely follow the available science.

In the interest of providing the factfinder with up-to-date information on the physiology of sex-based performance difference, Dr. Brown should be permitted to present this new evidence and discuss how it affects his expert opinions at trial. Thus, the State of West Virginia and Defendant-Intervenor Lainey Armistead (Defendants) move for leave to produce a brief supplemental expert report discussing these new developments, a copy of which is attached as Exhibit A.

Leave should be granted because the supplemental information is relevant to Dr. Brown's opinions and was not available at the time of his initial report. Further, no one will be prejudiced, as there is ample time before trial for Plaintiffs to depose Dr. Brown on the supplemental report if they so desire. Allowing Defendants to supplement Dr. Brown's report will give the factfinder the best available information to understand how biological sex affects athletic performance, and how sex-based separation in athletics substantially advances the State's important interest in providing equal athletic opportunities for women.

SUMMARY OF THE SUPPLEMENTAL REPORT

In his expert report, Dr. Brown, a tenured professor of exercise science and well-published researcher, set forth scientific evidence that biological males have substantial physiology-based athletic performance advantages over biological females. Brown Rep. ¶¶ 7–67, ECF No. 317-2. He further demonstrated that, while these physiology-based differences increase during puberty, they exist before

puberty, as shown in multiple peer-reviewed studies and fitness data from hundreds of thousands of children. *Id.* ¶¶ 71–113. He also presented evidence that suppressing testosterone after puberty has begun does not eliminate male athletic advantages, as some researchers had previously hypothesized. *Id.* ¶¶ 125–57. And he documented the evolution of global athletic policies to take account of this evidence. *Id.* ¶¶ 158–177. He further noted that there is no evidence that prescribing puberty blockers before the onset of puberty “eliminates the pre-existing performance advantages that prepubertal males have over prepubertal females.” *Id.* ¶ 113.

Since finalizing his expert report in February 2022, Dr. Brown has become aware of three peer-reviewed studies—all published after his report was produced—that bear on the evidence presented.

First, a study published by Dr. Lidewij Boogers et al. in June 2022 provides evidence that puberty blockers and cross-sex hormones do *not* affect adult height. Brown Supp. Rep. ¶¶ 1–4. In other words, male children who received puberty blockers followed by estrogen hormones can be expected to reach the same (male) height they would have reached in the absence of such interventions. *Id.* This finding matters because the height differential between males and females is an important source of male athletic advantage, and the new study suggests that advantage is unaffected by a standard course of puberty suppression followed by cross-sex hormones.

Second, a literature review published by Dr. Alison Heather in July 2022 on testosterone suppression in male athletes who identify as female concluded that the available scientific evidence fails to demonstrate that testosterone suppression eliminates male athletic advantage. Brown Supp. Rep. ¶¶ 5–7. This review shows that Dr. Brown’s expert opinion on the minimal effects of testosterone suppression

on athletic performance is mainstream in the peer-reviewed literature and deserves to be given weight.

Third, a cross-sectional study published earlier this month by Dr. Leonardo Alvarez et al. provides evidence that 14+ years of testosterone suppression is insufficient to eliminate male advantage in cardio-respiratory endurance, which is relevant to endurance events like running, cycling, and swimming. Brown Supp. Rep. ¶¶ 8–11. This study further supports Dr. Brown’s opinion that there is no course of testosterone suppression proven to eliminate male performance advantage.

In addition, since the production of Dr. Brown’s report, athletic organizations have continued to adjust their policies based on increasing evidence that testosterone suppression does not eliminate male performance advantage. Dr. Brown is aware of new national or international policies in aquatics, rugby, triathlon, cycling, and boxing. Brown Supp. Rep. ¶¶ 12–28. While these policies are not uniform, all of them account for the emerging scientific consensus that there is not a regimen of testosterone suppression proven to eliminate male athletic advantage. This evolution in the athletic community towards greater awareness of the science lends weight to Dr. Brown’s opinions and supports a finding that the Sports Act’s biological classification substantially advances the State’s interest in providing equal athletic opportunities for women.

LEGAL STANDARD

Rule 26(e)(1) of the Federal Rules of Civil Procedure requires parties to supplement an expert report “if the party learns that in some material respect the disclosure or response is incomplete.” Fed. R. Civ. P. 26(e)(1). Supplementation is permissible when “the supplemental information correspond[s] to a prior Rule 26(a) disclosure” and the supplemental information was not “available at the time set for the initial disclosure.” *In re C.R. Bard, Inc. Pelvic Repair Sys. Prods. Liab. Litig.*,

2:14-cv-02528, 2017 WL 4248809, at *2 (S.D.W. Va. Sept. 25, 2017) (cleaned up). Further, supplementation should be timely, based on the “availability of the supplemental information.” *Id.* (cleaned up). All three criteria are met here.

ARGUMENT

The proposed supplement (I) relates to the opinions expressed in Dr. Brown’s original report and (II) was not available at the time the report was published. Further, this supplement is (III) presented in a timely fashion with ample time for Plaintiffs to depose Dr. Brown on the supplement if they so desire. Therefore, Defendants’ motion for leave to supplement Dr. Brown’s report should be granted.

I. The Supplement Presents New Studies and Policies Directly Relevant to Dr. Brown’s Expert Opinions

The new studies and policies directly relate to, support, and supplement opinions in the original expert report. Specifically, the Boogers (2022) study on the effects of puberty suppression and cross-sex hormones on adult height helps fill the research gap identified in the original report. There, Dr. Brown noted that there was no published research on predicting final adult height for youths receiving puberty blockers followed by cross-sex hormones. Brown Rep. ¶ 113. Now, the Boogers study provides such evidence. And it is important for the factfinder to benefit from this new science. Brown Supp. Rep. ¶¶ 1–4.

Likewise, the Heather (2022) study addresses the effects of testosterone suppression on a variety of physiological components of athletic performance, such as brain structure, skeletal architecture, muscle structure, and the cardiorespiratory system. Dr. Brown’s report addressed these same topics. *See, e.g.*, Brown Rep. ¶¶ 129–33, 145–56, 162–66. The fact that another professional exercise physiologist considered much of the same data and came to the same conclusions as Dr. Brown—and successfully published those conclusions in a peer-reviewed journal—lends weight to Dr. Brown’s opinions.

Similarly, the Alvarez (2022) study provides new evidence that long-term testosterone suppression does not eliminate male advantage in cardiorespiratory endurance and helps fill a research gap identified in Dr. Brown’s report. Brown Rep. ¶ 151; Brown Supp. Rep. ¶¶ 8–11. It therefore supports Dr. Brown’s opinion that there is no course of testosterone suppression proven to eliminate male athletic advantage.

Finally, the new athletic policies supplement Dr. Brown’s discussion of the evolution of athletic policies to account for the emerging science. In his report, Dr. Brown identified new policies and analyses from World Rugby, the UK Sports Councils, the American Swimming Coaches Association, the NCAA, and USA Swimming. Brown Rep. ¶¶ 171–77. The proposed supplement demonstrates the continuing evolution of athletic policies to account for the lack of evidence that testosterone suppression eliminates male performance advantage. Brown Supp. Rep. ¶¶ 12–29.

In sum, the entirety of the proposed supplemental report “correspond[s] to a prior Rule 26(a) disclosure” and should therefore be allowed. *In re C.R. Bard*, 2017 WL 4248809, at *2 (quoting *Carillo v. B & J Andrews Enters., LLC*, No. 2:11-cv-01450-RCJ-CWH, 2013 WL 420401, at *4 (D. Nev. Jan. 31, 2013)).

II. The Supplement Presents Evidence Not Available When the Original Report Was Finalized and Produced

All of the new studies and athletics policies were published after Dr. Brown’s report was finalized and produced on February 23, 2022. And the vast majority were published well after the close of discovery on March 25, 2022. So these materials were not available to Dr. Brown at the time he finalized his report.

Supplementation of an expert report is appropriate—indeed, required—when the expert receives new information not available at the time of the initial report. *See, e.g., OmniSource Corp. v. Heat Wave Metal Processing, Inc.*, No. 5:13-cv-772-D,

2015 WL 3452918, at *10 (D. Md. May 29, 2015) (“Heat Wave’s supplement is proper because it is based on new information.”); *Kuklock v. Nev. Dep’t of Tansp.*, No. 3:19-cv-00369-LRH-CLB, 2020 WL 7081582, at *2 (D. Nev. Dec. 2, 2020) (“New information . . . is the proper subject of supplementation.”). Accordingly, Dr. Brown’s proposed supplement is proper.

III. The Supplement Is Timely, and There Is Ample Time for a Deposition on its Contents

Expert reports need not be supplemented “as each new item of information is learned,” but rather in appropriate intervals with ample time for supplemental depositions before trial. *In re C.R. Bard*, 2017 WL 4248809, at *2 (citation omitted). And “Rule 26(e) does not limit the time for supplementation to the discovery period.” *Carillo*, 2013 WL 420401, at *4. Rather, Rule 26(e)(2) requires supplementation before the disclosure of Defendants’ Rule 26(a)(3) disclosures, which are not yet due. Thus, the proposed supplement is timely.

Moreover, the supplement is offered more than 100 days before trial with ample time for Plaintiffs to depose Dr. Brown on the new studies and policies.¹ Indeed, courts have often permitted parties to designate entirely new experts or have experts render wholly new opinions this far from trial. *See, e.g., Ferrara & DiMercurio v. St. Paul Mercury Ins. Co.*, 240 F.3d 1, 9–10 (1st Cir. 2001) (no prejudice from allowing designation of new expert three-and-a-half months before trial, even without a proper expert report); *Kanawha-Gauley Coal & Coke Co. v. Pittson Minerals Grp., Inc.*, No. 2:09-cv-01278, 2011 WL 320909, at *3 (S.D.W. Va. Jan. 28, 2011) (disclosure of new opinion nearly four months before trial harmless). Here, Dr. Brown’s supplement merely presents a few new articles and policies that are entirely in line

¹ Defendants will work with Plaintiffs’ counsel to make Dr. Brown available for a deposition on his supplemental report at a mutually agreeable time.

with his previously disclosed opinions. No prejudice arises from allowing Dr. Brown to report on and discuss this new evidence.

CONCLUSION

By providing the factfinder with “scientific, technical, or other specialized knowledge,” expert testimony promotes “[a]n intelligent evaluation of facts.” Fed. R. Evid. 702, Advisory Committee Notes. It follows that experts should provide the factfinder with the most up-to-date scientific knowledge available.

That is precisely what Dr. Brown asks to do in this case. Allowing him to supplement his expert report with the very latest scientific research and athletics policies will give the factfinder the best opportunity to understand the physiology of sex-based athletic advantage. Thus, the motion for leave to supplement his expert report should be granted.

Respectfully submitted this 21st day of October, 2022.

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Case No. 2:21-cv-00316

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CERTIFICATE OF SERVICE

I, Brandon Steele, hereby certify that on October 21, 2022, I electronically filed a true and exact copy of the foregoing with the Clerk of Court and all parties using the CM/ECF system.

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and

LAINY ARMISTEAD,

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Hon. Joseph R. Goodwin

DECLARATION OF GREGORY A. BROWN, PHD., FACSM

I, Dr. Gregory A. Brown, pursuant to 28 U.S. Code § 1746, declare under penalty of perjury under the laws of the United States of America that the facts contained in my Supplemental Expert Report of Gregory A. Brown, Ph.D. FACSM in the Case of B.P.J. v. West Virginia State Board of Education, attached hereto, are true and correct to the best of my knowledge and belief, and that the opinions expressed therein represent my own expert opinions.

Executed on October 21, 2022.



Gregory A. Brown

**Supplemental Expert Report of Gregory A. Brown, Ph.D. FACSM in the
case of B.P.J. vs. West Virginia State Board of Education**

October 21, 2022

Introduction

Since the submission of my expert report of February 23, 2022, in *B.P.J. v. West Virginia State Board of Education*, I have become aware of a number of developments in physiology scholarship and sports policy concerning the participation of biological males who identify as female in women's sports. The purpose of this supplement is to update my report with these developments and explain how they bear on the opinions expressed in my report.

Effects of Puberty Suppression on the Components of Athletic Performance

1. In Boogers et al. (2022), the researchers studied the effects of puberty suppression followed by cross-sex hormone therapy on the adult height of natal males who identify as female. Analyzing retrospective data collected from 1972 to 2018, they concluded that “although P[uberty] S[uppression] and [cross-sex hormones] alter the growth pattern, they have little effect on adult height.” (9) In other words, natal males who followed a normal course of puberty suppression followed by cross-sex hormone therapy reached an adult height at or near their predicted height in the absence of such therapy.¹

¹ Eleven participants were given a high dose of the cross-sex hormone ethynyl estradiol (EE) instead of a normal course of estradiol in an attempt to reduce growth, and the researchers found a small reductive effect. They noted, however, that the study did not evaluate the side effects of high-dose EE, that their clinic was studying alternatives to high-dose EE “[b]ecause of the increased risk of venous thromboembolism,” and that high-dose EE “is no longer used to limit growth” in cisgender girls because of the potential side effects. (9) Based on population-level data, it does not appear that the reductive effect of high-dose EE on height eliminated the male-female height differential, but the authors of the paper did not address that question.

2. In my report, I cited Roberts and Carswell (2021) noting the dearth of published research on the effects of puberty suppression followed by cross-sex hormones in adult height. (1680–81) The Boogers study helps to fill that gap in the published literature with peer-reviewed evidence that puberty suppression followed by cross-sex hormone therapy does not meaningfully affect adult height.

3. This is relevant to the question of whether puberty suppression eliminates sex-based performance advantages. It provides evidence that an important component of that advantage—male vs. female height—is not eliminated, or even meaningfully affected, by an ordinary course of puberty suppression followed by cross-sex hormone therapy. *See* Brown Rep. ¶¶ 43–44 (discussing male height advantage).

4. In my report, I stated: “There is not any scientific evidence that [puberty blockers] eliminate[] the pre-existing performance advantages that prepubertal males have over prepubertal females.” Brown Rep. ¶ 113. That remains true. And the Boogers study strengthens that conclusion with evidence that the male height advantage is not eliminated by puberty suppression followed by cross-sex hormone treatment.

Additional Research on the Effects of Testosterone Suppression

5. I cited a variety of peer-reviewed research supporting the proposition that testosterone suppression does not erase male performance advantage in most athletic endeavors in my report. *See generally* Brown Rep. ¶¶ 119–57.

6. Heather (2022) is a new peer-reviewed literature review examining the evidence to date on whether testosterone suppression eliminates the physiological building blocks of male athletic advantage. In this review, Dr. Heather studied the existing literature on male advantages in brain structure, muscle mass, bone structure, and the cardio-respiratory system, and the effects of testosterone suppression on those advantages. She concluded:

Given that the percentage difference between medal placings at the elite level is normally less than 1%, there must be confidence that an elite transwoman athlete retains no residual advantage from former testosterone exposure, where the inherent advantage depending on sport could be 10–30%. Current scientific evidence can not [sic] provide such assurances and thus, under abiding rulings, the inclusion of transwomen in the elite female division needs to be reconsidered for fairness to female-born athletes. (8)

7. This study is relevant because it demonstrates that a well-respected physiologist has reviewed the literature and come to the same basic conclusion as set forth in my expert report: based on the best current scientific evidence, testosterone suppression does not erase male performance advantage.

8. Alvares (2022) is a new cross-sectional study on cardiopulmonary capacity and muscle strength in biological males who identify as female and have undergone long-term cross-sex hormone therapy.

9. All of the study subjects that were biological males who identify as female had testosterone suppressed through medication (cyproterone acetate) or gonadectomy. (Supplementary materials) And they had taken exogenous estrogen for an average of 14.4 years with a standard deviation of 3.5 years.

10. Compared to a control group of cisgender women, the study subjects exhibited advantages in body height, body mass, lean body mass, and muscle strength, confirming the findings of previous studies but extending the information to a longer time period. A novel aspect of this study is the demonstration that, even after 14 years of testosterone suppression and estrogen administration, the biological males who identify as female exhibited advantages in cardio-respiratory capacity measured as higher VO_2 peak and higher O_2 pulse, which suggests that male advantages are retained in events that are influenced by cardio-respiratory endurance (e.g. distance running, cycling, swimming, etc.).

11. This study provides further reliable evidence that even long-term testosterone suppression does not eliminate all of the sex-based athletic advantages between males and females and that there is retained advantage in cardiopulmonary capacity and muscle strength.

New Athletic Organization Policies

12. Since my report of February 23, 2022, there have been additional developments in the ways athletic associations have addressed the participation of male athletes who identify as female in the female category. As noted in my report, policymaking in this area is in flux, and numerous athletic associations are in the process of revising their policies. The following non-exhaustive description of new policies since the issuance of my report include the following.

13. ***Aquatics***. FINA, the international aquatics (swimming and diving) federation, issued a new policy in June 2022 allowing biological males to compete in the female category of aquatics only if they can establish that they “had male puberty suppressed beginning at Tanner Stage 2 or before age 12, whichever is later, and they have since continuously maintained their testosterone levels in serum (or plasma) below 2.5 nmol/L.” FINA Policy on Eligibility for the Men’s and Women’s Categories § F.4.b.ii. A biologically male athlete who cannot meet these criteria is prohibited from competing in the female category. *Id.*

14. This policy is based on the review of the scientific literature conducted by an independent panel of experts in physiology, endocrinology, and human performance, including specialists in transgender medicine. This panel concluded:

[I]f gender-affirming male-to-female transition consistent with the medical standard of care is initiated after the onset of puberty, it will blunt some, but not all, of the effects of testosterone on body structure, muscle function, and other determinants of performance, but there will be persistent legacy effects that will give male-to-female transgender athletes (transgender women) a relative performance advantage over biological females. A biological female athlete cannot overcome that

advantage through training or nutrition. Nor can they take additional testosterone to obtain the same advantage, because testosterone is a prohibited substance under the World Anti-Doping Code. (2)

15. **Rugby.** In July 2022, England’s Rugby Football Union and Rugby Football League both approved new policies limiting the female category to players whose sex recorded at birth is female for contact rugby for the under 12 age group and above. Rugby Football League Gender Participation Policy § 4.2(d); Rugby Football Union Gender Participation Policy § 4.2(d).

16. In August 2022, the Irish Rugby Football Union adopted the same policy. Irish Rugby Football Union Gender Participation Policy §§ 4.5(b) & (f).

17. In September 2022, the Welsh Rugby Union also adopted the same policy.²

18. These bodies based their policy on a review of the scientific research, which showed that male advantage “cannot be sufficiently addressed even with testosterone suppression.” Rugby Football Union Gender Participation Policy § 3.4; *see also* Rugby Football League Gender Participation Policy § 3.4; Irish Rugby Football Union Gender Participation Policy § 4.3.

19. **Triathlon.** In June 2022, British Triathlon adopted a new policy limiting competition in the female category to “people who are the female sex at birth.” British Triathlon Transgender Policy § 7.2.

20. This policy is based on its review of the scientific literature and conclusions that “the scientific community broadly agrees that the *majority* of the physiological/biological advantages brought about by male puberty are retained (either wholly or partially) by transwomen post transition” and that testosterone suppression does not “sufficiently remove[] the retained sporting performance

² <https://www.wru.wales/2022/09/wru-updates-gender-participation-policy/>.

advantage of transwomen.” British Triathlon Transgender Policy § 2 (emphasis in original).

21. In August 2022, World Triathlon issued a new policy limiting the female category to biological females and to biological males who have suppressed circulating testosterone to 2.5 nmol/L for at least 24 months and have not competed in the male category in at least 48 months. World Triathlon Transgender Policy Process § 3. Previously, it had followed the old IOC guidelines of requiring testosterone suppression to 10 nmol/L for at least 12 months.

22. In issuing this policy, World Triathlon stated that “the potential advantage in muscle strength/power of Transgender women cannot be erased before two years of testosterone suppression.” World Triathlon Transgender Policy Process § 3. Notably, World Triathlon did not assert that two years of testosterone suppression actually erases male performance advantage, nor did it cite any evidence that would support such a proposition.³

23. Although World Triathlon listed sports scientists Drs. Emma Hilton and Ross Tucker as consultants in developing the new policy, both immediately criticized the policy as allowing male advantage into female triathlon competitions.⁴

24. Another sports scientist listed as a consultant to World Triathlon, Dr. Alun Williams, has opined that basing eligibility on circulating testosterone levels is

³ The sentence quoted above cites to Roberts (2020), which, as noted in my report, did not find that male performance advantage was erased after two years. To the contrary, after two years, the male-to-female transitioners maintained an advantage over biological females in the 1.5 mile run. *See* Brown Rep. ¶ 134. Further, the sit-up and push-up results strongly suggested a retained advantage in overall strength. *See* Brown Rep. ¶ 131.

⁴ *See* <https://twitter.com/scienceofsport/status/1555072611285143552>; <https://twitter.com/FondOfBeetles/status/1555518655806537729>.

not evidence-based policymaking because of the lack of evidence that testosterone suppression eliminates male performance advantage.⁵

25. **Cycling.** In June 2022, UCI, the world cycling federation, changed its eligibility criteria for males who identify as female competing in the female category from 12 months of testosterone suppression to the level of 5 nmol/L to 24 months of testosterone suppression to the level of 2.5 nmol/L. UCI Rules § 13.5.015.

26. In releasing the new policy, UCI cited a position paper by Prof. Xavier Bigard (2022), which concluded that the “potential [male] advantage on muscle strength / power cannot be erased before a period of 24 months.” (15) Notably, Prof. Bigard did not assert that the best available evidence shows that male advantage is actually erased after 24 months; he merely asserted that the evidence shows that male advantage is *not* erased *before* 24 months.⁶

27. **Boxing.** In August 2022, the World Boxing Council issued a new policy requiring athletes to compete in accordance with their natal sex. World Boxing Council Statement/Guidelines Regarding Transgender Athletes Participation in Professional Combat Sports. The WBC concluded that any other policy would raise “serious health and safety concerns.” *Id.* ¶ 5.

28. **Conclusion.** These new policies represent a growing recognition among athletic organizations that the best available science shows that male performance advantage is retained despite testosterone suppression. To be sure, different athletic organizations prioritize the competing values of fairness, safety, and inclusion in different ways. But increasingly, athletic organizations are making policy against the backdrop of a scientific consensus that male advantage in most

⁵ See <https://www.pressreader.com/uk/the-mail-on-sunday/20220327/284399857680074>.

⁶ The sentence quoted above also cites to Roberts (2020), which, as noted, did not find that male strength or performance advantages were erased after two years. See *supra* note 3.

athletic endeavors is substantial, and that there is no regimen of testosterone suppression proven to eliminate that advantage. That consensus is even clearer now than it was when I issued my report in February 2022, and the spate of new athletic policies reflects increasing awareness and acceptance of the available science.

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