

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

DEFENDANT-INTERVENOR AND THE STATE OF WEST VIRGINIA'S MEMORANDUM IN
RESPONSE TO PLAINTIFF'S MOTION TO EXCLUDE THE EXPERT TESTIMONY OF DR. CHAD
T. CARLSON

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INTRODUCTION

Girls deserve a safe playing field when they play school sports. In West Virginia, the Sports Act (W. Va. Code § 18-2-25d) seeks to accomplish this goal by requiring biological males beginning in middle school to play on male or co-ed teams, not female ones. This historically common rule furthers safety and fairness, as well as furthering Title IX's concern for female sports. But Plaintiff B.P.J. says West Virginia must designate sports teams based solely on gender identity or the state violates the Equal Protection Clause and Title IX.

To rebut this contention, the State and Intervenor (Respondents) have named Dr. Chad Carlson, a board-certified sports medicine doctor, Fellow of the American College of Sports Medicine, and past president of the American Medical Society for Sports Medicine as an expert witness to discuss the epidemiology, biomechanics, and physics of sports injury; the sex-based physiologic and performance differences that implicate injury risk; the inherent vulnerabilities to injury that female athletes have (and male athletes lack); and the retention of male physiological and performance differences following testosterone suppression. Dr. Carlson's report details how introducing biological males into female sports would increase the risk of injury to the female athletes.

B.P.J. now moves to exclude some of Dr. Carlson's opinions. Specifically, B.P.J. takes issue with Dr. Carlson's opinion that *some* of the sex-based physiologic and performance differences that implicate athlete safety apply before puberty. But Dr. Carlson's opinion is well-grounded in the academic literature and easily passes the threshold for presentation to the factfinder.

B.P.J. also attempts to recast Dr. Carlson's opinion about increased injury risk to female athletes as inadmissible "personal opinion" or "policy recommendation" for a "categorical ban" on participation by athletes who identify as transgender. Dr. Carlson's opinion, however, is neither his personal opinion nor a policy

recommendation. It is a straightforward scientific opinion about the injury risk inherent in introducing biological males into women's sports. And it is based on a 60-page report citing 11 sources, most of which are peer-reviewed academic publications. At every step, the report explains how the mechanics of sports injury combine with the relevant sex-based physiological and performance differences to add up to enhanced risk for female athletes when biological males are permitted on their courts or playing fields. B.P.J. just does not like what the evidence shows. But that is not a basis to exclude it. Dr. Carlson's report is reliable and admissible.

LEGAL STANDARD

Federal Rule of Evidence 702 allows the admission of expert testimony where an expert qualified by "knowledge, skill, experience, training, or education" offers testimony that will "help the trier of fact to . . . determine a fact in issue" and is "based on sufficient facts and data," "the product of reliable principles and methods," and the applications of principles and methods to the facts is reliable. Fed. R. Evid. 702.

The advent of Rule 702 "was intended to liberalize the introduction of relevant expert evidence." *Westberry v. Gislaved Gummi AB*, 178 F.3d 257, 261 (4th Cir. 1999). And the Court's gatekeeping function "is not intended to serve as a replacement for the adversary system." *In re Lipitor (Atovastatin Calcium) Mktg., Sales Pracs. and Prod. Liab. Litig.*, 892 F.3d 624, 631 (4th Cir. 2018) (cleaned up). Rather, confirming that an expert opinion need not be "generally accepted" to be admissible, the Supreme Court emphasized the role of "conventional devices" for testing an expert's testimony, such as "[v]igorous cross-examination, presentation of contrary evidence," and summary judgment practice, rather than "wholesale exclusion." *Daubert v. Merrell Dow Pharma., Inc.*, 509 U.S. 579, 584 (2003).

The touchstone of the Court's analysis is whether an expert's opinion is reliable, not whether it is "irrefutable or certainly correct." *Eghnayem v. Bos. Sci.*

Corp., 57 F. Supp. 3d 658, 668 (cleaned up). One of the “hallmarks” of reliability is the citation of peer-reviewed literature. *Sardis v. Overhead Door Corp.*, 10 F.4th 268, 295 (4th Cir. 2021). That literature need not be unanimous, just reliable. *R.W. v. Bd. of Regents of the Univ. Sys. of Ga.*, 114 F. Supp. 3d 1260, 1275 (N.D. Ga. 2015). Ultimately, Rule 702 calls for a “flexible” analysis “on the principles and methodology employed by the expert, not on the conclusions reached.” *Westberry*, 178 F.3d at 261.

ARGUMENT

I. B.P.J did not challenge the bulk of Dr. Carlson’s opinions, and they are therefore admissible.

Though styled as a motion to exclude Dr. Carlson entirely, B.P.J.’s motion fails to address the bulk of his testimony. By its own terms, B.P.J.’s motion seeks to exclude three things: (1) opinions “regarding prepubertal children,” (2) opinions regarding biological males “who receive puberty-delaying treatment,” and (3) the purported policy opinion that a “categorical ban” on biological males who identify as females participating in women’s sports is appropriate. Mem. in Supp. of Pl.’s Mot. to Exclude Carlson (Pl.’s Mot.), ECF No. 328.

Even if these requests were granted (and they should not be), the bulk of Dr. Carlson’s report and proffered testimony would be unaffected. This includes:

- The epidemiological and biomechanical causes of sports injuries, which appear in Section III of Dr. Carlson’s report;
- The physics of sports injuries, including how relatively small differences in mass and velocity lead to relatively large differences in energy, and how colliding with an object with greater force cause more rapid deceleration, which can lead to injury, all of which appears in Section IV of the report;
- How differences between adolescent and adult males and females relate to sports injuries—particularly how physiologic components like weight and strength, and performance differences like running speed, throwing speed,

kicking speed, and jumping power lead to increased injury risks, which appears in Section V of the report.

- The enhanced vulnerability that biological females have to sports injury, particularly concussive and ACL injuries, which appears in Section VI of the report.
- That testosterone suppression does not eliminate male physiologic and performance advantages that relate to safety, which appears in Section VII of the report.

Nothing in B.P.J.'s motion would prevent Dr. Carlson from testifying about these topics.

This evidence is relevant and helpful because Respondents offer Dr. Carlson to help the factfinder evaluate how the Sports Act advances the State's interest in promoting safety for female athletes. And the Sports Act primarily applies to biological males in the adolescent and post-adolescent age groups.¹ It does not regulate elementary schools. W. Va. Code § 18-2-25d(c)(1). The youngest males regulated are sixth graders—11- and 12-year-olds—who are, on average, on the cusp of endogenous puberty. *Id.*; Supp. App. to Def.-Intervenor's Mot. for Summ. J., ECF No. 300 (Supp. App.) 130-31 (Safer Rebuttal Rep. ¶ 17 n.4) ("start of Tanner 2 for transgender girls [biological males identifying as females] begin at about age 11.5"); Supp. App. 130 (Safer Rebuttal Rep. ¶ 17) ("eligible to receive puberty blockers when they reach Tanner 2 ... which is early enough to prevent endogenous puberty from taking place").² Thus, the bulk of the Sports Act's effect is to prohibit pubertal and

¹ To be clear, B.P.J.'s motion does not argue that these opinions are irrelevant or unhelpful, and any such contention is therefore waived. *W. Va. Coal Workers' Pneumoconiosis Fund v. Bell*, 781 F. App'x 214, 227 (4th Cir. 2019) ("failure to address an issue" reflects a conscious issue that "a party has voluntarily chosen to concede."). Respondents discuss the relevance of the opinions simply to aid the Court in understanding the purpose of Dr. Carlson's proffered testimony.

² All citations to filed documents are to the original or bates-stamped page number.

post-pubertal biological males from participating on female-designated teams, and Dr. Carlson’s opinion squarely addresses sex-based differences in those age groups that implicate athlete safety. These opinions drew no objection from B.P.J. and are admissible.³

II. Dr. Carlson’s opinion about prepubertal boys’ physiological and performance differences and athlete safety is reliable.

In his report, Dr. Carlson explained that injury occurs when part of an athlete’s body is exposed to an impact that exceeds the body part’s load tolerance. Def.-Intervenor’s App. in Supp. of Mot. for Summ. J., ECF 286-1 (App.) 219 (Carlson Rep. ¶ 26). He then sets forth the basic building blocks of that kind of impact: mass and velocity, which give a moving object kinetic energy; mass and acceleration, which give a moving object force; and mass, rotational axis, and angular acceleration, which give a moving object torque. App. 222–25 (Carlson Rep. ¶¶ 31–41).

Dr. Carlson explained that since energy is never used up, when a higher energy person or object strikes a lower energy person, some of that energy deforms the lower energy athlete’s body, and some of it causes the lower energy athlete to rapidly decelerate or accelerate in a new direction. App. 222–23 (Carlson Rep. ¶¶ 32–34). He further explained that, when larger and smaller bodies bring equal force to a collision, the smaller body experiences more rapid deceleration or acceleration in another

³ Even if the Court were to exclude Dr. Carlson’s opinion that allowing biological males to play female sports increases injury risk for the females (and it should not for the reasons set forth in Section III, *infra*), the scientific building blocks of that opinion—the mechanics of sports injury, sex-based differences that relate to safety, female vulnerability to injury, and the retention of advantage after testosterone suppression—would be admissible. After all, “[a]n expert on the stand may give a dissertation or exposition of scientific or other principles relevant to the case, leaving the trier of fact to apply them to the facts.” Fed. R. Evid. 702 Advisory Comm. Notes. Indeed, it is well-recognized that an expert is not “banish[ed] from the stand altogether” because his “ultimate opinion” is deemed inadmissible. *Kopf v. Skyrms*, 993 F.2d 374, 377-78 (4th Cir. 1993).

direction. App. 223–24 (Carlson Rep. ¶ 37). Likewise, when a body is hit with a larger force, it will experience greater deceleration or acceleration. App. 224 (Carlson Rep. ¶ 38).

Dr. Carlson then described the sex-based physiologic and performance differences that affect these building blocks of injury: height, weight, and bone and connective tissue strength (affects load tolerance); running speed, strength, and power; and throwing and kicking speed. App. 226–34 (Carlson Rep. ¶¶ 43–56). He also discussed sex-based differences that make females more vulnerable than males to injury, particularly concussive and ACL injuries. App. 234–46 (Carlson Rep. ¶¶ 57–78).

None of this appears controversial in the adolescent and post-adolescent population. What B.P.J. challenges is Dr. Carlson’s statement that *some* of the sex-based physiologic and performance differences have safety implications for prepubertal children. Specifically, B.P.J. claims that Dr. Carlson’s opinion is unreliable because he cited, among other sources, research on this population performed and summarized by Dr. Gregory Brown, and because the white paper Dr. Carlson submitted at an earlier stage of this case did not contain opinions on the prepubertal population. These criticisms are unavailing because they fail to attack the substance of Dr. Carlson’s work. They also misrepresent both Dr. Carlson’s use of Dr. Brown’s data and the process by which Dr. Carlson updated his report.

A. Dr. Carlson’s use of Dr. Brown’s Data is proper.

Dr. Carlson’s opinion that some sex-based differences have safety implications for the prepubertal population is based on twelve academic sources, Dr. Carlson’s own analysis of international youth javelin records, and his citation to data compiled by Dr. Brown.

As an initial matter, B.P.J.’s motion ignores the first two sources of authority. This is a glaring omission, as those sources alone sustain Dr. Carlson’s opinion, and

B.P.J. does not argue otherwise. Dr. Carlson cited peer-reviewed sources showing that sex-based advantages in lean muscle mass exist in infancy and persist throughout childhood (five studies) and that differences in throwing velocity manifest before puberty (one study). App. 229–32 (Carlson Rep. ¶¶ 49, 51). He further analyzed world records in the javelin throw for children aged 5 to 12 and showed consistent male advantages of 34% to 55%.⁴ He also cited evidence that young females exhibit increased vulnerability to all injuries (three studies) and specifically to concussive injuries (three studies).⁵ Accordingly, even without the citation to Dr. Brown’s research, Dr. Carlson’s conclusion that some sex-based differences in prepubertal children implicate athlete safety is well-grounded in the peer-reviewed literature and is therefore reliable. *Sardis*, 10 F.4th at 295 (calling peer review a “hallmark” of reliability).

⁴ Dr. Carlson used the same data source for this evidence that Handelsman used in his 2017 study of sex-based differences in athletic performance. B.P.J. relies on the Handelsman study throughout the motion to exclude Dr. Brown, as does Dr. Safer in his rebuttal report. Supp. App. 127 (Safer Rebuttal Rep. ¶ 9); Daubert Resp. App. to the Def.-Intervenor and the State of W.V.’s Joint Mem. in Resp. to Pl.’s Mots. to Exclude Experts’ Test. (Daubert Resp. App.) 314 (Handelsman 2017). (The Daubert Response Appendix was filed contemporaneously.)

⁵ One of these studies found enhanced concussion incidence and severity in females as young as four years old. Daubert Resp. App. 243 (Ewing-Cobbs et al. (2018)). Four of the sources cited were studies of middle school students. Daubert Resp. App. 42 (Beachy & Rauh (2014)), Daubert Resp. App. 128 (Caswell), Daubert Resp. App. 498 (Kerr et al. (2017)), Daubert Resp. App. 288 (Hacherl et al. (2021)). All of them reported sex-based differences in vulnerability to concussive injuries, and, although they presumably included both prepubertal and early pubertal girls, none of them reported a difference in their findings based on age or grade level. Since middle school girls are precisely the population that would be affected by the introduction of biological males to middle school sports, these studies are plainly relevant to the Sports Act. The sixth source cited was a Finnish study that grouped together all athletes under the age of 15, and thus presumably included both prepubertal and early pubertal girls. Daubert Resp. App. 513 (Kujala et al. (1995)). Again, however, this age range is essentially a middle school population, and the results are therefore relevant to the Sports Act.

Further, Dr. Carlson’s use of Dr. Brown’s data was entirely proper. “The facts and data upon which an expert may rely in reaching an expert opinion includes the opinions and findings of other experts, if experts in their respective field would reasonably rely on other expert’s opinions and findings.” *In re Wright Med. Tech., Inc. Conserve Hip Implant Prods. Liab. Litig.*, 127 F. Supp. 3d 1306, 1320 (N.D. Ga. 2015). Here, Dr. Carlson was specific about what he relied on in Dr. Brown’s report: the studies and data presented in Dr. Brown’s report on prepubertal athletic performance and prepubertal body composition. App. 213–14 (Carlson Rep. ¶ 17). And he catalogued the performance differences these data revealed, including that “pre-pubertal males outperform comparably aged females in a wide array of athletic tests including but not limited to the countermovement jump test, drop jump test, change of direction test, long jump, timed sit-up test, the 10 X 5 meter shuttle run test, the 20 meter shuttle run test, curl-ups, pull-ups, push-ups, one mile run, standing broad jump, and bent arm hang test.” *Id.*

B.P.J. presents no reason a sports-medicine doctor would not reasonably rely on an exercise physiologist’s compilation of studies and data on athletic performance and body composition. Indeed, this is exactly the kind of data one would expect an exercise-physiologist to compile.⁶

B.P.J.’s objection seems to be that Dr. Carlson “merely regurgitates” Dr. Brown’s findings. Pl.’s Mot. 6–7. But that is not the case. Dr. Carlson relied on Dr. Brown’s compilation as one of many sources for the proposition that certain sex-based performance and physiological differences exist between prepubertal boys and girls.

⁶ Much of the information compiled by Dr. Brown on sex-based prepubertal performance advantages was published online just last week by the Physiology Educators Community of Practice after review by the editor of *Advances in Physiology Education* journal and another peer in the field. Daubert Resp. App. 69 (Brown (2022)), Supp. App. 392 (Brown Dep. 162:4–164:7) (describing review process). This makes it all the more clear that Dr. Brown’s compilation is the kind of evidence on which a professional would reasonably rely.

And he evaluated those differences though the lens of his own field, sports medicine, to opine that some of the sex-based differences identified by the relevant literature and Dr. Brown—such as muscle mass, running speed, upper body strength, leg strength, and throwing velocity—have safety implications. App. 228–34 (Carlson Rep. ¶¶ 46–56).

This is a far cry from what the cases cited by B.P.J. labelled mere “regurgitation” of another expert’s opinion. For example, in *Eberli v. Cirrus Design Corp.*, 615 F. Supp. 2d 1357 (S.D. Fla. 2009), the excluded expert admitted that his entire opinion was based on a flight test conducted by someone else, and, indeed, that it wasn’t even his opinion. *Id.* at 1364 & n.4 (proffered expert answered, “That’s correct” to the question, “That’s not your opinion in this case, correct, that’s [another person’s]?”).

Likewise, in *Member Services, Inc. v. Security Mutual Life Insurance Co. of New York*, No. 3:06-cv-1164, 2010 WL 3907489 (N.D.N.Y. Sep. 30., 2010), the proffered expert’s opinion was “little more than a factual narrative based upon his review of select discovery documents and [the] other expert reports” and simply “repeat[ed]” the opinions of another expert. *Id.* at *26–27. Here, however, Dr. Carlson did not simply “repeat” Dr. Brown’s compilation; indeed, Dr. Carlson merely discussed that compilation in one paragraph of a 60-page, 97-paragraph opinion. Instead, Dr. Carlson evaluated it and then applied it to his own field to render an opinion that some of the differences identified by Dr. Brown and others implicate safety. This is exactly how experts regularly and permissibly use other experts’ data in reaching their own reliable and admissible conclusions. *In re C.R. Bard, Inc. Pelvic Repair Sys. Prods. Liab. Litig.*, MDL No. 2187, 2018 WL 510105, *3 (S.D.W.Va. Jan. 23, 2018) (rejecting *Daubert* challenge because expert used another expert’s data in forming his own opinion). Accordingly, Dr. Carlson’s use of Dr. Brown’s data was proper.

B. Dr. Carlson properly updated his analysis to address the safety implications of sex-based prepubertal differences.

B.P.J. next complains that Dr. Carlson’s report contains an analysis about sex-based prepubertal physiologic and performance differences that did not appear at the preliminary-injunction stage. That is true, but irrelevant. B.P.J. fails to explain why it would be inherently unreliable or inappropriate for an expert to update his analysis after the obviously “preliminary” preliminary injunction stage. And B.P.J. cites no cases supporting this proposition.

Contrary to B.P.J.’s uncited position, an expert may go so far as to correct errors or change opinions entirely without running afoul of *Daubert*, as long as the underlying substance is reliable. *Crowley v. Chait*, 322 F. Supp. 2d 530, 540 (D.N.J. 2004) (noting that an expert’s evidence-based adjustments to his opinion “strengthen[] the quality of the expert report” and are not grounds for exclusion); *Colony Ins. Co. v. Coca-Cola Co.*, 239 F.R.D. 666, 675–76 (N.D. Ga. 2007) (holding expert’s opinion admissible even though he changed it one week before his deposition upon further review of the data); *McCuller v. Daimler/Chrysler Corp.*, No. 2:04-CV-339, 2006 WL 5159183, at *1 (E.D. Tex. Sep. 15, 2006) (when an expert is accused of changing his opinions, the relevant question is “whether his new opinions are sufficiently reliable to be admissible”). Here, Dr. Carlson did not change any pre-existing opinions or correct any errors. He simply addressed a topic he did not address previously. And nothing in B.P.J.’s motion suggests his new opinion is unreliable.

Indeed, the only real criticism B.P.J. levies for the update in Dr. Carlson’s opinion rests on mischaracterization. According to B.P.J., Dr. Carlson claimed he had done additional research to update his report but “could not recall any additional sources that he relied on.” Pl.’s Mot. at 6. But that is not what Dr. Carlson said.

In the cited deposition testimony, Dr. Carlson merely said is that he didn’t include the fitness testing compiled by Dr. Brown in his bibliography—and he didn’t need to since he made it clear in his report that he was relying on the fitness testing

compiled by Dr. Brown. Supp. App. 510–11 (Carlson Dep. 105:13–14, 105:25–106:4). Dr. Carlson didn’t say anything about “not recalling” his sources. Elsewhere, he testified that he used the PubMed research database to look “more into the picture on population testing, looking at what differences in performance were between boys and girls. I looked at international and national performance records, databases. I looked at ratified standards for -- that had been determined through, for instance, the presidential physical fitness test.” Supp. App. 509 (Carlson Dep. 100:19–25). He was never asked in his deposition to catalog his sources. But his bibliography catalogs a variety of peer-reviewed sources cited in his expert report over and above those cited in his preliminary injunction declaration.⁷ B.P.J. simply chose not to ask about them.

In sum, B.P.J. points to nothing that would render Dr. Carlson’s opinion on the safety implications of sex-based prepubertal physiologic and performance differences unreliable. To the extent B.P.J. perceives this as a “change” to his opinion or an inconsistency (and it is neither), that is a topic for cross-examination, not a reason for exclusion. *In re C.R. Bard*, 2018 WL 510105, at *4 (“The plaintiffs can explore a challenge regarding perceived changes to his testimony over time on cross-examination.”).⁸

⁷ Daubert Resp. App. 56 (Blankenship et al. (2020)), Daubert Resp. App. 487 (Hon & Kock (2001)), Daubert Resp. App. 491 (Howell et al. (2020)), Daubert Resp. App. 628 (Montalvo et al. 2019)).

⁸ B.P.J.’s discussion of puberty blockers is misleading. In his deposition, Dr. Carlson was never asked about any safety implications relating to children who use puberty blockers alone. Instead, he was asked only about people who use puberty blockers *followed by gender affirming hormone therapy*, which is a different question. Supp. App. 512–14 (Carlson Dep. 112:5–118:11). Regardless, consistent with his expert report, Dr. Carlson will not offer any opinions about the effects of puberty blockers.

III. Dr. Carlson’s opinion that introducing biological males into women’s sports meaningfully increases the risk of injury for biological females is reliable.

Dr. Carlson’s report sets forth in detail how various male physiologic and performance advantages—such as size, speed, and strength—combine to make biological males, as a category, more capable than biological females, as a category, of inflicting injury in contact sports. App. 225–34 (Carlson Rep. ¶¶ 42–56). And the report also details how injury risks increase when players with these kinds of differentials—bigger, faster, stronger—are playing on the same field. App. 221–25 (Carlson Rep. ¶¶ 29–41). It also sets forth in detail how biological females are more vulnerable to certain types of injuries than biological males. App. 234–46 (Carlson Rep. ¶¶ 57–78).

All of this logically, scientifically, and reliably adds up to the conclusion that letting biological males compete against female athletes increases the injury risk to the females. That will in turn assist the factfinder to understand how the Sports Act advances the State’s interest in safety for female athletes.

B.P.J., however, mischaracterizes Dr. Carlson’s opinion as a “policy recommendation” or “personal opinion” advocating for a “categorical ban” against athletes who identify as transgender. It is nothing of the kind. It is a scientific opinion about injury risk. The opinion applies copious peer-reviewed data about the science of sports injury to conclude that introducing biological males to female sports increases risks for females. And none of B.P.J.’s quibbles undercut this opinion’s reliability.

A. Dr. Carlson reliably explained why intra-sex differences do not create the same risk profile as intersex differences.

B.P.J. contends that Dr. Carlson’s opinion is unreliable because differences among biological females in size, strength, and speed also create injury risk. But Dr.

Carlson explained why these risks are categorically different. B.P.J. just fails to address that explanation.⁹

If state officials permit a biological male to play a contact sport with females, the officials thereby place a person from a population that is, on average, more capable of causing injury because of multiple, additive advantages onto a playing field with people from a population that is, on average, more susceptible to injury both because of size, speed, and strength differentials and because of inherent injury vulnerabilities. App. 225–46 (Carlson Rep. ¶¶ 42–78). As Dr. Carlson testified in his deposition,

when you bring biological males into a pool of biological females, ... you're bringing not just in body mass, but ... other ... retained differences that have the potential to be greater [than] anything that you're going to see in that second pool [of] athletes. And ... so normal variation between the sexes and what that means for injury doesn't look the same as what it -- what that risk would look like if you're bringing somebody who isn't in that category and placing them in that second group.”¹⁰

Supp. App. 519 (Carlson Dep. 140:15–141:1).

Dr. Carlson emphasized that it is the *combination* of physical and performance differences that has an outsized effect on injury risk. *See, e.g.*, App. 222–23 (Carlson Rep. ¶ 33) (explaining that player weighing 20% more and running 15% faster delivers 58% more energy in collision), App. 230 (Carlson Rep. ¶ 50) (“multiple small advantages aggregate into larger ones”), App. 232–33 (Carlson Rep. ¶ 53) (explaining that volleyball travelling 35% faster delivers 82% more energy upon impact), App.

⁹ Dr. Carlson did *not* testify that he was unable to compare the risks attendant to allowing biological males to play contact sports with biological females to the risks attendant to intrasex differences, as B.P.J. claims. In fact, he specifically testified that he *is* able to compare those risks. Supp. App. 519 (Carlson Dep. 139:3–8).

¹⁰ Dr. Carlson was answering a confusing question that involved puberty suppression and gender-affirming hormones. He was never specifically asked to explain his opinion that introducing biological males to women's sports creates a risk that is different from the risks attendant to normal intrasex variation, but his answer to the confusing question is nonetheless helpful.

234 (Carlson Rep. ¶ 55) (emphasizing “combination” of “innate male-female differences”). This is why speculation from Dr. Safer (B.P.J.’s expert) that safety could be addressed though “generally applicable limitations on height or weight” is incorrect and does not undercut the reliability of Dr. Carlson’s opinion. Supp. App. 134 (Safer Rebuttal Rep. ¶ 27). Height and weight restrictions wouldn’t address running speed, muscle mass, strength, throwing velocity, jumping power, kicking speed, or other risk-related characteristics that vary based on biological sex. Thus, Dr. Safer’s speculation fails to address the combined and additive effects of male-female difference that are at the heart of Dr. Carlson’s report.

To be sure, Dr. Carlson’s opinion evaluates the effects of known sex-based differences on injury risk based on the physics of sports injury—not, as B.P.J. notes, based on data of injuries caused by biological males participating in women’s sports. But this is not a serious criticism. *Daubert* does not require the use of any particular methodology or data; it just requires reliability. *Hartle v. FirstEnergy Gen. Corp.*, 7 F. Supp. 3d 510, 522–23 (W.D. Pa. 2014) (“*Daubert* does not require the ‘best’ methodology or data.”). As Dr. Carlson explained, whether such injuries are occurring is not being tracked, so the data does not exist. Supp. App. 515–16, 523 (124:25–126:15, 155:11–156:16). Pointing out what kind of data Dr. Carlson did not use (because it is not yet available) says nothing about the reliability of the data he did use.

Ultimately, the opinion that allowing biological males to play female sports would introduce a risk to the females above and beyond that inherent in normal intrasex variability flows logically from the large average differences between males and females in physiologic and performance characteristics that relate to safety, and the way those characteristics combine to enhance risk. This is not to say that every biological male who might play women’s sports would necessarily hurt someone. Dr. Carlson’s opinion speaks in terms of risks, not absolutes. We all know as a matter of

common sense that allowing 15-year-old boys to play tackle football with 9-year-old boys would increase injury risk for the 9-year-olds. We know that because we know how much bigger, stronger, and faster typical 15-year-olds are than typical 9-year-olds. By explaining the mechanics of sports injuries and giving the data on male physiological and performance advantages that relate to injury risk, Dr. Carlson demonstrates that this same logic would apply if biological males were allowed to play contact sports with females.

Thus, the conclusion that biological males, as a group, have characteristics that enhance injury risk to biological females if they were to play contact sports with them flows logically from Dr. Carlson's report about the safety-related physical and physiological differences between males and females.¹¹ This is precisely the kind of "reasonable inference[] from the available evidence" that experts are permitted to draw. *In re Flint Water Cases*, No. 17-10164, 2021 WL 5925190, at *4 (E.D. Mich. Dec. 15, 2021). Any objection that Dr. Carlson has not reduced that enhanced risk to specific number goes to the weight of his testimony, not its reliability. *See, e.g., Wild Fish Conservancy v. Cooke Aquaculture Pac., LLC*, No. C17-1708, 2019 WL 6310660, at *3 (W.D. Wash. Nov. 25, 2019) (testimony that product was "at risk of failure" admissible without quantification of risk); *Sloan Valve Co. v. Zurn Indus., Inc.*, No. 10-cv-00204, 2013 WL 4052030, at *5 (N.D. Ill. Aug. 12, 2013) (lack of quantification

¹¹ This opinion does not depend on the number of biological males who play women's sports. Plainly, the risk goes up if more play, but the number of players doesn't change the underlying point that introducing biological males to women's sports increases risk for the females. Thus, B.P.J.'s quibble with Dr. Carlson's evidence of the increasing incidence of transgender identities among youth is of no moment. Further, an increase in the number of youth who identify as "transgender," "genderqueer," "genderfluid," or "unsure," would indeed suggest an increasing number of youth who do not identify with their natal sex. Daubert Resp. App. 648 (Rider et al. (2018)). And, as Dr. Carlson noted, the increasing incidence of transgender identity has been reported in major media, including the New York Times. App. 260 (Carlson Rep. at 59).

goes to weight not reliability); *In re Testosterone Replacement Therapy Prods. Liab. Litig.*, MDL No. 2545, 2017 WL 1833173, at *17 (N.D. Ill. May 8, 2017) (same).

B. Dr. Carlson’s opinion is not a “policy recommendation” or “personal opinion” but a scientific opinion based on data and scientific principles.

Dr. Carlson opines that allowing biological males to play contact sports with biological females increases injury risk for the females. That is an opinion about injury risk based on the science of sex-based physiological and performance differences and the science and mechanics of sports injury. It is not a “policy recommendation” or “personal opinion,” *contra* Pl.’s Mot. 9–10, and the cases B.P.J. cites do not show otherwise.

For example, in *Hines v. Wyeth*, Civ. A. No. 2:04-0690, 2011 WL 2680842, (S.D.W.Va. July 8, 2011), *order clarified on reconsideration*, Civ. A. No. 2:04-0690, 2011 WL 2730908 (S.D.W.Va. July 13, 2011), the excluded expert provided “no explanation or analysis” for her opinion, cited nothing, and did not otherwise ground her conclusion in anything at all. *Hines*, 2011 WL 2680842 at *5. The court therefore deemed it a mere “personal opinion.” *Id.* Here, on the other hand, Dr. Carlson grounded every step of his risk analysis in measured, well-cited, sex-based physiologic and performance differences and a well-grounded discussion of the epidemiology, biomechanics, and physics of sports injury. His report is worlds apart from that of an expert whose opinions are “devoid of any explanation or analysis.” *Id.*

Likewise, in *Allison v. McGhan Medical Corp.*, the excluded expert only cited a handful of studies—mostly in animals—for the proposition that silicone breast implants cause systemic disease; the expert also totally ignored more than 20 published human epidemiological studies showing no connection between the implants and disease. 184 F.3d 1300, 1315 (11th Cir. 1999). Here, Dr. Carlson ignored nothing. And B.P.J. has not identified a single article or other piece of contradictory scientific evidence.

Finally, in *Ollier v. Sweetwater Union High School District*, the excluded experts in a Title IX suit opined on whether a school's baseball and softball programs were equal. 768 F.3d 843, 860–61 (9th Cir. 2014). But these opinions were grounded entirely in the experts' cursory walk-through of the facilities. A walk-through bears no similarity to a 60-page report like Dr. Carlson's that cites 114 sources, most of which are peer-reviewed academic publications.

At bottom, Dr. Carlson's opinion helps the factfinder in this case evaluate whether the Sports Act advances the State's interest in safety for female athletes. Dr. Carlson does not presume to tell policymakers what they must do. As Dr. Carlson himself noted, contact and collision sports are inherently risky, and what level of risk to accept is a "societal" decision. Supp. App. 533 (195:13–25). As a board-certified, sports medicine doctor with extensive experience, a Fellow of the American College of Sports Medicine, and a past president of the American Medical Society for Sports Medicine, Dr. Carlson is well qualified—and some would say has a moral obligation—to point out "[w]hen basic science and physiology both predict increased injury" so that policymakers can make an informed decision. App. 261 (Carlson Rep. at 60).

Here, West Virginia made that decision by passing the Sports Act to promote the safety of female athletes. And Dr. Carlson's report is reliable and helpful in understanding how the Act accomplishes that goal.

CONCLUSION

Dr. Carlson is the only expert offered by any side in this case qualified to discuss athlete safety. Both common sense and sports literature recognize the importance of safety in setting policies for athletic participation. So Dr. Carlson's perspective is important, and nothing in B.P.J.'s motion undermines its reliability or identifies any other deficiency with it. For the foregoing reasons, B.P.J.'s motion to exclude his testimony should be denied.

Respectfully submitted this 26th day of May, 2022.

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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

CERTIFICATE OF SERVICE

I, Brandon Steele, hereby certify that on May 26, 2022, I electronically filed a true and exact copy of the forgoing with the Clerk of Court and all parties using the CM/ECF system.

/s/ Brandon S. Steele

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