tion with how one is doing in tennis, and contentment with and the evaluation of one's tennis coach. In general, the present findings supported this hypothesis (although limited support emerged for the indices of subjective performance). Only in the case of the athletes' rating of the relevance of the coach to the athletes' training and development did dispositional goal perspectives also emerge as a significant, albeit less important, predictor. The latter result can be explained by the observation that this particular variable seemed to encompass a belief (i.e., that a coach's contribution is pertinent to one's achievement in a sport) as well as a situation-specific evaluation (i.e., I am satisfied with my coach's influence on my tennis development). Beliefs have been found to be more closely associated with dispositional differences in goal perspectives than perceptions of the prevailing motivational atmosphere operating in one's sport (e.g., 7, 14).

The overall results concerning the superior prediction provided by perceptions of the motivational climate have important applied implications. Recent research (28) has indicated that the situationally emphasized goal structure can be modified in sport and that such interventions have a theoretically consonant effect on indices of motivation. It is reasonable to assume that it is easier to alter situational in contrast to dispositional goal perspectives. That is, we would expect that there is a need to change the former to impact the latter over time (3, 5, 9).

It should be noted, however, that perceptions of the motivational climate and goal orientations captured a limited amount of variance in facets of performance improvement (R^2=.01–.07) and reported satisfaction with match results and personal level of play (R^2=.05–.06). It appears that other factors, besides dispositional and situationally emphasized goal perspectives, influence subjective ratings of performance and satisfaction with competitive outcomes and one's tennis play among the present sample of athletes (e.g., the athlete's objective level of tennis talent, and the difficulty of the competition the athlete has faced).

Situationally emphasized goals were a better predictor of the three items which related to the coach (R^2=.17–.26) than the other dependent variables examined in this study. As suggested above, we would expect a greater interdependence between athletes' perceptions of the goal perspectives manifested at the contextual level and their evaluation of the major determinant of that climate, namely the coach.

As a whole, the present findings are in accordance with the tenets of goal perspective theory (1–3) and previous sport research (5, 9, 10), and provide further support regarding the motivational advantages of a task-involving atmosphere. Some researchers have argued that the promotion of task involvement (and curtailing of ego involvement) may not be an appropriate strategy at the higher levels of athletic competition (11), while others, such as Pensgaard and Roberts (29) in their work involving Norwegian Olympic athletes, have noted the adaptive qualities of a task-involving climate. This study's results suggest that climates which are more task-involving and less ego-involving may be more beneficial for skilled athletes (at least in their own minds). Slightly over two-thirds of the current sample were at the advanced level of tennis proficiency or beyond. It should be noted that MANOVA revealed no differences in the variables of interest in this study as a function of competitive level. Further, the observed relationships between perceptions of the motivational climate, goal orientations, and the items assessing perceived improvement, satisfaction, and coach ratings did not significantly vary among the intermediate, advanced, and professional level tennis players.

In future research, it would be interesting to examine the predictive utility of dispositional and contextual goals to current *and* subsequent objective indices of competitive performance (11) among such skilled groups of athletes. Additionally, subsequent work might look at the capacity for perceptions of the motivational climate and goal orientations to discriminate between those younger, talented athletes who continue to participate and move up the competitive ladder and those who do not (30).

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Exhibit 8

Depression in Athletes: Prevalence and Risk Factors

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Abstract

Depression affects an estimated 6.7% of today's adult population in a 12-month period. The prevalence rates for certain age groups, such as young adults and older adults, are higher. There are approximately 400,000 National Collegiate Athletic Association student athletes competing each year and 5 to 7 million high school student athletes involved in competitive interscholastic sports. Given such a high prevalence rate in certain age groups and a large denominator pool of athletes, past notions that athletes are devoid of mental health issues have come under scrutiny by sports medicine providers. Initial data suggest that athletes are far from immune to depression. The purpose of this article was to review the current research on athletes and depression; particularly this article will provide an overview of studies, which have investigated the rate of depression among athletes, and discuss relevant risk factors, which may contribute to depression among athletes.

Introduction

Depression affects an estimated 6.7% of today's adult population in a 12-month period (21). According to the U.S. Department of Health and Human Services, the prevalence rates for certain age groups, such as young adults and older adults, are higher — for example, for the 18-to-25 age group, the 12-month depression prevalence rate was 8.7% in 2008. There are approximately 400,000 National Collegiate Athletic Association (NCAA) student athletes competing each year and 5 to 7 million high school student athletes involved in competitive interscholastic sports. Given such a high prevalence rate in certain age groups and a large denominator pool of athletes in these age groups, it is reasonable to surmise that there are thousands of athletes with depression participating at the high school and college levels. Recently, sports medicine and sports psychology practitioners and researchers have turned their attention to this important issue, as past notions that athletes have reduced mental health issues due to increased levels of exercise have come under scrutiny in the popular media (24). Although vastly understudied, initial data suggest that athletes are far from immune to depression. In fact, empirical studies indicate that athletes are just as likely to experience depression as the general population (26). The purpose of this article was to review the current research on athletes and depression and to highlight that this is an issue in much need of further study and inquiry. In particular, this article will provide an overview of studies, which have investigated the rate of depression among athletes, discuss relevant factors (*e.g.*, injury), which may contribute to depression among athletes, and consider how an integrative approach involving sports medicine and sports psychology can best serve athletes.

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Depression Prevalence and Athletes

To date, the majority of studies investigating the prevalence rate of depression among athletes have been conducted with college athletes. Findings from these studies suggest that the prevalence rate of depression among college athletes ranges from as low as 15.6% to as high as 21% (25,35). On the basis of these prevalence rates, as many as one in five athletes may be depressed. However, there has been a general lack of consistency thus far in the findings.

Storch et al. (29) were the first investigators to compare rates of depression symptoms between athletes and nonathletes. This study hypothesized that because athletes deal with more stress than nonathletes, they would report higher levels of alcohol use, depression symptoms, and social anxiety. The study also hypothesized that athletes would report having less social support than nonathletes. There was partial support for these hypotheses, as female athletes reported experiencing depression symptoms, social anxiety, and nonsupport to a greater extent than male athletes and male and female nonathletes. In another study, Yang et al. (35) demonstrated similar findings regarding gender, as female athletes reported the highest levels of depression among a sample of 257 Division I college athletes. These findings are consistent with data from the general population, which repeatedly have found women to report higher rates of

depression than men. In total, 21% of the athletes surveyed reported symptoms of depression. Freshman athletes and those who endorsed pain reported more depression symptoms in this study.

According to Yang et al. (35), athletes in their sample experienced depression at approximately the same rate as that of a comparison group of nonathletes who participated in the study. However, Armstrong and Oomen-Early (3) found that college athletes reported lower levels of depression than those reported by nonathletes. This study used a sample consisting of 227 participants, 104 of which were male and female athletes from various sports. Overall it was found that 33.5% of the sample reported clinically significant levels of depression. The percentage of athletes endorsing clinically significant levels of depression was reported to be "significantly lower" than that of nonathletes. This study also found that athletic status was not a statistically significant predictor of depression when compared with other variables investigated in the study including gender, self-esteem levels, social connectedness, and rested sleep. Armstrong and Oomen-Early (3) contended that having a social network and team support are two factors that most strongly protect college athletes from developing depression.

Proctor and Boan-Lenzo (25) conducted another recent college athlete and depression prevalence study. This study investigated depression symptoms among a group of 61 Division I male baseball players and 51 male nonathlete college students. Proctor and Boan-Lenzo (25) found that male athletes reported fewer depression symptoms than those reported by male nonathletes. Although nonathletes reported higher levels of depression (29.4%), 15.6% of the athletes met criteria for a possible diagnosis of clinical depression.

With consideration for the mixed epidemiological data, taking a more nuanced look at the factors that may contribute to depression among athletes is particularly relevant. To date, one of the most widely studied risk factors for psychological distress among athletes has been sports injury. In a recent survey of sports medicine physicians, it was found that 80% of the time, athletes coming to treatment for an injury also discuss psychological issues related to the injury (19). However, there only have been a handful of studies, which have investigated depression symptoms directly among athletes following sports injury.

Sports Injuries and Depression

Brewer and Petrie (7) were among the first researchers to compare depression symptoms between athletes who had and had not experienced injuries. In this retrospective study, it was found that athletes who experienced an injury during the previous year reported significantly higher depression symptom scores than those reported by noninjured athletes, as measured by the validated Center for Epidemiological Studies Depression (CES-D) scale. The sample in this study consisted of 916 NCAA Division I college football players. Brewer and Petrie (7) also found that both groups of athletes in their study reported high levels of depression symptoms, as 33% of athletes with injury and 27% of noninjured athletes could be classified as depressed on the basis of the CES-D results. In another study, Leddy et al. (16) used a prospective design to examine depression symptoms in athletes following injury. The results from this study indicated that over half of the athletes (51%) who sustained an injury during the course of the study endorsed mild-to-severe depression symptoms, as measured by the Beck Depression Inventory (BDI). Thus far, a limitation in the research has been sole reliance on self-report measures to assess depression. However, Appaneal et al. (2) sought to address this issue by including two measures (semistructured interview and self-report) of depression in their study examining athlete's postinjury depression symptoms. In this study, the researchers used a sample of 164 athletes competing at the NCAA Division I, NCAA Division II, and high school levels. Athletes in the study were assessed using the CES-D and the semistructured interview guide for the Hamilton Rating Scale for Depression (SIGH-D). In this study, it was found that depression symptoms of athletes with injury were elevated 1 wk after injury and remained this way 1 month after injury when compared with healthy controls, as measured by the SIGH-D. No significant differences between groups were found in this study, as measured by the CES-D.

There has been a recent surge of evidence suggesting that sports concussions can lead to changes in emotional state (14,17). Furthermore there is recent evidence to suggest that sports concussions can have long-lasting emotional impact. In a recent survey of 1,044 retired National Football League (NFL) players, it was found that the 9-year risk of a depression diagnosis increased with the number of self-reported concussions (15). According to the survey, retired athletes reporting three or more concussions were three times more likely to report being diagnosed with depression when compared with athletes with no history of concussions.

Strain et al. (30) conducted a study with 26 retired NFL athletes who underwent a magnetic resonance imaging technique identified as diffusion tensor imaging scanning. They reported that certain voxels negatively correlated with BDI-II scores and that specific brain areas of the forceps minor, right frontal aslant tract, right uncinate fasciculus, and left superior longitudinal fasciculus negatively correlated ($P < 0.01$) with total BDI-II scores. Fractional anisotropy maps, which reflect fiber density, axonal diameter, and myelination in white matter of the forceps minor differentiated depressed from nondepressed athletes with 100% sensitivity and 95% specificity, from which the authors conclude that diffusion tensor imaging is a promising biomarker predictor of depression symptoms. Additionally Hart et al. (13) conducted a neuroimaging study measuring cognitive impairment and depression in a sample of 34 retired NFL players and found a 23.5% prevalence of depression and a high rate of cognitive deficits compared with those of a control group. They concluded that cognitive deficits and depression symptoms appear to be more prevalent in retired NFL players when compared with those in a healthy control group.

While the relationship between concussion and depression may be significant, there is also evidence to suggest that a concussion may have the same effect as other injuries on mental health. For example, Mainwaring et al. (18) conducted a study to examine the differences between emotional responses in athletes who had a concussion compared with anterior cruciate ligament (ACL) injury. They found that athletes with ACL injuries had more severe levels of depression and longer duration of depression compared with those of athletes with concussion. The authors concluded that ACL injuries have a higher level of emotional disturbance compared with

that of athletes with concussion and that screening and intervention should be focused on athletes with ACL injuries and concussions. While the sample size of this particular study was small, it does illustrate that there is increased risk of maladaptive psychological response to various types of injuries and that concussion may or may not be an increased risk factor for depression over other types of sports-related injuries.

Although not due to the result of an acute injury, overtraining syndrome (OTS) also can threaten the overall mental and physical well-being of an athlete. OTS is characterized by psychological and physiological disturbances, along with decreases in performance (20). There is much debate about the causes and consequences of OTS, but the research does indicate that the symptoms of major depression and OTS can appear similar (23). As such, those professionals working with athletes should be mindful of not mistaking depression for OTS and *vice versa*. However, they also should be aware that the two conditions are not necessarily mutually exclusive and can co-occur.

Career Termination

The end of an athlete's career marks a major life transition that can result in changes to an athlete's interpersonal relationships, roles, and daily routines (28). Although sports career termination represents a significant life transition for athletes, this necessarily does not mean that it results in psychological distress. For some athletes, the transition from competitive athletics to sports retirement is done with ease, allowing them to pursue new career paths and opportunities. For others, this transition is a difficult process that has been correlated with behavioral difficulties and emotional distress (21). For example, sports career termination has been associated with maladaptive coping strategies, depression, anxiety, increased hostility and anger, and substance abuse (11,28,33,34).

It is likely that several moderating and mediating variables impact an athlete's response to career termination. One particular variable that has received considerable attention is voluntary (*i.e.*, personal decision to retire) versus involuntary (*i.e.*, injury, getting cut from team) career termination. It has been hypothesized that involuntary career termination is more likely than voluntary career termination to impact an athlete's mental health negatively (9).

Wippert and Wippert (34) garnered additional support for this contention in a study that found that involuntary career termination was associated with significantly greater psychological symptoms, including depression symptomatology, as measured by the Symptom Checklist-90-R, than voluntary career termination among a sample of skiers. However, it also was found that symptoms of psychological distress for those athletes dealing with involuntary career termination decreased over time. This finding may indicate that, initially, athletes have a difficult time adjusting to involuntary career termination but experience overall reduction in psychological distress the farther removed they are from the event. Alfermann et al. (1) demonstrated similar findings in their investigation of the cognitive, behavioral, and emotional consequences associated with career termination among a sample of 256 amateur European athletes. Alfermann et al. (1) found that planned retirement from sports was associated with fewer negative emotional reactions (including sadness) when compared with unplanned retirement.

Whereas voluntary versus involuntary career termination has been the most well-studied situational factor related to the end of athlete's career, athletic identity has received the most attention as a potential individual factor that can impact the process of transitioning out of sports. Athletic identity is defined as the degree to which an athlete defines himself or herself in terms of the athletic role (8). Baillie and Danish (4) found that athletes rating high in athletic identity were prone to experience emotional and social adjustment issues after they ended their sports career. Strong and exclusive athletic identity also has been associated with heightened stress and anxiety following sports career termination (11). Brewer (6) found that athletes scoring high on the Athletic Identity Measurement Scale responded to hypothetical career-ending injuries with depression reactions. In summary, research findings consistently suggest that individuals with a strong and exclusive athletic identity experience more intense and frequent psychological and emotional difficulties following retirement from sports (1,4,11,21).

The potential for loss of an athlete's identity following sports career termination was the primary reason, as hypothesized by a recent investigation, why former college athletes would report greater depression symptoms than current college athletes (32). However, the opposite was true, as depression was significantly higher among current athletes when compared with that among former athletes. On the basis of the results, 17% of current college athletes met the criteria for depression whereas 8% of former college athletes had levels of depression consistent with a diagnosis for the disorder. Weigand et al. (32) concluded that these findings suggest that voluntary sports career termination for the college athlete — *i.e.*, the end of their college athletic career — necessarily does not put the athlete at higher risk for the long-term development of depression. These findings may or may not be applicable to the athlete whose career is ended or interrupted by injury or who is cut from the team or sports, especially if the athlete's identity and self-worth are related intricately to continuation in sports.

Performance and Depression

From a psychological perspective, athletes may be prone to experience depression symptoms when they face declines in their athletic performance or a catastrophic ("choking") athletic performance. Conceptually poor athletic performance may result in lack of external reinforcement, behavioral deactivation, negative self-perceptions and evaluations, and feeling of helplessness or hopelessness, which are consistent with depression symptoms. When viewed in an objective context, the nature of athletic competition can yield higher rates of loss throughout the year and ultimately only one team or athlete may achieve the pinnacle while all others end their season or career with a competitive loss. Hammond et al. (12) conducted a study to examine the relationship between the prevalence of diagnosed failure-based depression and self-reported symptoms of depression within a sample of 50 elite swimmers. Of note in this study was a 68% lifetime prevalence of depression episodes among the participants, with significantly more females endorsing history of depression. The authors found that after an athletic competition, 34% of

the athletes had clinically elevated depression scores on the BDI-II but the top quartile of elite performance had 2 times higher rate of elevated depression scores. Considering the fact that the Olympics only occur every 4 years may account for this effect, it is still important to note that within this elite performer group, there was a significant relationship between the athlete's performance and depression symptoms. This study illustrates that some high-performing athletes actually may be more susceptible to depression when faced with performance outcomes that are below expectation and that sports medicine personnel need to be aware of the psychological consequences of losing or personally failing during competition. Those providing comprehensive care for the athlete should understand that the expectations for athletic performance have a number of influences and may include not only the athlete's viewpoint but also the perception of teammates, coaches, and family.

Concerns With Underreporting

As noted by Proctor and Boan-Lenzo (10), one reason for the difference in depression rates in their study may be because athletes were underreporting depression symptoms in an attempt to portray themselves in a favorable light. In contrast to nonathletes, athletes may have some reservations when filling out a depression measure, such as coaches discovering their scores or concerns over imagined reactions to admitting being depressed. The question of how responding impacts reporting on self-report questionnaires is always an important question for researchers and may be particularly critical in measuring depression among college athletes. Anecdotally, athletes tend to portray a picture of psychological strength when assessed for depression symptoms. There appears to be a tendency to put considerable effort into appearing "fine" or "okay" and ready for the next competition or challenge. This is inherent to the culture of athletics, as confidence often is regarded as a necessary state of mind for completion. However, it creates significant difficulty for sports medicine professionals attempting to access an athlete's state of mind accurately. Further research into depression in athletes ideally should take into account the concern for underreporting of depression symptoms, especially if the study relies on self-reported data. We currently are involved in such a study of college athletes that not only employs a validated depression survey tool but also includes an additional validated reporting tool that helps in determining whether symptoms are being underreported.

Suicide

A number of recent suicides of current or former athletes and related media attention have resulted in heightened focus and discussion on potential risk factors for suicidal behavior in athletes. Athletes, similar to the general population, in fact do contemplate and commit suicide. In a review of the medical and periodical literature, Baum (5) found 71 cases of athletes who contemplated, attempted, or completed suicide. Of these 71 identified cases, 66 were completed suicides. The vast majority of these cases were male athletes (61 cases) with an average of 22 years old for the entire sample. This is consistent with the empirical literature, which indicates that males are more likely than females to commit suicide and that individuals between the ages of 15 and 24 years represent the group with the highest risk of committing suicide. Although suicide in athletes continues to occur and there are aspects to athletic participation that may lead to increased rates of depression and potential suicide risk, there is paucity of research identifying risk factors for suicidal behaviors in athletes and a lack of information on guidelines to assess suicidal potential in athletes. Smith and Milliner (27) and Baum (5) report case studies of athletes who committed suicide and make inferences to the manner in which athletic trainers and other professionals may assess suicidal risk. For example, on the basis of five case studies of athletes with injury seen in their clinical practice, Smith and Milliner (27) contend that a serious injury necessitating surgery, an extended rehabilitation process (6 wk to 1 year), reduced athletic skills despite adherence to rehabilitation, a perceived lack of competence upon returning to sports when compared with preinjury levels, and being replaced by a teammate at their given position all may contribute to suicidal behavior among athletes with injury.

While the previous research and discussion are worthwhile, the small sample sizes of these studies elicit caution against making clinical decisions without more quantitative findings. Drawing from clinical practice guidelines may be the most effective manner at implementing strategies to assess and manage suicide risk with athletes. Fowler (10) completed a practice review of suicide risk assessment in clinical practice that illustrates the poor predictability of suicide and suicide attempts and the complex interactive nature of variables associated with suicide. Overall, much still remains to be understood about the identification and assessment of athletes at risk, as it relates to suicide and suicide risk reduction.

Conclusions and Discussion

Review of the literature reveals that depression does occur in athletes and that athletes are not somehow immune or resistant to depression. In fact, it is hypothesized that there are risk factors that are more unique to an athletic population (*i.e.*, injury, involuntary career termination, performance expectations, and possibly overtraining) that may increase the risk of depression compared with the general population. In certain subpopulations of athletes, there may be a higher rate of depression than nonathletes. Clearly depression in athletes exists. Suicide in athletes, a tragic outcome that can be associated with depression, exists.

At this time, there is limited knowledge regarding optimal assessment of depression in athletes and there is paucity of evidence-based interventions that have been shown to be effective for treating athletes with clinical levels of depression. Future studies in depression and athletes should explore how assessment and management of depression may be different in athletes and nonathletes; for example, is evidenced-based therapy more or less effective in athletes or what class of medications may be more helpful to the athlete? It is hypothesized that mental health treatment services may be underutilized by individuals participating in athletics due to a myriad of variables such as time constraints and social stigma (34), which is concerning, considering the high rates of depression among athletes that have been found in some studies. Primary contact regarding depression and mental health issues may occur with sports medicine teams.

Therefore, it is essential that these health care professionals are able to identify the signs and symptoms of depression among athletes and offer appropriate referrals when necessary. Athletes may present with atypical signs and symptoms, such as anger and irritability, and engage in healthy or less healthy coping mechanisms, such as substance abuse or overtraining. Beyond the traditional indicators of depression, athletic trainers and sports medicine teams should maintain increased awareness that (given the nature of the athletic culture) athletes may be likely to deny depression symptoms. Education of sports medicine professionals and the athletic care network is key to the optimal evaluation, management, and outcome of depression in athletes.

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Exhibit 9

Penn swimmer slams school's handling of Lia Thomas saga: 'They don't actually care about women at all'

By Paulina Dedaj

Published January 28, 2022

Fox News

EXCLUSIVE: A swimmer on the University of Pennsylvania women's team says she feels the school's decision to allow transgender swimmer Lia Thomas to compete has created an unfair balance within the sport that prioritizes Thomas' rights over that of biological female student-athletes.

The student, who spoke to Fox News Digital on the condition of anonymity out of fear of retribution, said she was "hopeful" after learning of the NCAA's decision last week to update its policy of allowing transgender athletes to compete based on hormone levels.

LIA THOMAS' TEAMMATES REALIZING 'THEY WILL NEVER, EVER BE ABLE TO BEAT THIS PERSON,' PENN SWIMMER'S DAD SAYS

"I'm a little bit more hopeful because I think that, at least as swimmers, we kind of realize that it's not just testosterone levels," she told Fox News. "It's testosterone levels from the last 20 years and how that affected, you know, the fact that [Thomas] went through male puberty and the way that built her heart and lungs and her hands and the way she circulates blood and the lactic acid and all that stuff."

"Stuff that – it's not just the difference between two girls and how one might have slightly larger lungs and that gives them a slight advantage," she continued, "These are monumental advantages that biological males just develop through puberty, and it's not something that a year of [hormone treatments] can suppress because they still have all the muscle mass they had from the last 20 years."

The new approach to allowing transgender athletes to compete will follow a sport-by-sport model similarly adopted by the U.S. and International Olympic committees. The new NCAA policy, which takes effect starting with the 2022 NCAA Winter Championships, means swimming athletes will be governed by USA Swimming policies.

Lia Thomas, a transgender woman, warms up before swimming for the University of Pennsylvania at an Ivy League meet against Harvard University in Cambridge, Massachusetts, on Jan. 22, 2022. (JOSEPH PREZIOSO/AFP via Getty Images)

USA Swimming uses an eligibility review panel to make a decision on transgender athletes' eligibility. Elite swimmers would be up to FINA and IOC policies.

USA Swimming released a statement last week following the NCAA's announcement of its updated transgender participation policy.

The organization said it is still awaiting new directives from the International Swimming Federation (FINA) concerning trans athlete participation.

"USA Swimming firmly believes in inclusivity and the opportunity for all athletes to experience the sport of swimming in a manner that is consistent with their gender identity and expression. We also strongly believe in competitive equity, and, like many, are doing our best to learn and educate ourselves on the appropriate balance in this space," the organization said.

"In 2018, we established athlete inclusion procedures, which included both a process by which an athlete could change their competition category consistent with their gender identity and criteria for athletes qualifying for or competing in elite-level competitions (including those competition time qualifications such as Juniors, Nationals and U.S. Open), which adhered to previous International Olympic Committee guidelines. This policy also importantly provides for individual athlete consideration.

"The non-elite athlete inclusion procedures remain unchanged. Following broad transgender policy changes in Nov. 2021, the IOC now requires International Federations to create their own sport-specific eligibility requirements, and so we have been proactively working with FINA for several months to help shape and support their policy development efforts. We believe they will release a new policy shortly, which we will adopt for elite-level competitions.

"USA Swimming is a member-driven organization governed by a 15-member Board of Directors, which oversees more than 360,000 members–including coaches, volunteers and over 325,000 athletes from age-group level to the Olympic Team. These individuals and 2,800 member clubs participate through a network of 59 Local Swimming Committees (LSCs) in four geographic Zones across the U.S. With the NCAA now deferring to USA Swimming for eligibility determinations, we welcome and look forward to American NCAA athletes and coaches joining our membership in order to be eligible to be governed by our policy and its provisions and benefits."

The IOC updated its transgender participation policy in November 2021, refraining from the focus on testosterone levels to determine eligibility, according to The Washington Post. The IOC urged the governing bodies of each individual sport to create the rules while offering assistance.

Lia Thomas of the Pennsylvania Quakers gets ready to compete in a freestyle event during a tri-meet against the Yale Bulldogs and the Dartmouth Big Green at Sheerr Pool on the campus of the University of Pennsylvania on Jan. 8, 2022, in Philadelphia, Pennsylvania. (Hunter Martin/Getty Images)

"Every athlete has the right to practice sport without discrimination and in a way that respects their health, safety and dignity," the updated rules stated. "At the same time the credibility of competitive sport — and particularly high-level sporting competitions — relies on a level playing field where no athlete has an unfair or disproportionate advantage over the rest."

USA Swimming didn't immediately respond to Fox News' request for comment on whether Thomas would be eligible for the NCAA Championships.

LIA THOMAS CONTROVERSY LEADS WOMEN'S SPORTS ADVOCATES TO SPEAK OUT AGAINST NCAA: 'IT'S ABOUT FAIRNESS'

The anonymous Penn swimmer also alleged that if Thomas, who is qualified to compete at the 2022 NCAA swimming and diving championships in Atlanta in March, is unable to compete under the new guidelines, a lawsuit could be filed.

"I have a feeling that if USA Swimming changes their rules, they will be filing a lawsuit for Lia to swim, but they wouldn't do that for

us," she said. "That's just really upsetting."

The student told Fox News that she does not know if the university itself or if Penn athletics would file the lawsuit but said she "heard that from some of the administrators."

The NCAA policy previously required trans women athletes to undergo at least a year of testosterone suppression treatment before competing on a women's team.

The updated policy for the NCAA says that, by March, "Transgender student-athletes will need to document sport-specific testosterone levels beginning four weeks before their sport's championship selections. Starting with the 2022-23 academic year, transgender student-athletes will need documented levels at the beginning of their season and a second documentation six months after the first. They will also need documented testosterone levels four weeks before championship selections. Full implementation would begin with the 2023-24 academic year."

Lia Thomas of the Pennsylvania Quakers after winning the 500-meter freestyle event during a tri-meet against the Yale Bulldogs and the Dartmouth Big Green at Sheerr Pool on the campus of the University of Pennsylvania on Jan. 8, 2022, in Philadelphia. (Hunter Martin/Getty Images)

"They're just proving, once again, that they don't actually care about their women athletes," the swimmer said of the University of Pennsylvania. "They say that they care and that they're here for our emotions, but why do we have to be gracious losers? ... Who are you to tell me that I shouldn't want to win because I do want to win. I'm swimming. I'm dedicating more than 20 hours a week to the sport.

"Obviously, I want to win. You can't just tell me I should be happy with second place. I'm not. And these people in Penn's administrative department who just think that women should just roll over -- it's disturbing, and it's reminiscent of the 1970s when they were fighting for Title IX and stuff like that. They don't actually care about women at all.

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"Everyone sees us and everyone stands with us. It's just a matter of trying to convince USA Swimming to do the right thing."

The student said she was initially "shocked" and "disappointed" when the team was informed that Thomas would be competing with the women's team after three years on the men's team, but she more so expressed her frustrations with the university's subsequent handling of the situation.

"Well, the administration didn't even discuss the topic with us until after Ohio (Zippy Invitational) and after we already started getting a ton of media attention. They did not address us or ask us how we were feeling. … It was so maddening, just crazy that they didn't have the foresight to talk to us sooner."

Penn Athletics didn't immediately respond to the swimmer's remarks on the assertion of the lawsuit or comments about the treatment of female athletes.

The student said that once the issue was addressed, the administration took the approach of "We're here to support your feelings but not you."

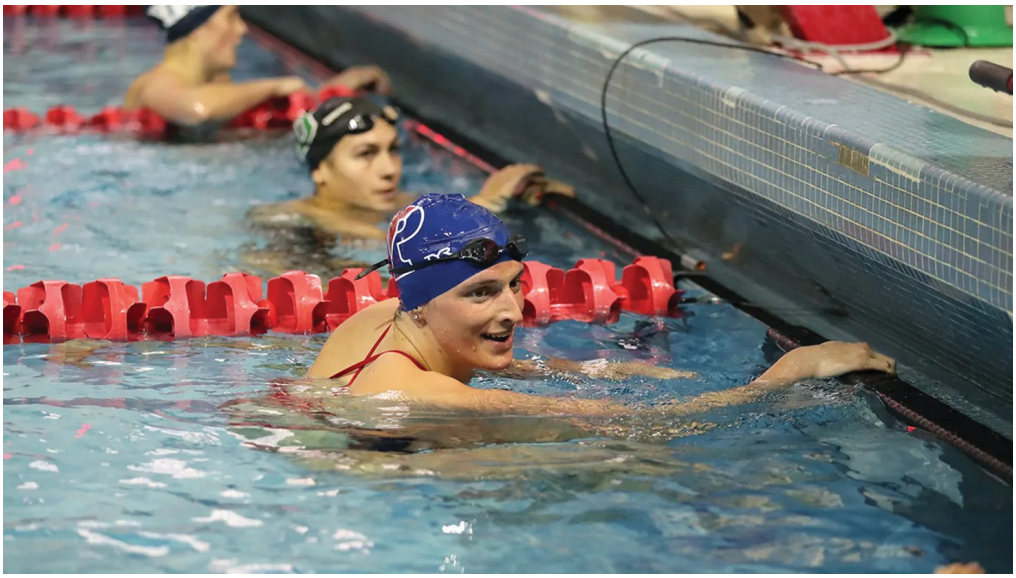
"They are basically saying that Lia swimming is a non-negotiable," she said. "They weren't willing to actually help us, they were just

willing to brush it under the rug and be [say], 'oh, your feelings are valid.'"

The student clarified that her concern does not lie with how Thomas chooses to identify.

"I think we all want Lia to live her best life and live as herself and do that safely and in a way that she's comfortable, but you can do that, but then you can't impede other people's lives to the point where they no longer have the rights guaranteed to them by Title IX," she said.

The bigger issue is the message she says the university is putting out.



Lia Thomas of the Pennsylvania Quakers smiles after winning the 200-meter freestyle event during a tri-meet against the Yale Bulldogs and the Dartmouth Big Green at Sheerr Pool on the campus of the University of Pennsylvania on Jan. 8, 2022 in Philadelphia, Pennsylvania. (Hunter Martin/Getty Images)

"It's really easy for the media and the administration to just focus on Lia and all the things that are hurting her and how she needs compassion right now, but I think we're the ones who truly need compassion right now, and we're the ones who are just being overlooked and told to just suck it up and deal with it and to accept second place. I think it's wrong," she said.

"When we came here, we were told we were going to have equal opportunities, and it just seems like our administrators and parts of society, very small parts, because I believe most people know it's wrong, but that those people just think that we shouldn't care about winning. And that's wrong. You know, what message are you telling little girls? You're telling them that they shouldn't strive for first place, that they should be OK with second."

UPenn will compete in its final regular-season meet Saturday at West Chester University.

The Ivy League Championships begin next month on Feb. 16-18, followed by the Eastern College Athletic Conference Championships on Feb. 24-27.

Fox News' Ryan Gaydos and Jessica Chasmar contributed to this report.

Paulina Dedaj is a Digital Reporter for Fox News and Fox Business. Follow Paulina Dedaj on Twitter at @PaulinaDedaj. If you've got a tip, you can email Paulina at Paulina.Dedaj@fox.com

17TH-PLACE FINISHER IN 500 REKA GYORGY PENS LETTER TO NCAA ON TRANSGENDER RULES

Comments: 183

Exhibit 11

Gyorgy is a 2-time ACC Champion, 2-time NCAA All-American, and 3-time NCAA Honorable Mention All-American. Stock photo via Jack Spitser/Spitser Photography

BY SPENCER PENLAND

183

March 20th, 2022

College, News

Virginia Tech 5th year **Reka Gyorgy** has released a letter to the NCAA addressing her opinion on the organization's controversial transgender policy, which allowed Penn 5th year Lia Thomas to compete at the NCAA Championships last week.

Gyorgy offers a unique perspective on the situation, as she finished 17th in prelims of the 500 free last Thursday, one spot out of qualifying for finals. The 500 was, of course, the event that Thomas would go on to win with a time of 4:33.24.

Towards the beginning of her remarks, Gyorgy says " I (Reka) respect and fully stand with Lia Thomas; I am convinced that she is no different from me or any other D1 swimmer who has woken up at 5am her entire life for morning practice." She talks about the sacrifice she knows are associated with a commitment to swimming, such as missing vacations and holidays. "She is doing what she is passionate about and deserves that right."

Gyorgy then gets into her criticisms of the NCAA's transgender policy, stating "On the other hand, I would like to critique the NCAA rules that allow her to compete against us, who are biologically women." She talks about how she's a 5th year

MORE NEWS

MEN'S NCAA DIVISION I CHAMPIONSHIPS: DAY 3 PRELIM LIVE RECAP

WORLD CHAMPION HWANG SUNWOO PUTS UP 48.69 100 FREE HEATS SWIM

MEN'S DIVISION I NCAA'S: DAY 3

senior at Virginia Tech, and this was her last collegiate meet competing for the Hokies, saying she feels "frustrated." In Gyorgy's view, the current transgender athlete policies don't "promote our sport in a good way and I (Gyorgy) think it is disrespectful against the biologically female swimmers who are competing in the NCAA."

She expands the context of her complaints outside of just her finishing 17th in the 500 free last week, arguing "one spot was taken away from the girl who got 9th in the 500 free and didn't make it back to the A final preventing her from being an All-American. Every event that transgender athletes competed in was one spot taken away from biological females throughout the meet."

Gyorgy makes her most pointed criticisms at the end of her letter, saying "The NCAA knew what was coming this past week." She goes on to highlight how she feels the meet was "more about reporters, media and division," instead of the historic swims that took place, citing Kate Douglass and Gretchen Walsh's 20-point 50 frees, Katharine Berkoff's American Record 100 back, and the depth and speed of the women's 100 fly. To Gyorgy's point, there was far more mainstream media attention the meet this year than previous years, and that was transparently because of the controversy surrounding the NCAA's policy.

Gyorgy is a 2-time ACC Champion, 2-time NCAA All-American, and 3-time NCAA Honorable Mention All-American. She has requested that anyone who reports on her statement release her full remarks, so here is her full letter to the NCAA, which I (the writer of the article) urge everyone to read in its entirety:

Dear NCAA,

I would like to address this past week's events and express my thoughts. First, I would like to remind everyone that I am a human being and that as a human being I experience feelings and emotions.

My name is Reka Gyorgy from Hungary. I am a 2016 Rio Olympian, represented Virginia Tech for the past 5 years, a 2 time ACC Champion, 2 time All-American and 3 time Honorable Mention All-American.

With all due respect, I would like to address something that is a problem in our sport right now and hurting athletes, especially female swimmers. Everyone has heard and known about transgender, Lia Thomas, and her case including all the issues and concerns that her situation brought into our sport. I'd like to point out that I respect and fully stand with Lia Thomas; I am convinced that she is no different than me or any other D1 swimmer who has woken up at 5am her entire life for morning practice. She has sacrificed family vacations and holidays for a competition. She has pushed herself to the limit to be the best athlete she could be. She is doing what she is passionate about and deserves that right. On the other hand, I would
like to critique the NCAA rules that allow her to compete against us, who are biologically women.

I'm writing this letter right now in hopes that the NCAA will open their eyes and change these rules in the future. It doesn't promote our sport in a good way and I think it is disrespectful against the biologically female swimmers who are competing in the NCAA.

I swam the 500 free at NCAA's on March 17th, 2022 where I got 17th which means I didn't make it back to the finals and was first alternate. I'm a 5th year senior, I have

PRELIM SCRATCHES- FRANKEL SET FOR TOUGH DOUBLE

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CAMPIONATI SVIZZERI: NOÈ PONTI TERZO AL MONDO NEI 200 FARFALLA

CRITERIA 2022 SESSIONE

been top 16 and top 8 before and I know how much of a privilege it is to make finals at a meet this big. This is my last college meet ever and I feel frustrated. It feels like that final spot was taken away from me because of the NCAA's decision to let someone who is not a biological female compete. I know you could say I had the opportunity to swim faster and make the top 16, but this situation makes it a bit different and I can't help but be angry or sad. It hurts me, my team and other women in the pool. One spot was taken away from the girl who got 9th in the 500 free and didn't make it back to the A final preventing her from being an All-American. Every event that transgender athletes competed in was one spot taken away from biological females throughout the meet.

The NCAA knew what was coming this past week. They knew opinions and minds will be divided and chose to do nothing. This week has been more about reporters, media and division in our sport than things like two women going under 21 seconds in the 50 freestyle, 3 women going under 50 seconds in the 100 butterfly and the first woman IN HISTORY to go under 48 seconds in the 100 backstroke. Thursday was not a specific athlete's fault. It is the result of the NCAA and their lack of interest in protecting their athletes. I ask that the NCAA takes time to think about all the other biological women in swimming, try to think how they would feel if they would be in our shoes. Make the right changes for our sport and for a better future in swimming.

Thank you for reading,

Reka Gyorgy, Virginia Tech swimmer

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Peculiarly, none of those huge, record-breaking accomplishments that she mentioned were by Lia Thomas.

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ooo

2 days ago

HB ORG

WEST VIRGINIA LEGISLATURE

2021 REGULAR SESSION

Originating

House Bill 3293

BY DELEGATES HANNA, BRIDGES, CLARK, ELLINGTON,
HORST, JENNINGS, LONGANACRE, MAZZOCCHI, TULLY AND
PHILLIPS AND BURKHAMMER

[Originating in the Committee on Education; Reported
on March 16, 2021]

HB ORG

A BILL to amend and reenact §18-2-5c and §18-2-25 of the Code of West Virginia, 1931, as amended, all relating to single-sex participation in interscholastic athletic events; providing that the birth certificate required for admission to public school confirm the pupil's sex at time of birth, or in the alternative, that the pupil's sex be identified by a signed physician's statement; providing that the sex identified at the time of admission must be the pupil's sex for the purposes of single-sex participation in interscholastic athletic events under the control, supervision, and regulation of the West Virginia Secondary Schools Activities Commission; providing that the commission must verify with each county board that each student participating in single-sex interscholastic events is participating according to the student's sex at the time of the student's birth; and clarifying that these requirements do not apply to co-educational secondary school interscholastic athletic events.

Be it enacted by the Legislature of West Virginia:

§18-2-5c. Birth certificate required upon admission to public school; required notice to local law-enforcement agency of missing children; identifying pupil's sex for the purpose of participating in single-sex interscholastic athletic events.

(a) No pupil shall be admitted for the first time to any public school in this state unless the person enrolling the pupil presents a copy of the pupil's original birth record certified by the state registrar of vital statistics confirming the pupil's identity, age, sex at time of birth, and state file number of the original birth record. If a certified copy of the pupil's birth record cannot be obtained, the person so enrolling the pupil shall submit:

(1) ~~an~~ An affidavit explaining the inability to produce a certified copy of the birth record: *Provided,* That if any person submitting such affidavit is in U.S. military service and is in transit due to military orders, a three-week extension shall be granted to such person for providing the birth records; and

(2) A signed physician's statement indicating the pupil's sex based solely on the pupil's unaltered internal and external reproductive anatomy.

HB ORG

(b) Upon the failure of any person enrolling a pupil to furnish a certified copy of the pupil's birth record in conformance with subsection (a) above, the principal of the school in which the pupil is being enrolled or his or her designee shall immediately notify the local law-enforcement agency. The notice to the local law-enforcement agency shall include copies of the submitted proof of the pupil's identity, ~~and~~ age, and sex at time of birth and the affidavit explaining the inability to produce a certified copy of the birth record.

(c) Within fourteen days after enrolling a transferred pupil, the principal of the school in which the pupil has been enrolled or his or her designee shall request that the principal or his or her designee of the school in which the pupil was previously enrolled transfer a certified copy of the pupil's birth record.

(d) Principals and their designees shall be immune from any civil or criminal liability in connection with any notice to a local law-enforcement agency of a pupil lacking a birth certificate or failure to give such notice as required by this section.

(e) The sex identified in subsection (a) above shall be the pupil's sex for the purposes of participating in single-sex secondary school interscholastic athletic events under the control, supervision, and regulation of the West Virginia Secondary Schools Activities Commission pursuant to §18-2-25 of this code.

§18-2-25. Authority of county boards to regulate athletic and other extracurricular activities of secondary schools; delegation of authority to West Virginia Secondary School Activities Commission; authority of commission; approval of rules by state board; incorporation; funds; participation by private and parochial schools, ~~and~~ by home-schooled students and by preparatory athletic programs; student participation in single-sex secondary school interscholastic athletic events.

(a) The county boards of education shall exercise the control, supervision, and regulation of all interscholastic athletic events, and other extracurricular activities of the students in public

HB ORG

secondary schools, and of those schools of their respective counties. The county board of education may delegate control, supervision, and regulation of interscholastic athletic events and band activities to the West Virginia Secondary School Activities Commission.

(b) The West Virginia Secondary School Activities Commission is composed of the principals, or their representatives, of those secondary schools whose county boards of education have certified in writing to the State Superintendent of Schools that they have elected to delegate the control, supervision, and regulation of their interscholastic athletic events and band activities of the students in the public secondary schools in their respective counties to the commission. The West Virginia Secondary School Activities Commission may exercise the control, supervision, and regulation of interscholastic athletic events and band activities of secondary schools, delegated to it pursuant to this section. The rules of the West Virginia Secondary School Activities Commission shall contain a provision for a proper review procedure and review board and be promulgated in accordance with the provisions of chapter 29A of this code, but shall, in all instances, be subject to the prior approval of the state board. The West Virginia Secondary School Activities Commission, may, with the consent of the State Board of Education, incorporate under the name of West Virginia Secondary School Activities Commission, Inc., as a nonprofit, nonstock corporation under the provisions of chapter 31 of this code. County boards of education may expend moneys for and pay dues to the West Virginia Secondary School Activities Commission, and all moneys paid to the commission, as well as moneys derived from any contest or other event sponsored by the commission, are quasi-public funds as defined in §18-5-1 *et seq.* of this code, and the funds of the commission are subject to an annual audit by the State Tax Commissioner.

(c) The West Virginia Secondary School Activities Commission shall promulgate reasonable rules providing for the control, supervision, and regulation of the interscholastic athletic events and other extracurricular activities of private and parochial secondary schools as

elect to delegate to the commission control, supervision, and regulation, upon the same terms and conditions, subject to the same rules and requirements and upon the payment of the same fees and charges as those provided for public secondary schools. Any such private or parochial secondary school shall receive any monetary or other benefits in the same manner and in the same proportion as any public secondary school.

(d) Notwithstanding any other provision of this section, or the commission's rules, the commission shall consider eligible for participation in interscholastic athletic events and other extracurricular activities of secondary schools a student who is receiving home instruction pursuant to §18-8-1(c) of this code and who:

(1) Has demonstrated satisfactory evidence of academic progress for one year in compliance with the provisions of that subsection: *Provided,* That the student's average test results are within or above the fourth stanine in all subject areas;

(2) Is enrolled in at least one virtual instructional course per semester, consistent with the applicable virtual instruction policy of the county board in which the home-schooled student lives and the State Board;

(3) Has not reached the age of 19 by August 1 of the current school year;

(4) Is an amateur who receives no compensation but participates solely for the educational, physical, mental and social benefits of the activity;

(5) Agrees to comply with all disciplinary rules of the West Virginia Secondary School Activities Commission and the county board in which the home-schooled student lives; and

(6) Agrees to obey all rules of the West Virginia Secondary School Activities Commission governing awards, all-star games, parental consents, physical examinations, and vaccinations applicable to all high school athletes.

Eligibility is limited to participation in interscholastic athletic events and other extracurricular activities at the public secondary school serving the attendance zone in which the student lives: *Provided,* That home-schooled students who leave a member school during the

school year are subject to the same transfer protocols that apply to member-to-member transfers. Reasonable fees may be charged to the student to cover the costs of participation in interscholastic athletic events and other extracurricular activities.

(e) The West Virginia Secondary School Activities Commission shall recognize preparatory athletic programs, whose participants attend a secondary school in West Virginia for academic instruction, as nonparticipating members of the commission solely for the purpose of competing on the national level: *Provided*, That the preparatory athletic program shall pay the same fees as member schools. Such recognition does not entitle the preparatory athletic program to compete against a member school during the regular season or in any commission state championship events. The commission may promulgate an emergency rule pursuant to subsection (b) of this section, if necessary, to carry out the intent of this subsection.

(f) Prior to a student's participation in single-sex secondary school interscholastic athletic events, the West Virginia Secondary School Activities Commission must verify with each county board that each student participating in single-sex interscholastic events is participating according to the student's sex at the time of the student's birth pursuant to §18-2-5c.

This subsection does not prohibit students from participating in a co-educational secondary school interscholastic athletic events. Students may participate in a co-educational secondary school interscholastic athletic events without having to comply with the requirements of this subsection.

NOTE: The purpose of this bill is to require that a secondary student athlete's participation in single-sex athletics be based upon the athlete's biological sex, as indicated on the athlete's original birth certificate issued at the time of birth.

Strike-throughs indicate language that would be stricken from a heading or the present law and underscoring indicates new language that would be added.

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

LAINEY ARMISTEAD

Defendant-Intervenor.

Case No. 2:21-cv-00316

Hon. Joseph R. Goodwin

ROGER G. BROOKS' DECLARATION IN SUPPORT OF DEFENDANT-INTERVENOR AND THE STATE OF WEST VIRGINIA'S MOTIONS TO EXCLUDE EXPERT TESTIMONY OF DRS. ADKINS, FRY, JANSSEN, AND SAFER

I, Roger G. Brooks, declare under penalty of perjury of the laws of the United States that the following is true and correct, and state:

I am counsel of record for Defendant-Intervenor Lainey Armistead in this litigation. The following is true of my own personal knowledge, and, if called as a witness, I would and could testify competently thereto.

As set forth below, I have reviewed the articles and studies used in support of the motions to exclude the certain proffered opinions of Dr. Adkins, Dr. Fry, Dr. Janssen, and Dr. Safer. The copies of the articles identified herein, and submitted in the accompanying Appendix to Defendant Intervenor and the State of West Virginia's Motion to Exclude Expert Testimony of Dr. Deanna Adkins ("Daubert Appendix") at

the pages indicated, are true and correct copies of those articles as obtained from public sources. I identify herein where each source was marked as an exhibit in deposition or cited in an expert's report.

1. Balaguer, I., et al., *Motivational Climate and Goal Orientations as Predictors of Perceptions of Improvement, Satisfaction and Coach Ratings Among Tennis Players*, 9 Scand. J. Med. Sci. Sports 381 (1999), doi: 10.1111/j.1600-0838.1999.tb00260.x.

This source was designated as Fry Deposition Exhibit 5 and is in the Daubert Appendix at page 370.

2. Bhargava, A., et al., *Considering Sex as a Biological Variable in Basic and Clinical Studies: An Endocrine Society Scientific Statement*, 42 Endocr. Revs. 219 (2021), doi: 10.1210/endrev/ bnaa034.

This source was designated as Adkins Deposition Exhibit 4 and is in the Daubert Appendix at page 379.

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This source was designated as Janssen Deposition Exhibit 40 and is in the Daubert Appendix at page 419.

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DECLARATION UNDER PENALTY OF PERJURY

I, Roger G. Brooks, a citizen of the United States and a resident of the State of North Carolina, hereby declare under penalty of perjury pursuant to 28 U.S.C. § 1746 that the foregoing is true and correct to the best of my knowledge.

Executed this 12th day of May, 2022, at Durham, North Carolina.

/s/ Roger G. Brooks
Roger G. Brooks

APPENDIX TO DEFENDANT-INTERVENOR AND THE STATE OF WEST VIRGINIA'S MOTIONS TO EXCLUDE EXPERT TESTIMONY OF DRS. ADKINS, FRY, JANSSEN, AND SAFER

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REVIEW ARTICLE

Transgender Women in the Female Category of Sport: Perspectives on Testosterone Suppression and Performance Advantage

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Abstract

Males enjoy physical performance advantages over females within competitive sport. The sex-based segregation into male and female sporting categories does not account for transgender persons who experience incongruence between their biological sex and their experienced gender identity. Accordingly, the International Olympic Committee (IOC) determined criteria by which a transgender woman may be eligible to compete in the female category, requiring total serum testosterone levels to be suppressed below 10 nmol/L for at least 12 months prior to and during competition. Whether this regulation removes the male performance advantage has not been scrutinized. Here, we review how differences in biological characteristics between biological males and females affect sporting performance and assess whether evidence exists to support the assumption that testosterone suppression in transgender women removes the male performance advantage and thus delivers fair and safe competition. We report that the performance gap between males and females becomes significant at puberty and often amounts to 10–50% depending on sport. The performance gap is more pronounced in sporting activities relying on muscle mass and explosive strength, particularly in the upper body. Longitudinal studies examining the effects of testosterone suppression on muscle mass and strength in transgender women consistently show very modest changes, where the loss of lean body mass, muscle area and strength typically amounts to approximately 5% after 12 months of treatment. Thus, the muscular advantage enjoyed by transgender women is only minimally reduced when testosterone is suppressed. Sports organizations should consider this evidence when reassessing current policies regarding participation of transgender women in the female category of sport.

Key Points

Given that biological males experience a substantial performance advantage over females in most sports, there is currently a debate whether inclusion of transgender women in the female category of sports would compromise the objective of fair and safe competition.

Here, we report that current evidence shows the biological advantage, most notably in terms of muscle mass and strength, conferred by male puberty and thus enjoyed by most transgender women is only minimally reduced when testosterone is suppressed as per current sporting guidelines for transgender athletes.

This evidence is relevant for policies regarding participation of transgender women in the female category of sport.

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1 Introduction

Sporting performance is strongly influenced by a range of physiological factors, including muscle force and power-producing capacity, anthropometric characteristics, cardiorespiratory capacity and metabolic factors [1, 2]. Many of these physiological factors differ significantly between biological males and females as a result of genetic differences and androgen-directed development of secondary sex characteristics [3, 4]. This confers large sporting performance advantages on biological males over females [5].

When comparing athletes who compete directly against one another, such as elite or comparable levels of school-aged athletes, the physiological advantages conferred by biological sex appear, on assessment of performance data, insurmountable. Further, in sports where contact, collision or combat are important for gameplay, widely different physiological attributes may create safety and athlete welfare concerns, necessitating not only segregation of sport into male and female categories, but also, for example, into weight and age classes. Thus, to ensure that both men and women can enjoy sport in terms of fairness, safety and inclusivity, most sports are divided, in the first instance, into male and female categories.

Segregating sports by biological sex does not account for transgender persons who experience incongruence between their biological sex and their experienced gender identity, and whose legal sex may be different to that recorded at birth [6, 7]. More specifically, transgender women (observed at birth as biologically male but identifying as women) may, before or after cross-hormone treatment, wish to compete in the female category. This has raised concerns about fairness and safety within female competition, and the issue of how to fairly and safely accommodate transgender persons in sport has been subject to much discussion [6–13].

The current International Olympic Committee (IOC) policy [14] on transgender athletes states that "it is necessary to ensure insofar as possible that trans athletes are not excluded from the opportunity to participate in sporting competition". Yet the policy also states that "the overriding sporting objective is and remains the guarantee of fair competition". As these goals may be seen as conflicting if male performance advantages are carried through to competition in the female category, the IOC concludes that "restrictions on participation are appropriate to the extent that they are necessary and proportionate to the achievement of that objective".

Accordingly, the IOC determined criteria by which transgender women may be eligible to compete in the female category. These include a solemn declaration that her gender identity is female and the maintenance of total serum testosterone levels below 10 nmol/L for at least 12 months prior to competing and during competition [14]. Whilst the scientific basis for this testosterone threshold was not openly communicated by the IOC, it is surmised that the IOC believed this testosterone criterion sufficient to reduce the sporting advantages of biological males over females and deliver fair and safe competition within the female category.

Several studies have examined the effects of testosterone suppression on the changing biology, physiology and performance markers of transgender women. In this review, we aim to assess whether evidence exists to support the assumption that testosterone suppression in transgender women removes these advantages. To achieve this aim, we first review the differences in biological characteristics between biological males and females, and examine how those differences affect sporting performance. We then evaluate the studies that have measured elements of performance and physical capacity following testosterone suppression in untrained transgender women, and discuss the relevance of these findings to the supposition of fairness and safety (i.e. removal of the male performance advantage) as per current sporting guidelines.

2 The Biological Basis for Sporting Performance Advantages in Males

The physical divergence between males and females begins during early embryogenesis, when bipotential gonads are triggered to differentiate into testes or ovaries, the tissues that will produce sperm in males and ova in females, respectively [15]. Gonad differentiation into testes or ovaries determines, via the specific hormone milieu each generates, downstream in utero reproductive anatomy development [16], producing male or female body plans. We note that in rare instances, differences in sex development (DSDs) occur and the typical progression of male or female development is disrupted [17]. The categorisation of such athletes is beyond the scope of this review, and the impact of individual DSDs on sporting performance must be considered on their own merits.

In early childhood, prior to puberty, sporting participation prioritises team play and the development of fundamental motor and social skills, and is sometimes mixed sex. Athletic performance differences between males and females prior to puberty are often considered inconsequential or relatively small [18]. Nonetheless, pre-puberty performance differences are not unequivocally negligible, and could be mediated, to some extent, by genetic factors and/or activation of the hypothalamic–pituitary–gonadal axis during the neonatal period, sometimes referred to as "minipuberty". For example, some 6500 genes are differentially expressed between males and females [19] with an estimated 3000 sex-specific

differences in skeletal muscle likely to influence composition and function beyond the effects of androgenisation [3], while increased testosterone during minipuberty in males aged 1–6 months may be correlated with higher growth velocity and an "imprinting effect" on BMI and bodyweight [20, 21]. An extensive review of fitness data from over 85,000 Australian children aged 9–17 years old showed that, compared with 9-year-old females, 9-year-old males were faster over short sprints (9.8%) and 1 mile (16.6%), could jump 9.5% further from a standing start (a test of explosive power), could complete 33% more push-ups in 30 s and had 13.8% stronger grip [22]. Male advantage of a similar magnitude was detected in a study of Greek children, where, compared with 6-year-old females, 6-year-old males completed 16.6% more shuttle runs in a given time and could jump 9.7% further from a standing position [23]. In terms of aerobic capacity, 6- to 7-year-old males have been shown to have a higher absolute and relative (to body mass) VO_{2max} than 6- to 7-year-old females [24]. Nonetheless, while some biological sex differences, probably genetic in origin, are measurable and affect performance pre-puberty, we consider the effect of androgenizing puberty more influential on performance, and have focused our analysis on musculoskeletal differences hereafter.

Secondary sex characteristics that develop during puberty have evolved under sexual selection pressures to improve reproductive fitness and thus generate anatomical divergence beyond the reproductive system, leading to adult body types that are measurably different between sexes. This phenomenon is known as sex dimorphism. During puberty, testes-derived testosterone levels increase 20-fold in males, but remain low in females, resulting in circulating testosterone concentrations at least 15 times higher in males than in females of any age [4, 25]. Testosterone in males induces changes in muscle mass, strength, anthropometric variables and hemoglobin levels [4], as part of the range of sexually dimorphic characteristics observed in humans.

Broadly, males are bigger and stronger than females. It follows that, within competitive sport, males enjoy significant performance advantages over females, predicated on the superior physical capacity developed during puberty in response to testosterone. Thus, the biological effects of elevated pubertal testosterone are primarily responsible for driving the divergence of athletic performances between males and females [4]. It is acknowledged that this divergence has been compounded historically by a lag in the cultural acceptance of, and financial provision for, females in sport that may have had implications for the rate of improvement in athletic performance in females. Yet, since the 1990s, the difference in performance records between males and females has been relatively stable, suggesting that biological differences created by androgenization explain most of the male advantage, and are insurmountable [5, 26, 27].

Table 1 outlines physical attributes that are major parameters underpinning the male performance advantage [28–38]. Males have: larger and denser muscle mass, and stiffer connective tissue, with associated capacity to exert greater muscular force more rapidly and efficiently; reduced fat mass, and different distribution of body fat and lean muscle mass, which increases power to weight ratios and upper to lower limb strength in sports where this may be a crucial determinant of success; longer and larger skeletal structure, which creates advantages in sports where levers influence force application, where longer limb/digit length is favorable, and where height, mass and proportions are directly responsible for performance capacity; superior cardiovascular and respiratory function, with larger blood and heart volumes, higher hemoglobin concentration, greater cross-sectional area of the trachea and lower oxygen cost of respiration [3, 4, 39, 40]. Of course, different sports select for different physiological characteristics—an advantage in one discipline may be neutral or even a disadvantage in another—but examination of a variety of record and performance metrics in any discipline reveals there are few sporting disciplines where males do not possess performance advantage over females as a result of the physiological characteristics affected by testosterone.

3 Sports Performance Differences Between Males and Females

3.1 An Overview of Elite Adult Athletes

A comparison of adult elite male and female achievements in sporting activities can quantify the extent of the male performance advantage. We searched publicly available sports federation databases and/or tournament/competition records to identify sporting metrics in various events and disciplines, and calculated the performance of males relative to females. Although not an exhaustive list, examples of performance gaps in a range of sports with various durations, physiological performance determinants, skill components and force requirements are shown in Fig. 1.

The smallest performance gaps were seen in rowing, swimming and running (11–13%), with low variation across individual events within each of those categories. The performance gap increases to an average of 16% in track cycling, with higher variation across events (from 9% in the 4000 m team pursuit to 24% in the flying 500 m time trial). The average performance gap is 18% in jumping events (long jump, high jump and triple jump). Performance differences larger than 20% are generally present when considering sports and activities that involve extensive upper body contributions. The gap between fastest recorded tennis serve

Table 1 Selected physical difference between untrained/moderately trained males and females. Female levels are set as the reference value

Variable	Magnitude of sex difference (%)	References
Body composition		
Lean body mass	45	Lee et al. [28]
Fat%	− 30	
Muscle mass		
Lower body	33	Janssen et al. [29]
Upper body	40	
Muscle strength		
Grip strength	57	Bohannon et al. [30]
Knee extension peak torque	54	Neder et al. [31]
Anthropometry and bone geometry		
Femur length	9.4	Jantz et al. [32]
Humerus length	12.0	Brinckmann et al. [33]
Radius length	14.6	
Pelvic width relative to pelvis height	− 6.1	
Tendon properties		
Force	83	Lepley et al. [34]
Stiffness	41	
VO_{2max}		
Absolute values	50	Pate et al. [35]
Relative values	25	
Respiratory function		
Pulmonary ventilation (maximal)	48	Åstrand et al. [36]
Cardiovascular function		
Left ventricular mass	31	Åstrand et al. [36]
Cardiac output (rest)	22	Best et al. [37]
Cardiac output (maximal)	30	Tong et al. [38]
Stroke volume (rest)	43	
Stroke volume (maximal)	34	
Hemoglobin concentration	11	

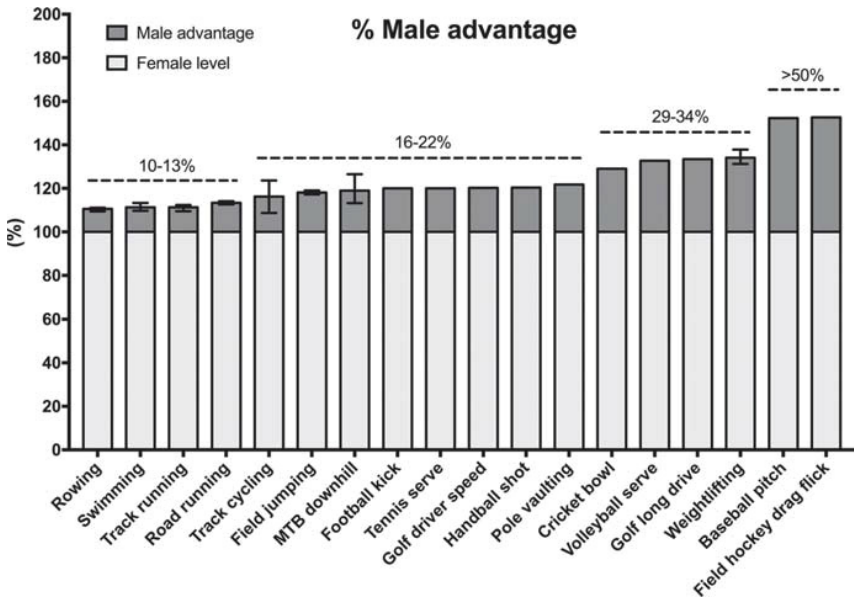

Fig. 1 The male performance advantage over females across various selected sporting disciplines. The female level is set to 100%. In sport events with multiple disciplines, the male value has been averaged across disciplines, and the error bars represent the range of the advantage. The metrics were compiled from publicly available sports federation databases and/or tournament/competition records. *MTB* mountain bike

is 20%, while the gaps between fastest recorded baseball pitches and field hockey drag flicks exceed 50%.

Sports performance relies to some degree on the magnitude, speed and repeatability of force application, and, with respect to the speed of force production (power), vertical jump performance is on average 33% greater in elite men than women, with differences ranging from 27.8% for endurance sports to in excess of 40% for precision and combat sports [41]. Because implement mass differs, direct comparisons are not possible in throwing events in track and field athletics. However, the performance gap is known to be substantial, and throwing represents the widest sex difference in motor performance from an early age [42]. In Olympic javelin throwers, this is manifested in differences in the peak linear velocities of the shoulder, wrist, elbow and hand, all of which are 13–21% higher for male athletes compared with females [43].

The increasing performance gap between males and females as upper body strength becomes more critical for performance is likely explained to a large extent by the observation that males have disproportionately greater strength in their upper compared to lower body, while females show the inverse [44, 45]. This different distribution of strength compounds the general advantage of increased muscle mass in upper body dominant disciplines. Males also have longer arms than females, which allows greater torque production from the arm lever when, for example, throwing a ball, punching or pushing.

3.2 Olympic Weightlifting

In Olympic weightlifting, where weight categories differ between males and females, the performance gap is between 31 and 37% across the range of competitive body weights between 1998 and 2020 (Fig. 1). It is important to note that at all weight categories below the top/open category, performances are produced within weight categories with an upper limit, where strength can be correlated with "fighting weight", and we focused our analysis of performance gaps in these categories.

To explore strength–mass relationships further, we compared Olympic weightlifting data between equivalent weight categories which, to some extent, limit athlete height, to examine the hypothesis that male performance advantage may be largely (or even wholly) mediated by increased height and lever-derived advantages (Table 2). Between 1998 and 2018, a 69 kg category was common to both males and females, with the male record holder (69 kg, 1.68 m) lifting a combined weight 30.1% heavier than the female record holder (69 kg, 1.64 m). Weight category changes in 2019 removed the common 69 kg category and created a common 55 kg category. The current male record holder (55 kg, 1.52 m) lifts 29.5% heavier than the female record holder (55 kg, 1.52 m). These comparisons demonstrate that males are approximately 30% stronger than females of equivalent stature and mass. However, importantly, male vs. female weightlifting performance gaps increase with increasing bodyweight. For example, in the top/open weight category of Olympic weightlifting, in the absence of weight (and associated height) limits, maximum male lifting strength exceeds female lifting strength by nearly 40%. This is further manifested in powerlifting, where the male record (total of squat, bench press and deadlift) is 65% higher than the female record in the open weight category of the World Open Classic Records. Further analysis of Olympic weightlifting data shows that the 55-kg male record holder is 6.5% stronger than the 69-kg female record holder (294 kg vs 276 kg), and that the 69-kg male record is 3.2% higher than the record held in the female open category by a 108-kg female (359 kg vs 348 kg). This Olympic weightlifting analysis reveals key differences between male and female strength capacity. It shows that, even after adjustment for mass, biological males are significantly stronger (30%) than females, and

Table 2 Olympic weightlifting data between equivalent male–female and top/open weight categories

	Sex	Weight (kg)	Height (m)	Combined record (kg)	Strength to weight ratio	Relative performance (%)
2019 record in the 55 kg weight-limited category						
Liao Qiuyun	F	55	1.52	227	4.13	
Om Yun-chol	M	55	1.52	294	5.35	29.5
1998–2018 record in the 69-kg weight-limited category						
Oxsana Slivenko	F	69	1.64	276	4.00	
Liao Hui	M	69	1.68	359	5.20	30.1
Comparative performances for top/open categories (all time heaviest combined lifts)						
Tatiana Kashirina	F	108	1.77	348	3.22	
Lasha Talakhadze	M	168	1.97	484	2.88	39.1

F female, *M* male

that females who are 60% heavier than males do not overcome these strength deficits.

3.3 Perspectives on Elite Athlete Performance Differences

Figure 1 illustrates the performance gap between adult elite males and adult elite females across various sporting disciplines and activities. The translation of these advantages, assessed as the performance difference between the very best males and very best females, are significant when extended and applied to larger populations. In running events, for example, where the male–female gap is approximately 11%, it follows that many thousands of males are faster than the very best females. For example, approximately 10,000 males have personal best times that are faster than the current Olympic 100 m female champion (World Athletics, personal communication, July 2019). This has also been described elsewhere [46, 47], and illustrates the true effect of an 11% typical difference on population comparisons between males and females. This is further apparent upon examination of selected junior male records, which surpass adult elite female performances by the age of 14–15 years (Table 3), demonstrating superior male athletic performance over elite females within a few years of the onset of puberty.

These data overwhelmingly confirm that testosterone-driven puberty, as the driving force of development of male secondary sex characteristics, underpins sporting advantages that are so large no female could reasonably hope to succeed without sex segregation in most sporting competitions. To ensure, in light of these analyses, that female athletes can be included in sporting competitions in a fair and safe manner, most sports have a female category the purpose of which is the protection of both fairness and, in some sports, safety/welfare of athletes who do not benefit from the physiological changes induced by male levels of testosterone from puberty onwards.

Table 3 Selected junior male records in comparison with adult elite female records

Event	Schoolboy male record	Elite female (adult) record
100 m	10.20 (age 15)	10.49
800 m	1:51.23 (age 14)	1:53.28
1500 m	3:48.37 (age 14)	3:50.07
Long jump	7.85 m (age 15)	7.52 m
Discus throw	77.68 m (age 15)	76.80 m

M meters

Time format: minutes:seconds.hundredths of a second

3.4 Performance Differences in Non-elite Individuals

The male performance advantages described above in athletic cohorts are similar in magnitude in untrained people. Even when expressed relative to fat-free weight, VO_{2max} is 12–15% higher in males than in females [48]. Records of lower-limb muscle strength reveal a consistent 50% difference in peak torque between males and females across the lifespan [31]. Hubal et al. [49] tested 342 women and 243 men for isometric (maximal voluntary contraction) and dynamic strength (one-repetition maximum; 1RM) of the elbow flexor muscles and performed magnetic resonance imaging (MRI) of the biceps brachii to determine cross-sectional area. The males had 57% greater muscle size, 109% greater isometric strength, and 89% greater 1RM strength than age-matched females. This reinforces the finding in athletic cohorts that sex differences in muscle size and strength are more pronounced in the upper body.

Recently, sexual dimorphism in arm force and power was investigated in a punch motion in moderately-trained individuals [50]. The power produced during a punch was 162% greater in males than in females, and the least powerful man produced more power than the most powerful woman. This highlights that sex differences in parameters such as mass, strength and speed may combine to produce even larger sex differences in sport-specific actions, which often are a product of how various physical capacities combine. For example, power production is the product of force and velocity, and momentum is defined as mass multiplied by velocity. The momentum and kinetic energy that can be transferred to another object, such as during a tackle or punch in collision and combat sports are, therefore, dictated by: the mass; force to accelerate that mass, and; resultant velocity attained by that mass. As there is a male advantage for each of these factors, the net result is likely synergistic in a sport-specific action, such as a tackle or a throw, that widely surpasses the sum of individual magnitudes of advantage in isolated fitness variables. Indeed, already at 17 years of age, the average male throws a ball further than 99% of 17-year-old females [51], despite no single variable (arm length, muscle mass etc.) reaching this numerical advantage. Similarly, punch power is 162% greater in men than women even though no single parameter that produces punching actions achieves this magnitude of difference [50].

4 Is the Male Performance Advantage Lost when Testosterone is Suppressed in Transgender Women?

The current IOC criteria for inclusion of transgender women in female sports categories require testosterone suppression below 10 nmol/L for 12 months prior to and during competition. Given the IOC's stated position that the "overriding sporting objective is and remains the guarantee of fair competition" [14], it is reasonable to assume that the rationale for this requirement is that it reduces the male performance advantages described previously to an acceptable degree, thus permitting fair and safe competition. To determine whether this medical intervention is sufficient to remove (or reduce) the male performance advantage, which we described above, we performed a systematic search of the scientific literature addressing anthropometric and muscle characteristics of transgender women. Search terms and filtering of peer-reviewed data are given in Supplementary Table S1.

4.1 Anthropometrics

Given its importance for the general health of the transgender population, there are multiple studies of bone health, and reviews of these data. To summarise, transgender women often have low baseline (pre-intervention) bone mineral density (BMD), attributed to low levels of physical activity, especially weight-bearing exercise, and low vitamin D levels [52, 53]. However, transgender women generally maintain bone mass over the course of at least 24 months of testosterone suppression. There may even be small but significant increases in BMD at the lumbar spine [54, 55]. Some retrieved studies present data pertaining to maintained BMD in transgender women after many years of testosterone suppression. One such study concluded that "BMD is preserved over a median of 12.5 years" [56]. In support, no increase in fracture rates was observed over 12 months of testosterone suppression [54]. Current advice, including that from the International Society for Clinical Densitometry, is that transgender women, in the absence of other risk factors, do not require monitoring of BMD [52, 57]. This is explicable under current standard treatment regimes, given the established positive effect of estrogen, rather than testosterone, on bone turnover in males [58].

Given the maintenance of BMD and the lack of a plausible biological mechanism by which testosterone suppression might affect skeletal measurements such as bone length and hip width, we conclude that height and skeletal parameters remain unaltered in transgender women, and that sporting advantage conferred by skeletal size and bone density would be retained despite testosterone reductions compliant with the IOC's current guidelines. This is of particular relevance to sports where height, limb length and handspan are key (e.g. basketball, volleyball, handball) and where high movement efficiency is advantageous. Male bone geometry and density may also provide protection against some sport-related injuries—for example, males have a lower incidence of knee injuries, often attributed to low quadriceps (Q) angle conferred by a narrow pelvic girdle [59, 60].

4.2 Muscle and Strength Metrics

As discussed earlier, muscle mass and strength are key parameters underpinning male performance advantages. Strength differences range between 30 and 100%, depending upon the cohort studied and the task used to assess strength. Thus, given the important contribution made by strength to performance, we sought studies that have assessed strength and muscle/lean body mass changes in transgender women after testosterone reduction. Studies retrieved in our literature search covered both longitudinal and cross-sectional analyses. Given the superior power of the former study type, we will focus on these.

The pioneer work by Gooren and colleagues, published in part in 1999 [61] and in full in 2004 [62], reported the effects of 1 and 3 years of testosterone suppression and estrogen supplementation in 19 transgender women (age 18–37 years). After the first year of therapy, testosterone levels were reduced to 1 nmol/L, well within typical female reference ranges, and remained low throughout the study course. As determined by MRI, thigh muscle area had decreased by − 9% from baseline measurement. After 3 years, thigh muscle area had decreased by a further − 3% from baseline measurement (total loss of − 12% over 3 years of treatment). However, when compared with the baseline measurement of thigh muscle area in transgender men (who are born female and experience female puberty), transgender women retained significantly higher thigh muscle size. The final thigh muscle area, after three years of testosterone suppression, was 13% larger in transwomen than in the transmen at baseline ($p < 0.05$). The authors concluded that testosterone suppression in transgender women does not reverse muscle size to female levels.

Including Gooren and Bunck [62], 12 longitudinal studies [53, 63–73] have examined the effects of testosterone suppression on lean body mass or muscle size in transgender women. The collective evidence from these studies suggests that 12 months, which is the most commonly examined intervention period, of testosterone suppression to female-typical reference levels results in a modest (approximately − 5%) loss of lean body mass or muscle size (Table 4). No

Table 4 Longitudinal studies of muscle and strength changes in adult transgender women undergoing cross-sex hormone therapy

Study	Participants (age)	Therapy	Confirmed serum testosterone levels	Muscle/strength data	Comparison with reference females
Polderman et al. [73]	*N* = 12 TW 18–36 yr (age range)	T suppression + E supplementation	< 2 nmol/L at 4 mo	*LBM* 4 mo − 2.2%	*LBM* 4 mo 16%
Gooren and Bunck [62]	*N* = 19 TW 26 ± 6 yr	T suppression + E supplementation	≤ 1 nmol/L at 1 and 3 yr	*Thigh area* 1 yr − 9% / 3 yr -12%	*Thigh area* 1 yr 16%/3 yr 13%
Haraldsen et al. [63]	*N* = 12 TW 29 ± 8 yr	E supplementation	< 10 nmol/L at 3 mo and 1 yr	*LBM* 3 mo/1 yr—small changes, unclear magnitude	
Mueller et al. [64]	*N* = 84 TW 36 ± 11 yr	T suppression + E supplementation	≤ 1 nmol/L at 1 and 2 yr	*LBM* 1 yr − 4%/2 yr − 7%	
Wierckx et al. [65]	*N* = 53 TW 31 ± 14 yr	T suppression + E supplementation	< 10 nmol/L at 1 yr	*LBM* 1 yr − 5%	*LBM* 1 yr 39%
Van Caenegem et al. [53] (and Van Caenegem et al. [76])	*N* = 49 TW 33 ± 14 yr	T suppression + E supplementation	≤ 1 nmol/L at 1 and 2 yr	*LBM* 1 yr − 4%/2 yr − 0.5% *Grip strength* 1 yr − 7%/2 yr − 9% *Calf area* 1 yr − 2%/2 yr − 4% *Forearm area* 1 yr − 8%/2 yr − 4%	*LBM* 1 yr 24%/2 yr 28% *Grip strength* 1 yr 26%/2 yr 23% *Calf area* 1 yr 16%/2 yr 13% *Forearm area* 1 yr 29%/2 yr 34%
Gava et al. [66]	*N* = 40 TW 31 ± 10 yr	T suppression + E supplementation	< 5 nmol/L at 6 mo and ≤ 1 nmol/L at 1 yr	*LBM* 1 yr − 2%	
Auer et al. [67]	*N* = 45 TW 35 ± 1 (SE) yr	T suppression + E supplementation	< 5 nmol/L at 1 yr	*LBM* 1 yr − 3%	*LBM* 1 yr 27%
Klaver et al. [68]	*N* = 179 TW 29 (range 18–66)	T suppression + E supplementation	≤ 1 nmol/L at 1 yr	*LBM 1 yr* Total − 3% Arm region − 6% Trunk region − 2% Android region 0% Gynoid region − 3% Leg region − 4%	*LBM 1 yr* Total 18% Arm region 28% Leg region 19%
Fighera et al. [69]	*N* = 46 TW 34 ± 10	E supplementation with or without T suppression	< 5 nmol/L at 3 mo ≤ 1 nmol/L at 31 mo	*ALM* 31 mo − 4% from the 3 mo visit	
Scharff et al. [70]	*N* = 249 TW 28 (inter quartile range 23–40)	T suppression + E supplementation	≤ 1 nmol/L at 1 yr	*Grip strength* 1 yr − 4%	*Grip strength* 1 yr 21%
Wiik et al. [71]	*N* = 11 TW 27 ± 4	T suppression + E supplementation	≤ 1 nmol/L at 4 mo and at 1 yr	*Thigh volume* 1 yr − 5% *Quad area* 1 yr − 4% *Knee extension strength* 1 yr 2% *Knee flexion strength* 1 yr 3%	*Thigh volume* 1 yr 33% *Quad area* 26% *Knee extension strength* 41% *Knee flexion strength* 33%

Studies reporting measures of lean mass, muscle volume, muscle area or strength are included. Muscle/strength data are calculated in reference to baseline cohort data and, where reported, reference female (or transgender men before treatment) cohort data. Tack et al. [72] was not included in the table since some of the participants had not completed full puberty at treatment initiation. van Caenegem et al. [76] reports reference female values measured in a separately-published, parallel cohort of transgender men

N number of participants, *TW* transgender women, *Yr* year, *Mo* month, *T* testosterone, *E* estrogen. ± Standard deviation (unless otherwise indicated in text), *LBM* lean body mass, *ALM* appendicular lean mass

study has reported muscle loss exceeding the −12% found by Gooren and Bunck after 3 years of therapy. Notably, studies have found very consistent changes in lean body mass (using dual-energy X-ray absorptiometry) after 12 months of treatment, where the change has always been between −3 and −5% on average, with slightly greater reductions in the arm compared with the leg region [68]. Thus, given the large baseline differences in muscle mass between males and females (Table 1; approximately 40%), the reduction achieved by 12 months of testosterone suppression can reasonably be assessed as small relative to the initial superior mass. We, therefore, conclude that the muscle mass advantage males possess over females, and the performance implications thereof, are not removed by the currently studied durations (4 months, 1, 2 and 3 years) of testosterone suppression in transgender women. In sports where muscle mass is important for performance, inclusion is therefore only possible if a large imbalance in fairness, and potentially safety in some sports, is to be tolerated.

To provide more detailed information on not only gross body composition but also thigh muscle volume and contractile density, Wiik et al. [71] recently carried out a comprehensive battery of MRI and computed tomography (CT) examinations before and after 12 months of successful testosterone suppression and estrogen supplementation in 11 transgender women. Thigh volume (both anterior and posterior thigh) and quadriceps cross-sectional area decreased −4 and −5%, respectively, after the 12-month period, supporting previous results of modest effects of testosterone suppression on muscle mass (see Table 4). The more novel measure of radiological attenuation of the quadriceps muscle, a valid proxy of contractile density [74, 75], showed no significant change in transgender women after 12 months of treatment, whereas the parallel group of transgender men demonstrated a +6% increase in contractile density with testosterone supplementation.

As indicated earlier (e.g. Table 1), the difference in muscle strength between males and females is often more pronounced than the difference in muscle mass. Unfortunately, few studies have examined the effects of testosterone suppression on muscle strength or other proxies of performance in transgender individuals. The first such study was published online approximately 1 year prior to the release of the current IOC policy. In this study, as well as reporting changes in muscle size, van Caenegem et al. [53] reported that hand-grip strength was reduced from baseline measurements by −7% and −9% after 12 and 24 months, respectively, of cross-hormone treatment in transgender women. Comparison with data in a separately-published, parallel cohort of transgender men [76] demonstrated a retained hand-grip strength advantage after 2 years of 23% over female baseline measurements (a calculated average of baseline data obtained from control females and transgender men).

In a recent multicenter study [70], examination of 249 transgender women revealed a decrease of −4% in grip strength after 12 months of cross-hormone treatment, with no variation between different testosterone level, age or BMI tertiles (all transgender women studied were within female reference ranges for testosterone). Despite this modest reduction in strength, transgender women retained a 17% grip strength advantage over transgender men measured at baseline. The authors noted that handgrip strength in transgender women was in approximately the 25th percentile for males but was over the 90th percentile for females, both before and after hormone treatment. This emphasizes that the strength advantage for males over females is inherently large. In another study exploring handgrip strength, albeit in late puberty adolescents, Tack et al. noted no change in grip strength after hormonal treatment (average duration 11 months) of 21 transgender girls [72].

Although grip strength provides an excellent proxy measurement for general strength in a broad population, specific assessment within different muscle groups is more valuable in a sports-specific framework. Wiik et al., [71] having determined that thigh muscle mass reduces only modestly, and that no significant changes in contractile density occur with 12 months of testosterone suppression, provided, for the first time, data for isokinetic strength measurements of both knee extension and knee flexion. They reported that muscle strength after 12 months of testosterone suppression was comparable to baseline strength. As a result, transgender women remained about 50% stronger than both the group of transgender men at baseline and a reference group of females. The authors suggested that small neural learning effects during repeated testing may explain the apparent lack of small reductions in strength that had been measured in other studies [71].

These longitudinal data comprise a clear pattern of very modest to negligible changes in muscle mass and strength in transgender women suppressing testosterone for at least 12 months. Muscle mass and strength are key physical parameters that constitute a significant, if not majority, portion of the male performance advantage, most notably in those sports where upper body strength, overall strength, and muscle mass are crucial determinants of performance. Thus, our analysis strongly suggests that the reduction in testosterone levels required by many sports federation transgender policies is insufficient to remove or reduce the male advantage, in terms of muscle mass and strength, by any meaningful degree. The relatively consistent finding of a minor (approximately −5%) muscle loss after the first year of treatment is also in line with studies on androgen-deprivation therapy in males with prostate cancer, where the annual loss

of lean body mass has been reported to range between −2 and −4% [77].

Although less powerful than longitudinal studies, we identified one major cross-sectional study that measured muscle mass and strength in transgender women. In this study, 23 transgender women and 46 healthy age- and height-matched control males were compared [78]. The transgender women were recruited at least 3 years after sex reassignment surgery, and the mean duration of cross-hormone treatment was 8 years. The results showed that transgender women had 17% less lean mass and 25% lower peak quadriceps muscle strength than the control males [78]. This cross-sectional comparison suggests that prolonged testosterone suppression, well beyond the time period mandated by sports federations substantially reduces muscle mass and strength in transgender women. However, the typical gap in lean mass and strength between males and females at baseline (Table 1) exceeds the reductions reported in this study [78]. The final average lean body mass of the transgender women was 51.2 kg, which puts them in the 90th percentile for women [79]. Similarly, the final grip strength was 41 kg, 25% higher than the female reference value [80]. Collectively, this implies a retained physical advantage even after 8 years of testosterone suppression. Furthermore, given that cohorts of transgender women often have slightly lower baseline measurements of muscle and strength than control males [53], and baseline measurements were unavailable for the transgender women of this cohort, the above calculations using control males reference values may be an overestimate of actual loss of muscle mass and strength, emphasizing both the need for caution when analyzing cross-sectional data in the absence of baseline assessment and the superior power of longitudinal studies quantifying within-subject changes.

4.3 Endurance Performance and Cardiovascular Parameters

No controlled longitudinal study has explored the effects of testosterone suppression on endurance-based performance. Sex differences in endurance performance are generally smaller than for events relying more on muscle mass and explosive strength. Using an age grading model designed to normalize times for masters/veteran categories, Harper [81] analyzed self-selected and self-reported race times for eight transgender women runners of various age categories who had, over an average 7 year period (range 1–29 years), competed in sub-elite middle and long distance races within both the male and female categories. The age-graded scores for these eight runners were the same in both categories, suggesting that cross-hormone treatment reduced running performance by approximately the size of the typical male advantage. However, factors affecting performances in the interim, including training and injury, were uncontrolled for periods of years to decades and there were uncertainties regarding which race times were self-reported vs. which race times were actually reported and verified, and factors such as standardization of race course and weather conditions were unaccounted for. Furthermore, one runner improved substantially post-transition, which was attributed to improved training [81]. This demonstrates that performance decrease after transition is not inevitable if training practices are improved. Unfortunately, no study to date has followed up these preliminary self-reports in a more controlled setting, so it is impossible to make any firm conclusions from this data set alone.

Circulating hemoglobin levels are androgen-dependent [82] and typically reported as 12% higher in males compared with females [4]. Hemoglobin levels appear to decrease by 11–14% with cross-hormone therapy in transgender women [62, 71], and indeed comparably sized reductions have been reported in athletes with DSDs where those athletes are sensitive to and been required to reduce testosterone [47, 83]. Oxygen-carrying capacity in transgender women is most likely reduced with testosterone suppression, with a concomitant performance penalty estimated at 2–5% for the female athletic population [83]. Furthermore, there is a robust relationship between hemoglobin mass and VO_{2max} [84, 85] and reduction in hemoglobin is generally associated with reduced aerobic capacity [86, 87]. However, hemoglobin mass is not the only parameter contributing to VO_{2max}, where central factors such as total blood volume, heart size and contractility, and peripheral factors such as capillary supply and mitochondrial content also plays a role in the final oxygen uptake [88]. Thus, while a reduction in hemoglobin is strongly predicted to impact aerobic capacity and reduce endurance performance in transgender women, it is unlikely to completely close the baseline gap in aerobic capacity between males and females.

The typical increase in body fat noted in transgender women [89, 90] may also be a disadvantage for sporting activities (e.g. running) where body weight (or fat distribution) presents a marginal disadvantage. Whether this body composition change negatively affects performance results in transgender women endurance athletes remains unknown. It is unclear to what extent the expected increase in body fat could be offset by nutritional and exercise countermeasures, as individual variation is likely to be present. For example, in the Wiik et al. study [71], 3 out of the 11 transgender women were completely resistant to the marked increase in total adipose tissue noted at the group level. This inter-individual response to treatment represents yet another challenge for sports governing bodies who most likely, given the many obstacles with case-by-case assessments, will form policies based on average effect sizes.

Altogether, the effects of testosterone suppression on performance markers for endurance athletes remain

insufficiently explored. While the negative effect on hemoglobin concentration is well documented, the effects on VO_{2max}, left ventricular size, stroke volume, blood volume, cardiac output lactate threshold, and exercise economy, all of which are important determinants of endurance performance, remain unknown. However, given the plausible disadvantages with testosterone suppression mentioned in this section, together with the more marginal male advantage in endurance-based sports, the balance between inclusion and fairness is likely closer to equilibrium in weight-bearing endurance-based sports compared with strength-based sports where the male advantage is still substantial.

5 Discussion

The data presented here demonstrate that superior anthropometric, muscle mass and strength parameters achieved by males at puberty, and underpinning a considerable portion of the male performance advantage over females, are not removed by the current regimen of testosterone suppression permitting participation of transgender women in female sports categories. Rather, it appears that the male performance advantage remains substantial. Currently, there is no consensus on an acceptable degree of residual advantage held by transgender women that would be tolerable in the female category of sport. There is significant dispute over this issue, especially since the physiological determinants of performance vary across different sporting disciplines. However, given the IOC position that fair competition is the overriding sporting objective [14], any residual advantage carried by transgender women raises obvious concerns about fair and safe competition in the numerous sports where muscle mass, strength and power are key performance determinants.

5.1 Perspectives on Athletic Status of Transgender Women

Whilst available evidence is strong and convincing that strength, skeletal- and muscle-mass derived advantages will largely remain after cross-hormone therapy in transgender women, it is acknowledged that the findings presented here are from healthy adults with regular or even low physical activity levels [91], and not highly trained athletes. Thus, further research is required in athletic transgender populations.

However, despite the current absence of empirical evidence in athletic transgender women, it is possible to evaluate potential outcomes in athletic transgender women compared with untrained cohorts. The first possibility is that athletic transgender women will experience similar reductions (approximately −5%) in muscle mass and strength as untrained transgender women, and will thus retain significant advantages over a comparison group of females. As a result of higher baseline characteristics in these variables, the retained advantage may indeed be even larger. A second possibility is that by virtue of greater muscle mass and strength at baseline, pre-trained transgender women will experience larger relative decreases in muscle mass and strength if they converge with untrained transgender women, particularly if training is halted during transition. Finally, training before and during the period of testosterone suppression may attenuate the anticipated reductions, such that relative decreases in muscle mass and strength will be smaller or non-existent in transgender women who undergo training, compared to untrained (and non-training) controls.

It is well established that resistance training counteracts substantial muscle loss during atrophy conditions that are far more severe than testosterone suppression. For example, resistance exercise every third day during 90-days bed rest was sufficient to completely offset the 20% reduction in knee extensor muscle size noted in the resting control subjects [92]. More relevant to the question of transgender women, however, is to examine training effects in studies where testosterone has been suppressed in biological males. Kvorning et al. investigated, in a randomized placebo-controlled trial, how suppression of endogenous testosterone for 12 weeks influenced muscle hypertrophy and strength gains during a training program (3 days/week) that took place during the last 8 weeks of the 3-month suppression period [93]. Despite testosterone suppression to female levels of 2 nmol/L, there was a significant + 4% increase in leg lean mass and a + 2% increase in total lean body mass, and a measurable though insignificant increase in isometric knee extension strength. Moreover, in select exercises used during the training program, 10RM leg press and bench press increased + 32% and + 17%, respectively. While some of the training adaptations were lower than in the placebo group, this study demonstrates that training during a period of testosterone suppression not only counteracts muscle loss, but can actually increase muscle mass and strength.

Males with prostate cancer undergoing androgen deprivation therapy provide a second avenue to examine training effects during testosterone suppression. Testosterone levels are typically reduced to castrate levels, and the loss of lean mass has typically ranged between −2 and −4% per year [77], consistent with the findings described previously in transgender women. A recent meta-analysis concluded that exercise interventions including resistance exercise were generally effective for maintaining muscle mass and increasing muscle strength in prostate cancer patients undergoing androgen deprivation therapy [94]. It is important to emphasize that the efficacy of the different training programs may vary. For example, a 12-week training study of prostate cancer patients undergoing androgen deprivation therapy

included drop-sets to combine heavy loads and high volume while eliciting near-maximal efforts in each set [95]. This strategy resulted in significantly increased lean body mass (+3%), thigh muscle volume (+6%), knee extensor 1RM strength (+28%) and leg press muscle endurance (+110%).

In addition to the described effects of training during testosterone suppression, the effect of training prior to testosterone suppression may also contribute to the attenuation of any muscle mass and strength losses, via a molecular mechanism referred to as 'muscle memory' [96]. Specifically, it has been suggested that myonuclei acquired by skeletal muscle cells during training are maintained during subsequent atrophy conditions [97]. Even though this model of muscle memory has been challenged recently [98], it may facilitate an improved training response upon retraining [99]. Mechanistically, the negative effects of testosterone suppression on muscle mass are likely related to reduced levels of resting protein synthesis [100], which, together with protein breakdown, determines the net protein balance of skeletal muscle. However, testosterone may not be required to elicit a robust muscle protein synthesis response to resistance exercise [100]. Indeed, relative increases in muscle mass in men and women from resistance training are comparable, despite marked differences in testosterone levels [101], and the acute rise in testosterone apparent during resistance exercise does not predict muscle hypertrophy nor strength gains [102]. This suggests that even though testosterone is important for muscle mass, especially during puberty, the maintenance of muscle mass through resistance training is not crucially dependent on circulating testosterone levels.

Thus, in well-controlled studies in biological males who train while undergoing testosterone reduction, training is protective of, and may even enhance, muscle mass and strength attributes. Considering transgender women athletes who train during testosterone suppression, it is plausible to conclude that any losses will be similar to or even smaller in magnitude than documented in the longitudinal studies described in this review. Furthermore, pre-trained transgender women are likely to have greater muscle mass at baseline than untrained transgender women; it is possible that even with the same, rather than smaller, relative decreases in muscle mass and strength, the magnitude of retained advantage will be greater. In contrast, if pre-trained transgender women undergo testosterone suppression while refraining from intense training, it appears likely that muscle mass and strength will be lost at either the same or greater rate than untrained individuals, although there is no rationale to expect a weaker endpoint state. The degree of change in athletic transgender women is influenced by the athlete's baseline resistance-training status, the efficacy of the implemented program and other factors such as genetic make-up and nutritional habits, but we argue that it is implausible that athletic transgender women would achieve final muscle mass and strength metrics that are on par with reference females at comparable athletic level.

5.2 The Focus on Muscle Mass and Strength

We acknowledge that changes in muscle mass are not always correlated in magnitude to changes in strength measurements because muscle mass (or total mass) is not the only contributor to strength [103]. Indeed, the importance of the nervous system, e.g. muscle agonist activation (recruitment and firing frequency) and antagonist co-activation, for muscle strength must be acknowledged [104]. In addition, factors such as fiber types, biomechanical levers, pennation angle, fascicle length and tendon/extracellular matrix composition may all influence the ability to develop muscular force [105]. While there is currently limited to no information on how these factors are influenced by testosterone suppression, the impact seems to be minute, given the modest changes noted in muscle strength during cross-hormone treatment.

It is possible that estrogen replacement may affect the sensitivity of muscle to anabolic signaling and have a protective effect on muscle mass [106] explaining, in part, the modest change in muscle mass with testosterone suppression and accompanying cross-hormone treatment. Indeed, this is supported by research conducted on estrogen replacement therapy in other targeted populations [107, 108] and in several different animal models, including mice after gonadectomy [109] and ovariectomy [110].

In terms of other performance proxies relevant to sports performance, there is no research evaluating the effects of transgender hormone treatment on factors such as agility, jumping or sprint performance, competition strength performance (e.g. bench press), or discipline-specific performance. Other factors that may impact sports performance, known to be affected by testosterone and some of them measurably different between males and females, include visuospatial abilities, aggressiveness, coordination and flexibility.

5.3 Testosterone-Based Criteria for Inclusion of Transgender Women in Female Sports

The appropriate testosterone limit for participation of transgender women in the female category has been a matter of debate recently, where sports federations such as World Athletics recently lowered the eligibility criterion of free circulating testosterone (measured by means of liquid chromatography coupled with mass spectrometry) to < 5 nmol/L. This was based, at least in part, on a thorough review by Handelsman et al. [4], where the authors concluded that, given the nonoverlapping distribution of circulating testosterone between males and females, and making an allowance

for females with mild hyperandrogenism (e.g. with polycystic ovary syndrome), the appropriate testosterone limit should be 5 rather than 10 nmol/L.

From the longitudinal muscle mass/strength studies summarised here, however, it is apparent that most therapeutic interventions result in almost complete suppression of testosterone levels, certainly well below 5 nmol/L (Table 4). Thus, with regard to transgender women athletes, we question whether current circulating testosterone level cut-off can be a meaningful decisive factor, when in fact not even suppression down to around 1 nmol/L removes the anthropometric and muscle mass/strength advantage in any significant way.

In terms of duration of testosterone suppression, it may be argued that although 12 months of treatment is not sufficient to remove the male advantage, perhaps extending the time frame of suppression would generate greater parity with female metrics. However, based on the studies reviewed here, evidence is lacking that this would diminish the male advantage to a tolerable degree. On the contrary, it appears that the net loss of lean mass and grip strength is not substantially decreased at year 2 or 3 of cross-hormone treatment (Table 4), nor evident in cohorts after an average 8 years after transition. This indicates that a plateau or a new steady state is reached within the first or second year of treatment, a phenomenon also noted in transgender men, where the increase in muscle mass seems to stabilise between the first and the second year of testosterone treatment [111].

6 Conclusions

We have shown that under testosterone suppression regimes typically used in clinical settings, and which comfortably exceed the requirements of sports federations for inclusion of transgender women in female sports categories by reducing testosterone levels to well below the upper tolerated limit, evidence for loss of the male performance advantage, established by testosterone at puberty and translating in elite athletes to a 10–50% performance advantage, is lacking. Rather, the data show that strength, lean body mass, muscle size and bone density are only trivially affected. The reductions observed in muscle mass, size, and strength are very small compared to the baseline differences between males and females in these variables, and thus, there are major performance and safety implications in sports where these attributes are competitively significant. These data significantly undermine the delivery of fairness and safety presumed by the criteria set out in transgender inclusion policies, particularly given the stated prioritization of fairness as an overriding objective (for the IOC). If those policies are intended to preserve fairness, inclusion and the safety of biologically female athletes, sporting organizations may need to reassess their policies regarding inclusion of transgender women.

From a medical-ethical point of view, it may be questioned as to whether a requirement to lower testosterone below a certain level to ensure sporting participation can be justified at all. If the advantage persists to a large degree, as evidence suggests, then a stated objective of targeting a certain testosterone level to be eligible will not achieve its objective and may drive medical practice that an individual may not want or require, without achieving its intended benefit.

The research conducted so far has studied untrained transgender women. Thus, while this research is important to understand the isolated effects of testosterone suppression, it is still uncertain how transgender women athletes, perhaps undergoing advanced training regimens to counteract the muscle loss during the therapy, would respond. It is also important to recognize that performance in most sports may be influenced by factors outside muscle mass and strength, and the balance between inclusion, safety and fairness therefore differs between sports. While there is certainly a need for more focused research on this topic, including more comprehensive performance tests in transgender women athletes and studies on training capacity of transgender women undergoing hormone therapy, it is still important to recognize that the biological factors underpinning athletic performance are unequivocally established. It is, therefore, possible to make strong inferences and discuss potential performance implications despite the lack of direct sport-specific studies in athletes. Finally, since athlete safety could arguably be described as the immediate priority above considerations of fairness and inclusion, proper risk assessment should be conducted within respective sports that continue to include transgender women in the female category.

If transgender women are restricted within or excluded from the female category of sport, the important question is whether or not this exclusion (or conditional exclusion) is necessary and proportionate to the goal of ensuring fair, safe and meaningful competition. Regardless of what the future will bring in terms of revised transgender policies, it is clear that different sports differ vastly in terms of physiological determinants of success, which may create safety considerations and may alter the importance of retained performance advantages. Thus, we argue against universal guidelines for transgender athletes in sport and instead propose that each individual sports federation evaluate their own conditions for inclusivity, fairness and safety.

Compliance with Ethical Standards

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Conflicts of interest Emma N Hilton and Tommy R Lundberg declare that they have no conflict of interest with the content of this review.

Authorship contributions Both authors (ENH and TRL) were involved in the conception and design of this paper, and both authors drafted, revised and approved the final version of the paper.

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Endocrine Treatment of Gender-Dysphoric/ Gender-Incongruent Persons: An Endocrine Society* Clinical Practice Guideline

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*Cosponsoring Associations: American Association of Clinical Endocrinologists, American Society of Andrology, European Society for Pediatric Endocrinology, European Society of Endocrinology, Pediatric Endocrine Society, and World Professional Association for Transgender Health.

Objective: To update the "Endocrine Treatment of Transsexual Persons: An Endocrine Society Clinical Practice Guideline," published by the Endocrine Society in 2009.

Participants: The participants include an Endocrine Society–appointed task force of nine experts, a methodologist, and a medical writer.

Evidence: This evidence-based guideline was developed using the Grading of Recommendations, Assessment, Development, and Evaluation approach to describe the strength of recommendations and the quality of evidence. The task force commissioned two systematic reviews and used the best available evidence from other published systematic reviews and individual studies.

Consensus Process: Group meetings, conference calls, and e-mail communications enabled consensus. Endocrine Society committees, members and cosponsoring organizations reviewed and commented on preliminary drafts of the guidelines.

Conclusion: Gender affirmation is multidisciplinary treatment in which endocrinologists play an important role. Gender-dysphoric/gender-incongruent persons seek and/or are referred to endocrinologists to develop the physical characteristics of the affirmed gender. They require a safe and effective hormone regimen that will (1) suppress endogenous sex hormone secretion determined by the person's genetic/gonadal sex and (2) maintain sex hormone levels within the normal range for the person's affirmed gender. Hormone treatment is not recommended for prepubertal gender-dysphoric/gender-incongruent persons. Those clinicians who recommend gender-affirming endocrine treatments—appropriately trained diagnosing clinicians (required), a mental health provider for adolescents (required) and mental health

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Abbreviations: BMD, bone mineral density; DSD, disorder/difference of sex development; DSM, Diagnostic and Statistical Manual of Mental Disorders; GD, gender dysphoria; GnRH, gonadotropin-releasing hormone; ICD, International Statistical Classification of Diseases and Related Health Problems; MHP, mental health professional; VTE, venous thromboembolism.

professional for adults (recommended)—should be knowledgeable about the diagnostic criteria and criteria for gender-affirming treatment, have sufficient training and experience in assessing psychopathology, and be willing to participate in the ongoing care throughout the endocrine transition. We recommend treating gender-dysphoric/gender-incongruent adolescents who have entered puberty at Tanner Stage G2/B2 by suppression with gonadotropin-releasing hormone agonists. Clinicians may add gender-affirming hormones after a multidisciplinary team has confirmed the persistence of gender dysphoria/gender incongruence and sufficient mental capacity to give informed consent to this partially irreversible treatment. Most adolescents have this capacity by age 16 years old. We recognize that there may be compelling reasons to initiate sex hormone treatment prior to age 16 years, although there is minimal published experience treating prior to 13.5 to 14 years of age. For the care of peripubertal youths and older adolescents, we recommend that an expert multidisciplinary team comprised of medical professionals and mental health professionals manage this treatment. The treating physician must confirm the criteria for treatment used by the referring mental health practitioner and collaborate with them in decisions about gender-affirming surgery in older adolescents. For adult gender-dysphoric/gender-incongruent persons, the treating clinicians (collectively) should have expertise in transgender-specific diagnostic criteria, mental health, primary care, hormone treatment, and surgery, as needed by the patient. We suggest maintaining physiologic levels of gender-appropriate hormones and monitoring for known risks and complications. When high doses of sex steroids are required to suppress endogenous sex steroids and/or in advanced age, clinicians may consider surgically removing natal gonads along with reducing sex steroid treatment. Clinicians should monitor both transgender males (female to male) and transgender females (male to female) for reproductive organ cancer risk when surgical removal is incomplete. Additionally, clinicians should persistently monitor adverse effects of sex steroids. For gender-affirming surgeries in adults, the treating physician must collaborate with and confirm the criteria for treatment used by the referring physician. Clinicians should avoid harming individuals (via hormone treatment) who have conditions other than gender dysphoria/gender incongruence and who may not benefit from the physical changes associated with this treatment. (***J Clin Endocrinol Metab*** **102: 3869–3903, 2017)**

Summary of Recommendations

1.0 Evaluation of youth and adults

1.1. We advise that only trained mental health professionals (MHPs) who meet the following criteria should diagnose gender dysphoria (GD)/gender incongruence in adults: (1) competence in using the Diagnostic and Statistical Manual of Mental Disorders (DSM) and/or the International Statistical Classification of Diseases and Related Health Problems (ICD) for diagnostic purposes, (2) the ability to diagnose GD/gender incongruence and make a distinction between GD/gender incongruence and conditions that have similar features (*e.g.*, body dysmorphic disorder), (3) training in diagnosing psychiatric conditions, (4) the ability to undertake or refer for appropriate treatment, (5) the ability to psychosocially assess the person's understanding, mental health, and social conditions that can impact gender-affirming hormone therapy, and (6) a practice of regularly attending relevant professional meetings. (Ungraded Good Practice Statement)

1.2. We advise that only MHPs who meet the following criteria should diagnose GD/gender incongruence in children and adolescents: (1) training in child and adolescent developmental psychology and psychopathology, (2) competence in using the DSM and/or the ICD for diagnostic purposes, (3) the ability to make a distinction between GD/gender incongruence and conditions that have similar features (*e.g.*, body dysmorphic disorder), (4) training in diagnosing psychiatric conditions, (5) the ability to undertake or refer for appropriate treatment, (6) the ability to psychosocially assess the person's understanding and social conditions that can impact gender-affirming hormone therapy, (7) a practice of regularly attending relevant professional meetings, and (8) knowledge of the criteria for puberty blocking and gender-affirming hormone treatment in adolescents. (Ungraded Good Practice Statement)

1.3. We advise that decisions regarding the social transition of prepubertal youths with GD/gender incongruence are made with the assistance of an MHP or another experienced professional. (Ungraded Good Practice Statement).

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1.4. We recommend against puberty blocking and gender-affirming hormone treatment in prepubertal children with GD/gender incongruence. (1 |⊕⊕◯◯)

1.5. We recommend that clinicians inform and counsel all individuals seeking gender-affirming medical treatment regarding options for fertility preservation prior to initiating puberty suppression in adolescents and prior to treating with hormonal therapy of the affirmed gender in both adolescents and adults. (1 |⊕⊕⊕◯)

2.0 Treatment of adolescents

2.1. We suggest that adolescents who meet diagnostic criteria for GD/gender incongruence, fulfill criteria for treatment, and are requesting treatment should initially undergo treatment to suppress pubertal development. (2 |⊕⊕◯◯)

2.2. We suggest that clinicians begin pubertal hormone suppression after girls and boys first exhibit physical changes of puberty. (2 |⊕⊕◯◯)

2.3. We recommend that, where indicated, GnRH analogues are used to suppress pubertal hormones. (1 |⊕⊕◯◯)

2.4. In adolescents who request sex hormone treatment (given this is a partly irreversible treatment), we recommend initiating treatment using a gradually increasing dose schedule after a multidisciplinary team of medical and MHPs has confirmed the persistence of GD/gender incongruence and sufficient mental capacity to give informed consent, which most adolescents have by age 16 years. (1 |⊕⊕◯◯).

2.5. We recognize that there may be compelling reasons to initiate sex hormone treatment prior to the age of 16 years in some adolescents with GD/gender incongruence, even though there are minimal published studies of gender-affirming hormone treatments administered before age 13.5 to 14 years. As with the care of adolescents ≥16 years of age, we recommend that an expert multidisciplinary team of medical and MHPs manage this treatment. (1 |⊕◯◯◯)

2.6. We suggest monitoring clinical pubertal development every 3 to 6 months and laboratory parameters every 6 to 12 months during sex hormone treatment. (2 |⊕⊕◯◯)

3.0 Hormonal therapy for transgender adults

3.1. We recommend that clinicians confirm the diagnostic criteria of GD/gender incongruence and the criteria for the endocrine phase of gender transition before beginning treatment. (1 |⊕⊕⊕◯)

3.2. We recommend that clinicians evaluate and address medical conditions that can be exacerbated by hormone depletion and treatment with sex hormones of the affirmed gender before beginning treatment. (1 |⊕⊕⊕◯)

3.3. We suggest that clinicians measure hormone levels during treatment to ensure that endogenous sex steroids are suppressed and administered sex steroids are maintained in the normal physiologic range for the affirmed gender. (2 |⊕⊕◯◯)

3.4. We suggest that endocrinologists provide education to transgender individuals undergoing treatment about the onset and time course of physical changes induced by sex hormone treatment. (2 |⊕◯◯◯)

4.0 Adverse outcome prevention and long-term care

4.1. We suggest regular clinical evaluation for physical changes and potential adverse changes in response to sex steroid hormones and laboratory monitoring of sex steroid hormone levels every 3 months during the first year of hormone therapy for transgender males and females and then once or twice yearly. (2 |⊕⊕◯◯)

4.2. We suggest periodically monitoring prolactin levels in transgender females treated with estrogens. (2 |⊕⊕◯◯)

4.3. We suggest that clinicians evaluate transgender persons treated with hormones for cardiovascular risk factors using fasting lipid profiles, diabetes screening, and/or other diagnostic tools. (2 |⊕⊕◯◯)

4.4. We recommend that clinicians obtain bone mineral density (BMD) measurements when risk factors for osteoporosis exist, specifically in those who stop sex hormone therapy after gonadectomy. (1 |⊕⊕◯◯)

4.5. We suggest that transgender females with no known increased risk of breast cancer follow breast-screening guidelines recommended for non-transgender females. (2 |⊕⊕◯◯)

4.6. We suggest that transgender females treated with estrogens follow individualized screening according to personal risk for prostatic disease and prostate cancer. (2 |⊕◯◯◯)

4.7. We advise that clinicians determine the medical necessity of including a total hysterectomy and oophorectomy as part of gender-affirming surgery. (Ungraded Good Practice Statement)

5.0 Surgery for sex reassignment and gender confirmation

5.1. We recommend that a patient pursue genital gender-affirming surgery only after the MHP and the clinician responsible for endocrine transition therapy both agree that surgery is medically necessary and would benefit the patient's overall health and/or well-being. (1 |⊕⊕◯◯)

5.2. We advise that clinicians approve genital gender-affirming surgery only after completion of at least 1 year of consistent and compliant hormone treatment, unless hormone therapy is not desired or medically contraindicated. (Ungraded Good Practice Statement)

5.3. We advise that the clinician responsible for endocrine treatment and the primary care provider ensure appropriate medical clearance of transgender individuals for genital gender-affirming surgery and collaborate with the surgeon regarding hormone use during and after surgery. (Ungraded Good Practice Statement)

5.4. We recommend that clinicians refer hormone-treated transgender individuals for genital surgery when: (1) the individual has had a satisfactory social role change, (2) the individual is satisfied about the hormonal effects, and (3) the individual desires definitive surgical changes. (1 |⊕◯◯◯)

5.5. We suggest that clinicians delay gender-affirming genital surgery involving gonadectomy and/or hysterectomy until the patient is at least 18 years old or legal age of majority in his or her country. (2 |⊕⊕◯◯).

5.6. We suggest that clinicians determine the timing of breast surgery for transgender males based upon the physical and mental health status of the individual. There is insufficient evidence to recommend a specific age requirement. (2 |⊕◯◯◯)

Changes Since the Previous Guideline

Both the current guideline and the one published in 2009 contain similar sections. Listed here are the sections contained in the current guideline and the corresponding number of recommendations: Introduction, Evaluation of Youth and Adults (5), Treatment of Adolescents (6), Hormonal Therapy for Transgender Adults (4), Adverse Outcomes Prevention and Long-term Care (7), and Surgery for Sex Reassignment and Gender Confirmation (6). The current introduction updates the diagnostic classification of "gender dysphoria/gender incongruence." It also reviews the development of "gender identity" and summarizes its natural development. The section on clinical evaluation of both youth and adults, defines in detail the professional qualifications required of those who diagnose and treat both adolescents and adults. We advise that decisions regarding the social transition of prepubertal youth are made with the assistance of a mental health professional or similarly experienced professional. We recommend against puberty blocking followed by gender-affirming hormone treatment of prepubertal children. Clinicians should inform pubertal children, adolescents, and adults seeking gender-confirming treatment of their options for fertility preservation. Prior to treatment, clinicians should evaluate the presence of medical conditions that may be worsened by hormone depletion and/or treatment. A multidisciplinary team, preferably composed of medical and mental health professionals, should monitor treatments. Clinicians evaluating transgender adults for endocrine treatment should confirm the diagnosis of persistent gender dysphoria/gender incongruence. Physicians should educate transgender persons regarding the time course of steroid-induced physical changes. Treatment should include periodic monitoring of hormone levels and metabolic parameters, as well as assessments of bone density and the impact upon prostate, gonads, and uterus. We also make recommendations for transgender persons who plan genital gender-affirming surgery.

Method of Development of Evidence-Based Clinical Practice Guidelines

The Clinical Guidelines Subcommittee (CGS) of the Endocrine Society deemed the diagnosis and treatment of individuals with GD/gender incongruence a priority area for revision and appointed a task force to formulate evidence-based recommendations. The task force followed the approach recommended by the Grading of Recommendations, Assessment, Development, and Evaluation group, an international group with expertise in the development and implementation of evidence-based guidelines (1). A detailed description of the grading scheme has been published elsewhere (2). The task force used the best available research evidence to develop the recommendations. The task force also used consistent language and graphical descriptions of both the strength of a recommendation and the quality of evidence. In terms of the strength of the recommendation, strong recommendations use the phrase "we recommend" and the number 1, and weak recommendations use the phrase "we suggest" and the number 2. Cross-filled circles indicate the quality of the evidence, such that ⊕◯◯◯ denotes very low–quality evidence; ⊕⊕◯◯, low quality; ⊕⊕⊕◯, moderate quality; and ⊕⊕⊕⊕, high quality. The task force has confidence that persons who receive care according to the strong recommendations will derive, on average, more benefit than harm. Weak recommendations require more careful consideration of the person's circumstances, values, and preferences to determine the best course of action. Linked to each recommendation is a description of the evidence and the

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values that the task force considered in making the recommendation. In some instances, there are remarks in which the task force offers technical suggestions for testing conditions, dosing, and monitoring. These technical comments reflect the best available evidence applied to a typical person being treated. Often this evidence comes from the unsystematic observations of the task force and their preferences; therefore, one should consider these remarks as suggestions.

In this guideline, the task force made several statements to emphasize the importance of shared decision-making, general preventive care measures, and basic principles of the treatment of transgender persons. They labeled these "Ungraded Good Practice Statement." Direct evidence for these statements was either unavailable or not systematically appraised and considered out of the scope of this guideline. The intention of these statements is to draw attention to these principles.

The Endocrine Society maintains a rigorous conflict-of-interest review process for developing clinical practice guidelines. All task force members must declare any potential conflicts of interest by completing a conflict-of-interest form. The CGS reviews all conflicts of interest before the Society's Council approves the members to participate on the task force and periodically during the development of the guideline. All others participating in the guideline's development must also disclose any conflicts of interest in the matter under study, and most of these participants must be without any conflicts of interest. The CGS and the task force have reviewed all disclosures for this guideline and resolved or managed all identified conflicts of interest.

Conflicts of interest are defined as remuneration in any amount from commercial interests; grants; research support; consulting fees; salary; ownership interests [*e.g.*, stocks and stock options (excluding diversified mutual funds)]; honoraria and other payments for participation in speakers' bureaus, advisory boards, or boards of directors; and all other financial benefits. Completed forms are available through the Endocrine Society office.

The Endocrine Society provided the funding for this guideline; the task force received no funding or remuneration from commercial or other entities.

Commissioned Systematic Review

The task force commissioned two systematic reviews to support this guideline. The first one aimed to summarize the available evidence on the effect of sex steroid use in transgender individuals on lipids and cardiovascular outcomes. The review identified 29 eligible studies at moderate risk of bias. In transgender males (female to male), sex steroid therapy was associated with a statistically significant increase in serum triglycerides and low-density lipoprotein cholesterol levels. High-density lipoprotein cholesterol levels decreased significantly across all follow-up time periods. In transgender females (male to female), serum triglycerides were significantly higher without any changes in other parameters. Few myocardial infarction, stroke, venous thromboembolism (VTE), and death events were reported. These events were more frequent in transgender females. However, the quality of the evidence was low. The second review summarized the available evidence regarding the effect of sex steroids on bone health in transgender individuals and identified 13 studies. In transgender males, there was no statistically significant difference in the lumbar spine, femoral neck, or total hip BMD at 12 and 24 months compared with baseline values before initiating masculinizing hormone therapy. In transgender females, there was a statistically significant increase in lumbar spine BMD at 12 months and 24 months compared with baseline values before initiation of feminizing hormone therapy. There was minimal information on fracture rates. The quality of evidence was also low.

Introduction

Throughout recorded history (in the absence of an endocrine disorder) some men and women have experienced confusion and anguish resulting from rigid, forced conformity to sexual dimorphism. In modern history, there have been numerous ongoing biological, psychological, cultural, political, and sociological debates over various aspects of gender variance. The 20th century marked the emergence of a social awakening for men and women with the belief that they are "trapped" in the wrong body (3). Magnus Hirschfeld and Harry Benjamin, among others, pioneered the medical responses to those who sought relief from and a resolution to their profound discomfort. Although the term transsexual became widely known after Benjamin wrote "The Transsexual Phenomenon" (4), it was Hirschfeld who coined the term "transsexual" in 1923 to describe people who want to live a life that corresponds with their experienced gender vs their designated gender (5). Magnus Hirschfeld (6) and others (4, 7) have described other types of trans phenomena besides transsexualism. These early researchers proposed that the gender identity of these people was located somewhere along a unidimensional continuum. This continuum ranged from all male through "something in between" to all female. Yet such a classification does not take into account that people may have gender identities outside this continuum. For instance, some experience themselves as having both a male and female gender identity, whereas others completely renounce any gender classification (8, 9). There are also reports of individuals experiencing a continuous and rapid involuntary alternation between a male and female identity (10) or men who do not experience themselves as men but do not want to live as women (11, 12). In some countries, (*e.g.*, Nepal, Bangladesh, and Australia), these nonmale or nonfemale genders are officially recognized (13). Specific treatment protocols, however, have not yet been developed for these groups.

Instead of the term transsexualism, the current classification system of the American Psychiatric Association uses the term gender dysphoria in its diagnosis of persons who are not satisfied with their designated gender (14). The current version of the World Health Organization's ICD-10 still uses the term transsexualism when diagnosing adolescents and adults. However, for the ICD-11, the World Health Organization has proposed using the term "gender incongruence" (15).

Treating persons with GD/gender incongruence (15) was previously limited to relatively ineffective elixirs or creams. However, more effective endocrinology-based treatments became possible with the availability of testosterone in 1935 and diethylstilbestrol in 1938. Reports of individuals with GD/gender incongruence who were treated with hormones and gender-affirming surgery appeared in the press during the second half of the 20th century. The Harry Benjamin International Gender Dysphoria Association was founded in September 1979 and is now called the World Professional Association for Transgender Health (WPATH). WPATH published its first Standards of Care in 1979. These standards have since been regularly updated, providing guidance for treating persons with GD/gender incongruence (16).

Prior to 1975, few peer-reviewed articles were published concerning endocrine treatment of transgender persons. Since then, more than two thousand articles about various aspects of transgender care have appeared.

It is the purpose of this guideline to make detailed recommendations and suggestions, based on existing medical literature and clinical experience, that will enable treating physicians to maximize benefit and minimize risk when caring for individuals diagnosed with GD/gender incongruence.

In the future, we need more rigorous evaluations of the effectiveness and safety of endocrine and surgical protocols. Specifically, endocrine treatment protocols for GD/gender incongruence should include the careful assessment of the following: (1) the effects of prolonged delay of puberty in adolescents on bone health, gonadal function, and the brain (including effects on cognitive, emotional, social, and sexual development); (2) the effects of treatment in adults on sex hormone levels; (3) the requirement for and the effects of progestins and other agents used to suppress endogenous sex steroids during treatment; and (4) the risks and benefits of gender-affirming hormone treatment in older transgender people.

To successfully establish and enact these protocols, a commitment of mental health and endocrine investigators is required to collaborate in long-term, large-scale studies across countries that use the same diagnostic and inclusion criteria, medications, assay methods, and response assessment tools (*e.g.*, the European Network for the Investigation of Gender Incongruence) (17, 18).

Terminology and its use vary and continue to evolve. Table 1 contains the definitions of terms as they are used throughout this guideline.

Biological Determinants of Gender Identity Development

One's self-awareness as male or female changes gradually during infant life and childhood. This process of cognitive and affective learning evolves with interactions with parents, peers, and environment. A fairly accurate timetable exists outlining the steps in this process (19). Normative psychological literature, however, does not address if and when gender identity becomes crystallized and what factors contribute to the development of a gender identity that is not congruent with the gender of rearing. Results of studies from a variety of biomedical disciplines—genetic, endocrine, and neuroanatomic—support the concept that gender identity and/or gender expression (20) likely reflect a complex interplay of biological, environmental, and cultural factors (21, 22).

With respect to endocrine considerations, studies have failed to find differences in circulating levels of sex steroids between transgender and nontransgender individuals (23). However, studies in individuals with a disorder/difference of sex development (DSD) have informed our understanding of the role that hormones may play in gender identity outcome, even though most persons with GD/gender incongruence do not have a DSD. For example, although most 46,XX adult individuals with virilizing congenital adrenal hyperplasia caused by mutations in *CYP21A2* reported a female gender identity, the prevalence of GD/gender incongruence was much greater in this group than in the general population without a DSD. This supports the concept that there is a role for prenatal/postnatal androgens in gender development (24–26), although some studies indicate that prenatal androgens are more likely to affect gender behavior and sexual orientation rather than gender identity *per se* (27, 28).

Researchers have made similar observations regarding the potential role of androgens in the development of gender identity in other individuals with DSD. For example, a review of two groups of 46,XY persons, each with androgen synthesis deficiencies and female raised, reported transgender male (female-to-male) gender role changes in 56% to 63% and 39% to 64% of patients, respectively (29). Also, in 46,XY female-raised individuals with cloacal

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Table 1. Definitions of Terms Used in This Guideline

Biological sex, biological male or female: These terms refer to physical aspects of maleness and femaleness. As these may not be in line with each other (*e.g.*, a person with XY chromosomes may have female-appearing genitalia), the terms biological sex and biological male or female are imprecise and should be avoided.
Cisgender: This means not transgender. An alternative way to describe individuals who are not transgender is "non-transgender people."
Gender-affirming (hormone) treatment: See "gender reassignment"
Gender dysphoria: This is the distress and unease experienced if gender identity and designated gender are not completely congruent (see Table 2). In 2013, the American Psychiatric Association released the fifth edition of the DSM-5, which replaced "gender identity disorder" with "gender dysphoria" and changed the criteria for diagnosis.
Gender expression: This refers to external manifestations of gender, expressed through one's name, pronouns, clothing, haircut, behavior, voice, or body characteristics. Typically, transgender people seek to make their gender expression align with their gender identity, rather than their designated gender.
Gender identity/experienced gender: This refers to one's internal, deeply held sense of gender. For transgender people, their gender identity does not match their sex designated at birth. Most people have a gender identity of man or woman (or boy or girl). For some people, their gender identity does not fit neatly into one of those two choices. Unlike gender expression (see below), gender identity is not visible to others.
Gender identity disorder: This is the term used for GD/gender incongruence in previous versions of DSM (see "gender dysphoria"). The ICD-10 still uses the term for diagnosing child diagnoses, but the upcoming ICD-11 has proposed using "gender incongruence of childhood."
Gender incongruence: This is an umbrella term used when the gender identity and/or gender expression differs from what is typically associated with the designated gender. Gender incongruence is also the proposed name of the gender identity–related diagnoses in ICD-11. Not all individuals with gender incongruence have gender dysphoria or seek treatment.
Gender variance: See "gender incongruence"
Gender reassignment: This refers to the treatment procedure for those who want to adapt their bodies to the experienced gender by means of hormones and/or surgery. This is also called gender-confirming or gender-affirming treatment.
Gender-reassignment surgery (gender-confirming/gender-affirming surgery): These terms refer only to the surgical part of gender-confirming/gender-affirming treatment.
Gender role: This refers to behaviors, attitudes, and personality traits that a society (in a given culture and historical period) designates as masculine or feminine and/or that society associates with or considers typical of the social role of men or women.
Sex designated at birth: This refers to sex assigned at birth, usually based on genital anatomy.
Sex: This refers to attributes that characterize biological maleness or femaleness. The best known attributes include the sex-determining genes, the sex chromosomes, the H-Y antigen, the gonads, sex hormones, internal and external genitalia, and secondary sex characteristics.
Sexual orientation: This term describes an individual's enduring physical and emotional attraction to another person. Gender identity and sexual orientation are not the same. Irrespective of their gender identity, transgender people may be attracted to women (gynephilic), attracted to men (androphilic), bisexual, asexual, or queer.
Transgender: This is an umbrella term for people whose gender identity and/or gender expression differs from what is typically associated with their sex designated at birth. Not all transgender individuals seek treatment.
Transgender male (also: trans man, female-to-male, transgender male): This refers to individuals assigned female at birth but who identify and live as men.
Transgender woman (also: trans woman, male-to female, transgender female): This refers to individuals assigned male at birth but who identify and live as women.
Transition: This refers to the process during which transgender persons change their physical, social, and/or legal characteristics consistent with the affirmed gender identity. Prepubertal children may choose to transition socially.
Transsexual: This is an older term that originated in the medical and psychological communities to refer to individuals who have permanently transitioned through medical interventions or desired to do so.

exstrophy and penile agenesis, the occurrence of transgender male changes was significantly more prevalent than in the general population (30, 31). However, the fact that a high percentage of individuals with the same conditions did not change gender suggests that cultural factors may play a role as well.

With respect to genetics and gender identity, several studies have suggested heritability of GD/gender incongruence (32, 33). In particular, a study by Heylens *et al.* (33) demonstrated a 39.1% concordance rate for gender identity disorder (based on the DSM-IV criteria) in 23 monozygotic twin pairs but no concordance in 21 same-sex dizygotic or seven opposite-sex twin pairs. Although numerous investigators have sought to identify specific genes associated with GD/gender incongruence, such studies have been inconsistent and without strong statistical significance (34–38).

Studies focusing on brain structure suggest that the brain phenotypes of people with GD/gender incongruence differ in various ways from control males and females, but that there is not a complete sex reversal in brain structures (39).

In summary, although there is much that is still unknown with respect to gender identity and its expression, compelling studies support the concept that biologic factors, in addition to environmental factors, contribute to this fundamental aspect of human development.

Natural History of Children With GD/Gender Incongruence

With current knowledge, we cannot predict the psychosexual outcome for any specific child. Prospective follow-up studies show that childhood GD/gender incongruence does not invariably persist into adolescence and adulthood (so-called "desisters"). Combining all outcome studies to date, the GD/gender incongruence of a minority of prepubertal children appears to persist in adolescence (20, 40). In adolescence, a significant number of these desisters identify as homosexual or bisexual. It may be that children who only showed some gender nonconforming characteristics have been included in the follow-up studies, because the DSM-IV text revision criteria for a diagnosis were rather broad. However, the persistence of GD/gender incongruence into adolescence is more likely if it had been extreme in childhood (41, 42). With the newer, stricter criteria of the DSM-5 (Table 2), persistence rates may well be different in future studies.

1.0 Evaluation of Youth and Adults

Gender-affirming treatment is a multidisciplinary effort. After evaluation, education, and diagnosis, treatment may include mental health care, hormone therapy, and/or surgical therapy. Together with an MHP, hormone-prescribing clinicians should examine the psychosocial impact of the potential changes on people's lives, including mental health, friends, family, jobs, and their role in society. Transgender individuals should be encouraged to experience living in the new gender role and assess whether this improves their quality of life. Although the focus of this guideline is gender-affirming hormone therapy, collaboration with appropriate professionals responsible for each aspect of treatment maximizes a successful outcome.

Diagnostic assessment and mental health care

GD/gender incongruence may be accompanied with psychological or psychiatric problems (43–51). It is therefore necessary that clinicians who prescribe hormones and are involved in diagnosis and psychosocial assessment meet the following criteria: (1) are competent in using the DSM and/or the ICD for diagnostic purposes, (2) are able to diagnose GD/gender incongruence and make a distinction between GD/gender incongruence and conditions that have similar features (*e.g.*, body dysmorphic disorder), (3) are trained in diagnosing psychiatric conditions, (4) undertake or refer for appropriate treatment, (5) are able to do a psychosocial assessment of the patient's understanding, mental health, and social conditions that can impact gender-affirming hormone therapy, and (6) regularly attend relevant professional meetings.

Because of the psychological vulnerability of many individuals with GD/gender incongruence, it is important that mental health care is available before, during, and sometimes also after transitioning. For children and adolescents, an MHP who has training/experience in child and adolescent gender development (as well as child and adolescent psychopathology) should make the diagnosis, because assessing GD/gender incongruence in children and adolescents is often extremely complex.

During assessment, the clinician obtains information from the individual seeking gender-affirming treatment. In the case

Table 2. DSM-5 Criteria for Gender Dysphoria in Adolescents and Adults

A. A marked incongruence between one's experienced/expressed gender and natal gender of at least 6 mo in duration, as manifested by at least two of the following:
1. A marked incongruence between one's experienced/expressed gender and primary and/or secondary sex characteristics (or in young adolescents, the anticipated secondary sex characteristics)
2. A strong desire to be rid of one's primary and/or secondary sex characteristics because of a marked incongruence with one's experienced/expressed gender (or in young adolescents, a desire to prevent the development of the anticipated secondary sex characteristics)
3. A strong desire for the primary and/or secondary sex characteristics of the other gender
4. A strong desire to be of the other gender (or some alternative gender different from one's designated gender)
5. A strong desire to be treated as the other gender (or some alternative gender different from one's designated gender)
6. A strong conviction that one has the typical feelings and reactions of the other gender (or some alternative gender different from one's designated gender)

B. The condition is associated with clinically significant distress or impairment in social, occupational, or other important areas of functioning.

Specify if:
1. The condition exists with a disorder of sex development.
2. The condition is posttransitional, in that the individual has transitioned to full-time living in the desired gender (with or without legalization of gender change) and has undergone (or is preparing to have) at least one sex-related medical procedure or treatment regimen—namely, regular sex hormone treatment or gender reassignment surgery confirming the desired gender (*e.g.*, penectomy, vaginoplasty in natal males; mastectomy or phalloplasty in natal females).

Reference: American Psychiatric Association (14).

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of adolescents, the clinician also obtains information from the parents or guardians regarding various aspects of the child's general and psychosexual development and current functioning. On the basis of this information, the clinician:

- decides whether the individual fulfills criteria for treatment (see Tables 2 and 3) for GD/gender incongruence (DSM-5) or transsexualism (DSM-5 and/or ICD-10);
- informs the individual about the possibilities and limitations of various kinds of treatment (hormonal/surgical and nonhormonal), and if medical treatment is desired, provides correct information to prevent unrealistically high expectations;
- assesses whether medical interventions may result in unfavorable psychological and social outcomes.

In cases in which severe psychopathology, circumstances, or both seriously interfere with the diagnostic work or make satisfactory treatment unlikely, clinicians should assist the adolescent in managing these other issues. Literature on postoperative regret suggests that besides poor quality of surgery, severe psychiatric comorbidity and lack of support may interfere with positive outcomes (52–56).

For adolescents, the diagnostic procedure usually includes a complete psychodiagnostic assessment (57) and an assessment of the decision-making capability of the youth. An evaluation to assess the family's ability to endure stress, give support, and deal with the complexities of the adolescent's situation should be part of the diagnostic phase (58).

Social transitioning

A change in gender expression and role (which may involve living part time or full time in another gender role that is consistent with one's gender identity) may test the person's resolve, the capacity to function in the affirmed gender, and the adequacy of social, economic, and psychological supports. It assists both the individual and the clinician in their judgments about how to proceed (16). During social transitioning, the person's feelings about the social transformation (including coping with the responses of others) is a major focus of the counseling. The optimal timing for social transitioning may differ between individuals. Sometimes people wait until they start gender-affirming hormone treatment to make social transitioning easier, but individuals increasingly start social transitioning long before they receive medically supervised, gender-affirming hormone treatment.

Criteria

Adolescents and adults seeking gender-affirming hormone treatment and surgery should satisfy certain criteria before proceeding (16). Criteria for gender-affirming hormone therapy for adults are in Table 4, and criteria for gender-affirming hormone therapy for adolescents are in Table 5. Follow-up studies in adults meeting these criteria indicate a high satisfaction rate with treatment (59). However, the quality of evidence is usually low. A few follow-up studies on adolescents who fulfilled these criteria also indicated good treatment results (60–63).

Recommendations for Those Involved in the Gender-Affirming Hormone Treatment of Individuals With GD/Gender Incongruence

1.1. We advise that only trained MHPs who meet the following criteria should diagnose GD/gender incongruence in adults: (1) competence in using the DSM and/or the ICD for diagnostic purposes, (2) the ability to diagnose GD/gender incongruence and make a distinction between GD/gender incongruence and conditions that have similar features (*e.g.*, body dysmorphic disorder), (3) training in diagnosing psychiatric conditions, (4) the ability to undertake or refer for appropriate treatment, (5) the ability to psychosocially assess the person's understanding, mental health, and social conditions that can impact gender-affirming hormone therapy, and (6) a practice of regularly attending relevant professional meetings. (Ungraded Good Practice Statement)

1.2. We advise that only MHPs who meet the following criteria should diagnose GD/gender incongruence in children and adolescents: (1) training in child and adolescent developmental psychology and psychopathology, (2) competence in using the DSM and/or ICD for diagnostic

Table 3. ICD-10 Criteria for Transsexualism

Transsexualism (F64.0) has three criteria:
1. The desire to live and be accepted as a member of the opposite sex, usually accompanied by the wish to make his or her body as congruent as possible with the preferred sex through surgery and hormone treatments.
2. The transsexual identity has been present persistently for at least 2 y.
3. The disorder is not a symptom of another mental disorder or a genetic, DSD, or chromosomal abnormality.

Table 4. Criteria for Gender-Affirming Hormone Therapy for Adults

1. Persistent, well-documented gender dysphoria/gender incongruence
2. The capacity to make a fully informed decision and to consent for treatment
3. The age of majority in a given country (if younger, follow the criteria for adolescents)
4. Mental health concerns, if present, must be reasonably well controlled

Reproduced from World Professional Association for Transgender Health (16).

purposes, (3) the ability to make a distinction between GD/gender incongruence and conditions that have similar features (*e.g.*, body dysmorphic disorder), (4) training in diagnosing psychiatric conditions, (5) the ability to undertake or refer for appropriate treatment, (6) the ability to psychosocially assess the person's understanding and social conditions that can impact gender-affirming hormone therapy, (7) a practice of regularly attending relevant professional meetings, and (8) knowledge of the criteria for puberty blocking and gender-affirming hormone treatment in adolescents. (Ungraded Good Practice Statement)

Evidence

Individuals with gender identity issues may have psychological or psychiatric problems (43–48, 50, 51, 64, 65). It is therefore necessary that clinicians making the diagnosis are able to make a distinction between GD/gender incongruence and conditions that have similar features. Examples of conditions with similar features are body dysmorphic disorder, body identity integrity disorder (a condition in which individuals have a sense that their anatomical configuration as an able-bodied person is somehow wrong or inappropriate) (66), or certain forms of eunuchism (in which a person is preoccupied with or engages in castration and/or penectomy for

Table 5. Criteria for Gender-Affirming Hormone Therapy for Adolescents

Adolescents are eligible for GnRH agonist treatment if:
1. A qualified MHP has confirmed that:
•the adolescent has demonstrated a long-lasting and intense pattern of gender nonconformity or gender dysphoria (whether suppressed or expressed),
•gender dysphoria worsened with the onset of puberty,
•any coexisting psychological, medical, or social problems that could interfere with treatment (*e.g.*, that may compromise treatment adherence) have been addressed, such that the adolescent's situation and functioning are stable enough to start treatment,
•the adolescent has sufficient mental capacity to give informed consent to this (reversible) treatment,
2. And the adolescent:
•has been informed of the effects and side effects of treatment (including potential loss of fertility if the individual subsequently continues with sex hormone treatment) and options to preserve fertility,
•has given informed consent and (particularly when the adolescent has not reached the age of legal medical consent, depending on applicable legislation) the parents or other caretakers or guardians have consented to the treatment and are involved in supporting the adolescent throughout the treatment process,
3. And a pediatric endocrinologist or other clinician experienced in pubertal assessment
•agrees with the indication for GnRH agonist treatment,
•has confirmed that puberty has started in the adolescent (Tanner stage ≥G2/B2),
•has confirmed that there are no medical contraindications to GnRH agonist treatment.
Adolescents are eligible for subsequent sex hormone treatment if:
1. A qualified MHP has confirmed:
•the persistence of gender dysphoria,
•any coexisting psychological, medical, or social problems that could interfere with treatment (*e.g.*, that may compromise treatment adherence) have been addressed, such that the adolescent's situation and functioning are stable enough to start sex hormone treatment,
•the adolescent has sufficient mental capacity (which most adolescents have by age 16 years) to estimate the consequences of this (partly) irreversible treatment, weigh the benefits and risks, and give informed consent to this (partly) irreversible treatment,
2. And the adolescent:
•has been informed of the (irreversible) effects and side effects of treatment (including potential loss of fertility and options to preserve fertility),
•has given informed consent and (particularly when the adolescent has not reached the age of legal medical consent, depending on applicable legislation) the parents or other caretakers or guardians have consented to the treatment and are involved in supporting the adolescent throughout the treatment process,
3. And a pediatric endocrinologist or other clinician experienced in pubertal induction:
•agrees with the indication for sex hormone treatment,
•has confirmed that there are no medical contraindications to sex hormone treatment.

Reproduced from World Professional Association for Transgender Health (16).

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reasons that are not gender identity related) (11). Clinicians should also be able to diagnose psychiatric conditions accurately and ensure that these conditions are treated appropriately, particularly when the conditions may complicate treatment, affect the outcome of gender-affirming treatment, or be affected by hormone use.

Values and preferences

The task force placed a very high value on avoiding harm from hormone treatment in individuals who have conditions other than GD/gender incongruence and who may not benefit from the physical changes associated with this treatment and placed a low value on any potential benefit these persons believe they may derive from hormone treatment. This justifies the good practice statement.

1.3. We advise that decisions regarding the social transition of prepubertal youths with GD/gender incongruence are made with the assistance of an MHP or another experienced professional. (Ungraded Good Practice Statement).

1.4. We recommend against puberty blocking and gender-affirming hormone treatment in prepubertal children with GD/gender incongruence. (1 |⊕⊕◯◯)

Evidence

In most children diagnosed with GD/gender incongruence, it did not persist into adolescence. The percentages differed among studies, probably dependent on which version of the DSM clinicians used, the patient's age, the recruitment criteria, and perhaps cultural factors. However, the large majority (about 85%) of prepubertal children with a childhood diagnosis did not remain GD/gender incongruent in adolescence (20). If children have completely socially transitioned, they may have great difficulty in returning to the original gender role upon entering puberty (40). Social transition is associated with the persistence of GD/gender incongruence as a child progresses into adolescence. It may be that the presence of GD/gender incongruence in prepubertal children is the earliest sign that a child is destined to be transgender as an adolescent/adult (20). However, social transition (in addition to GD/gender incongruence) has been found to contribute to the likelihood of persistence.

This recommendation, however, does not imply that children should be discouraged from showing gender-variant behaviors or should be punished for exhibiting such behaviors. In individual cases, an early complete social transition may result in a more favorable outcome, but there are currently no criteria to identify the GD/gender-incongruent children to whom this applies. At the present time, clinical experience suggests that persistence of GD/gender incongruence can only be reliably assessed after the first signs of puberty.

Values and preferences

The task force placed a high value on avoiding harm with gender-affirming hormone therapy in prepubertal children with GD/gender incongruence. This justifies the strong recommendation in the face of low-quality evidence.

1.5. We recommend that clinicians inform and counsel all individuals seeking gender-affirming medical treatment regarding options for fertility preservation prior to initiating puberty suppression in adolescents and prior to treating with hormonal therapy of the affirmed gender in both adolescents and adults. (1 |⊕⊕⊕◯)

Remarks

Persons considering hormone use for gender affirmation need adequate information about this treatment in general and about fertility effects of hormone treatment in particular to make an informed and balanced decision (67, 68). Because young adolescents may not feel qualified to make decisions about fertility and may not fully understand the potential effects of hormonal interventions, consent and protocol education should include parents, the referring MHP(s), and other members of the adolescent's support group. To our knowledge, there are no formally evaluated decision aids available to assist in the discussion and decision regarding the future fertility of adolescents or adults beginning gender-affirming treatment.

Treating early pubertal youth with GnRH analogs will temporarily impair spermatogenesis and oocyte maturation. Given that an increasing number of transgender youth want to preserve fertility potential, delaying or temporarily discontinuing GnRH analogs to promote gamete maturation is an option. This option is often not preferred, because mature sperm production is associated with later stages of puberty and with the significant development of secondary sex characteristics.

For those designated male at birth with GD/gender incongruence and who are in early puberty, sperm production and the development of the reproductive tract are insufficient for the cryopreservation of sperm. However, prolonged pubertal suppression using GnRH analogs is reversible and clinicians should inform these individuals that sperm production can be initiated following prolonged gonadotropin suppression. This can be accomplished by spontaneous gonadotropin recovery after

cessation of GnRH analogs or by gonadotropin treatment and will probably be associated with physical manifestations of testosterone production, as stated above. Note that there are no data in this population concerning the time required for sufficient spermatogenesis to collect enough sperm for later fertility. In males treated for precocious puberty, spermarche was reported 0.7 to 3 years after cessation of GnRH analogs (69). In adult men with gonadotropin deficiency, sperm are noted in seminal fluid by 6 to 12 months of gonadotropin treatment. However, sperm numbers when partners of these patients conceive are far below the "normal range" (70, 71).

In girls, no studies have reported long-term, adverse effects of pubertal suppression on ovarian function after treatment cessation (72, 73). Clinicians should inform adolescents that no data are available regarding either time to spontaneous ovulation after cessation of GnRH analogs or the response to ovulation induction following prolonged gonadotropin suppression.

In males with GD/gender incongruence, when medical treatment is started in a later phase of puberty or in adulthood, spermatogenesis is sufficient for cryopreservation and storage of sperm. *In vitro* spermatogenesis is currently under investigation. Restoration of spermatogenesis after prolonged estrogen treatment has not been studied.

In females with GD/gender incongruence, the effect of prolonged treatment with exogenous testosterone on ovarian function is uncertain. There have been reports of an increased incidence of polycystic ovaries in transgender males, both prior to and as a result of androgen treatment (74–77), although these reports were not confirmed by others (78). Pregnancy has been reported in transgender males who have had prolonged androgen treatment and have discontinued testosterone but have not had genital surgery (79, 80). A reproductive endocrine gynecologist can counsel patients before gender-affirming hormone treatment or surgery regarding potential fertility options (81). Techniques for cryopreservation of oocytes, embryos, and ovarian tissue continue to improve, and oocyte maturation of immature tissue is being studied (82).

2.0 Treatment of Adolescents

During the past decade, clinicians have progressively acknowledged the suffering of young adolescents with GD/gender incongruence. In some forms of GD/gender incongruence, psychological interventions may be useful and sufficient. However, for many adolescents with GD/gender incongruence, the pubertal physical changes are unbearable. As early medical intervention may prevent psychological harm, various clinics have decided to start treating young adolescents with GD/gender incongruence with puberty-suppressing medication (a GnRH analog). As compared with starting gender-affirming treatment long after the first phases of puberty, a benefit of pubertal suppression at early puberty may be a better psychological and physical outcome.

In girls, the first physical sign of puberty is the budding of the breasts followed by an increase in breast and fat tissue. Breast development is also associated with the pubertal growth spurt, and menarche occurs ~2 years later. In boys, the first physical change is testicular growth. A testicular volume ≥4 mL is seen as consistent with the initiation of physical puberty. At the beginning of puberty, estradiol and testosterone levels are still low and are best measured in the early morning with an ultrasensitive assay. From a testicular volume of 10 mL, daytime testosterone levels increase, leading to virilization (83). Note that pubic hair and/or axillary hair/odor may not reflect the onset of gonadarche; instead, it may reflect adrenarche alone.

2.1. We suggest that adolescents who meet diagnostic criteria for GD/gender incongruence, fulfill criteria for treatment (Table 5), and are requesting treatment should initially undergo treatment to suppress pubertal development. (2 |⊕⊕◯◯)

2.2. We suggest that clinicians begin pubertal hormone suppression after girls and boys first exhibit physical changes of puberty (Tanner stages G2/B2). (2 |⊕⊕◯◯)

Evidence

Pubertal suppression can expand the diagnostic phase by a long period, giving the subject more time to explore options and to live in the experienced gender before making a decision to proceed with gender-affirming sex hormone treatments and/or surgery, some of which is irreversible (84, 85). Pubertal suppression is fully reversible, enabling full pubertal development in the natal gender, after cessation of treatment, if appropriate. The experience of full endogenous puberty is an undesirable condition for the GD/gender-incongruent individual and may seriously interfere with healthy psychological functioning and well-being. Treating GD/gender-incongruent adolescents entering puberty with GnRH analogs has been shown to improve psychological functioning in several domains (86).

Another reason to start blocking pubertal hormones early in puberty is that the physical outcome is improved compared with initiating physical transition after puberty has been completed (60, 62). Looking like a man or woman when living as the opposite sex creates difficult

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barriers with enormous life-long disadvantages. We therefore advise starting suppression in early puberty to prevent the irreversible development of undesirable secondary sex characteristics. However, adolescents with GD/gender incongruence should experience the first changes of their endogenous spontaneous puberty, because their emotional reaction to these first physical changes has diagnostic value in establishing the persistence of GD/gender incongruence (85). Thus, Tanner stage 2 is the optimal time to start pubertal suppression. However, pubertal suppression treatment in early puberty will limit the growth of the penis and scrotum, which will have a potential effect on future surgical treatments (87).

Clinicians can also use pubertal suppression in adolescents in later pubertal stages to stop menses in transgender males and prevent facial hair growth in transgender females. However, in contrast to the effects in early pubertal adolescents, physical sex characteristics (such as more advanced breast development in transgender boys and lowering of the voice and outgrowth of the jaw and brow in transgender girls) are not reversible.

Values and preferences

These recommendations place a high value on avoiding an unsatisfactory physical outcome when secondary sex characteristics have become manifest and irreversible, a higher value on psychological well-being, and a lower value on avoiding potential harm from early pubertal suppression.

Remarks

Table 6 lists the Tanner stages of breast and male genital development. Careful documentation of hallmarks of pubertal development will ensure precise timing when initiating pubertal suppression once puberty has started. Clinicians can use pubertal LH and sex steroid levels to confirm that puberty has progressed sufficiently before starting pubertal suppression (88). Reference ranges for sex steroids by Tanner stage may vary depending on the assay used. Ultrasensitive sex steroid and gonadotropin assays will help clinicians document early pubertal changes.

Irreversible and, for GD/gender-incongruent adolescents, undesirable sex characteristics in female puberty are breasts, female body habitus, and, in some cases, relative short stature. In male puberty, they are a prominent Adam's apple; low voice; male bone configuration, such as a large jaw, big feet and hands, and tall stature; and male hair pattern on the face and extremities.

2.3. We recommend that, where indicated, GnRH analogues are used to suppress pubertal hormones. (1 l⊕⊕◯◯)

Evidence

Clinicians can suppress pubertal development and gonadal function most effectively via gonadotropin suppression using GnRH analogs. GnRH analogs are long-acting agonists that suppress gonadotropins by GnRH receptor desensitization after an initial increase of gonadotropins during ~10 days after the first and (to a lesser degree) the second injection (89). Antagonists immediately suppress pituitary gonadotropin secretion (90, 91). Long-acting GnRH analogs are the currently preferred treatment option. Clinicians may consider long-acting GnRH antagonists when evidence on their safety and efficacy in adolescents becomes available.

During GnRH analog treatment, slight development of secondary sex characteristics may regress, and in a later phase of pubertal development, it will stop. In girls, breast tissue will become atrophic, and menses will stop. In boys, virilization will stop, and testicular volume may decrease (92).

An advantage of using GnRH analogs is the reversibility of the intervention. If, after extensive exploration of his/her transition wish, the individual no longer desires transition, they can discontinue pubertal suppression. In subjects with

Table 6. Tanner Stages of Breast Development and Male External Genitalia

The description of Tanner stages for breast development:
1. Prepubertal
2. Breast and papilla elevated as small mound; areolar diameter increased
3. Breast and areola enlarged, no contour separation
4. Areola and papilla form secondary mound
5. Mature; nipple projects, areola part of general breast contour

For penis and testes:
1. Prepubertal, testicular volume <4 mL
2. Slight enlargement of penis; enlarged scrotum, pink, texture altered, testes 4–6 mL
3. Penis longer, testes larger (8–12 mL)
4. Penis and glans larger, including increase in breadth; testes larger (12–15 mL), scrotum dark
5. Penis adult size; testicular volume > 15 ml

Adapted from Lawrence (56).

precocious puberty, spontaneous pubertal development has been shown to resume after patients discontinue taking GnRH analogs (93).

Recommendations 2.1 to 2.3 are supported by a prospective follow-up study from The Netherlands. This report assessed mental health outcomes in 55 transgender adolescents/young adults (22 transgender females and 33 transgender males) at three time points: (1) before the start of GnRH agonist (average age of 14.8 years at start of treatment), (2) at initiation of gender-affirming hormones (average age of 16.7 years at start of treatment), and (3) 1 year after "gender-reassignment surgery" (average age of 20.7 years) (63). Despite a decrease in depression and an improvement in general mental health functioning, GD/gender incongruence persisted through pubertal suppression, as previously reported (86). However, following sex hormone treatment and gender-reassignment surgery, GD/gender incongruence was resolved and psychological functioning steadily improved (63). Furthermore, well-being was similar to or better than that reported by age-matched young adults from the general population, and none of the study participants regretted treatment. This study represents the first long-term follow-up of individuals managed according to currently existing clinical practice guidelines for transgender youth, and it underscores the benefit of the multidisciplinary approach pioneered in The Netherlands; however, further studies are needed.

Side effects

The primary risks of pubertal suppression in GD/gender-incongruent adolescents may include adverse effects on bone mineralization (which can theoretically be reversed with sex hormone treatment), compromised fertility if the person subsequently is treated with sex hormones, and unknown effects on brain development. Few data are available on the effect of GnRH analogs on BMD in adolescents with GD/gender incongruence. Initial data in GD/gender-incongruent subjects demonstrated no change of absolute areal BMD during 2 years of GnRH analog therapy but a decrease in BMD *z* scores (85). A recent study also suggested suboptimal bone mineral accrual during GnRH analog treatment. The study reported a decrease in areal BMD *z* scores and of bone mineral apparent density *z* scores (which takes the size of the bone into account) in 19 transgender males treated with GnRH analogs from a mean age of 15.0 years (standard deviation = 2.0 years) for a median duration of 1.5 years (0.3 to 5.2 years) and in 15 transgender females treated from 14.9 (±1.9) years for 1.3 years (0.5 to 3.8 years), although not all changes were statistically significant (94). There was incomplete catch-up at age 22 years after sex hormone treatment from age 16.6 (±1.4) years for a median duration of 5.8 years (3.0 to 8.0 years) in transgender females and from age 16.4 (±2.3) years for 5.4 years (2.8 to 7.8 years) in transgender males. Little is known about more prolonged use of GnRH analogs. Researchers reported normal BMD *z* scores at age 35 years in one individual who used GnRH analogs from age 13.7 years until age 18.6 years before initiating sex hormone treatment (65).

Additional data are available from individuals with late puberty or GnRH analog treatment of other indications. Some studies reported that men with constitutionally delayed puberty have decreased BMD in adulthood (95). However, other studies reported that these men have normal BMD (96, 97). Treating adults with GnRH analogs results in a decrease of BMD (98). In children with central precocious puberty, treatment with GnRH analogs has been found to result in a decrease of BMD during treatment by some (99) but not others (100). Studies have reported normal BMD after discontinuing therapy (69, 72, 73, 101, 102). In adolescents treated with growth hormone who are small for gestational age and have normal pubertal timing, 2-year GnRH analog treatments did not adversely affect BMD (103). Calcium supplementation may be beneficial in optimizing bone health in GnRH analog–treated individuals (104). There are no studies of vitamin D supplementation in this context, but clinicians should offer supplements to vitamin D–deficient adolescents. Physical activity, especially during growth, is important for bone mass in healthy individuals (103) and is therefore likely to be beneficial for bone health in GnRH analog–treated subjects.

GnRH analogs did not induce a change in body mass index standard deviation score in GD/gender-incongruent adolescents (94) but caused an increase in fat mass and decrease in lean body mass percentage (92). Studies in girls treated for precocious puberty also reported a stable body mass index standard deviation score during treatment (72) and body mass index and body composition comparable to controls after treatment (73).

Arterial hypertension has been reported as an adverse effect in a few girls treated with GnRH analogs for precocious/early puberty (105, 106). Blood pressure monitoring before and during treatment is recommended.

Individuals may also experience hot flashes, fatigue, and mood alterations as a consequence of pubertal suppression. There is no consensus on treatment of these side effects in this context.

It is recommended that any use of pubertal blockers (and subsequent use of sex hormones, as detailed below) include a discussion about implications for fertility (see recommendation 1.3). Transgender adolescents may

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want to preserve fertility, which may be otherwise compromised if puberty is suppressed at an early stage and the individual completes phenotypic transition with the use of sex hormones.

Limited data are available regarding the effects of GnRH analogs on brain development. A single cross-sectional study demonstrated no compromise of executive function (107), but animal data suggest there may be an effect of GnRH analogs on cognitive function (108).

Values and preferences

Our recommendation of GnRH analogs places a higher value on the superior efficacy, safety, and reversibility of the pubertal hormone suppression achieved (as compared with the alternatives) and a relatively lower value on limiting the cost of therapy. Of the available alternatives, depot and oral progestin preparations are effective. Experience with this treatment dates back prior to the emergence of GnRH analogs for treating precocious puberty in papers from the 1960s and early 1970s (109–112). These compounds are usually safe, but some side effects have been reported (113–115). Only two recent studies involved transgender youth (116, 117). One of these studies described the use of oral lynestrenol monotherapy followed by the addition of testosterone treatment in transgender boys who were at Tanner stage B4 or further at the start of treatment (117). They found lynestrenol safe, but gonadotropins were not fully suppressed. The study reported metrorrhagia in approximately half of the individuals, mainly in the first 6 months. Acne, headache, hot flashes, and fatigue were other frequent side effects. Another progestin that has been studied in the United States is medroxyprogesterone. This agent is not as effective as GnRH analogs in lowering endogenous sex hormones either and may be associated with other side effects (116). Progestin preparations may be an acceptable treatment for persons without access to GnRH analogs or with a needle phobia. If GnRH analog treatment is not available (insurance denial, prohibitive cost, or other reasons), postpubertal, transgender female adolescents may be treated with an antiandrogen that directly suppresses androgen synthesis or action (see adult section).

Remarks

Measurements of gonadotropin and sex steroid levels give precise information about gonadal axis suppression, although there is insufficient evidence for any specific short-term monitoring scheme in children treated with GnRH analogs (88). If the gonadal axis is not completely suppressed—as evidenced by (for example) menses, erections, or progressive hair growth—the interval of GnRH analog treatment can be shortened or the dose increased. During treatment, adolescents should be monitored for negative effects of delaying puberty, including a halted growth spurt and impaired bone mineral accretion. Table 7 illustrates a suggested clinical protocol.

Anthropometric measurements and X-rays of the left hand to monitor bone age are informative for evaluating growth. To assess BMD, clinicians can perform dual-energy X-ray absorptiometry scans.

2.4. In adolescents who request sex hormone treatment (given this is a partly irreversible treatment), we recommend initiating treatment using a gradually increasing dose schedule (see Table 8) after a multidisciplinary team of medical and MHPs has confirmed the persistence of GD/gender incongruence and sufficient mental capacity to give informed consent, which most adolescents have by age 16 years (Table 5). (1 |⊕⊕◯◯)

2.5. We recognize that there may be compelling reasons to initiate sex hormone treatment prior to the age of 16 years in some adolescents with GD/gender incongruence, even though there are minimal published studies of gender-affirming hormone treatments administered before age 13.5 to 14 years. As with the care of adolescents ≥16 years of age, we recommend that an expert multidisciplinary team of medical and MHPs manage this treatment. (1 |⊕◯◯◯)

2.6. We suggest monitoring clinical pubertal development every 3 to 6 months and laboratory parameters every 6 to 12 months during sex hormone treatment (Table 9). (2 |⊕⊕◯◯)

Table 7. Baseline and Follow-Up Protocol During Suppression of Puberty

Every 3–6 mo
Anthropometry: height, weight, sitting height, blood pressure, Tanner stages
Every 6–12 mo
Laboratory: LH, FSH, E2/T, 25OH vitamin D
Every 1–2 y
Bone density using DXA
Bone age on X-ray of the left hand (if clinically indicated)

Adapted from Hembree *et al.* (118).

Abbreviations: DXA, dual-energy X-ray absorptiometry; E2, estradiol; FSH, follicle stimulating hormone; LH, luteinizing hormone; T, testosterone;

Table 8. Protocol Induction of Puberty

Induction of female puberty with oral 17β-estradiol, increasing the dose every 6 mo:
- 5 μg/kg/d
- 10 μg/kg/d
- 15 μg/kg/d
- 20 μg/kg/d
- Adult dose = 2–6 mg/d
- *In postpubertal transgender female adolescents, the dose of 17β-estradiol can be increased more rapidly:*
  - 1 mg/d for 6 mo
  - 2 mg/d

Induction of female puberty with transdermal 17β-estradiol, increasing the dose every 6 mo (new patch is placed every 3.5 d):
- 6.25–12.5 μg/24 h (cut 25-μg patch into quarters, then halves)
- 25 μg/24 h
- 37.5 μg/24 h
- Adult dose = 50–200 μg/24 h
- *For alternatives once at adult dose, see Table 11.*
- *Adjust maintenance dose to mimic physiological estradiol levels (see Table 15).*

Induction of male puberty with testosterone esters increasing the dose every 6 mo (IM or SC):
- 25 mg/m^2/2 wk (or alternatively, half this dose weekly, or double the dose every 4 wk)
- 50 mg/m^2/2 wk
- 75 mg/m^2/2 wk
- 100 mg/m^2/2 wk
- Adult dose = 100–200 mg every 2 wk
- *In postpubertal transgender male adolescents the dose of testosterone esters can be increased more rapidly:*
  - 75 mg/2 wk for 6 mo
  - 125 mg/2 wk
- *For alternatives once at adult dose, see Table 11.*
- *Adjust maintenance dose to mimic physiological testosterone levels (see Table 14).*

Adapted from Hembree *et al.* (118).

Abbreviations: IM, intramuscularly; SC, subcutaneously.

Evidence

Adolescents develop competence in decision making at their own pace. Ideally, the supervising medical professionals should individually assess this competence, although no objective tools to make such an assessment are currently available.

Many adolescents have achieved a reasonable level of competence by age 15 to 16 years (119), and in many countries 16-year-olds are legally competent with regard to medical decision making (120). However, others believe that although some capacities are generally achieved before age 16 years, other abilities (such as good risk assessment) do not develop until well after 18 years (121). They suggest that health care procedures should be divided along a matrix of relative risk, so that younger adolescents can be allowed to decide about low-risk procedures, such as most diagnostic tests and common therapies, but not about high-risk procedures, such as most surgical procedures (121).

Currently available data from transgender adolescents support treatment with sex hormones starting at age 16 years (63, 122). However, some patients may incur potential risks by waiting until age 16 years. These include the potential risk to bone health if puberty is suppressed

Table 9. Baseline and Follow-up Protocol During Induction of Puberty

Every 3–6 mo
- •Anthropometry: height, weight, sitting height, blood pressure, Tanner stages

Every 6–12 mo
- •In transgender males: hemoglobin/hematocrit, lipids, testosterone, 25OH vitamin D
- •In transgender females: prolactin, estradiol, 25OH vitamin D

Every 1–2 y
- •BMD using DXA
- •Bone age on X-ray of the left hand (if clinically indicated)

BMD should be monitored into adulthood (until the age of 25–30 y or until peak bone mass has been reached).
For recommendations on monitoring once pubertal induction has been completed, see Tables 14 and 15.

Adapted from Hembree *et al.* (118).

Abbreviation: DXA, dual-energy X-ray absorptiometry.

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for 6 to 7 years before initiating sex hormones (*e.g.*, if someone reached Tanner stage 2 at age 9-10 years old). Additionally, there may be concerns about inappropriate height and potential harm to mental health (emotional and social isolation) if initiation of secondary sex characteristics must wait until the person has reached 16 years of age. However, only minimal data supporting earlier use of gender-affirming hormones in transgender adolescents currently exist (63). Clearly, long-term studies are needed to determine the optimal age of sex hormone treatment in GD/gender-incongruent adolescents.

The MHP who has followed the adolescent during GnRH analog treatment plays an essential role in assessing whether the adolescent is eligible to start sex hormone therapy and capable of consenting to this treatment (Table 5). Support of the family/environment is essential. Prior to the start of sex hormones, clinicians should discuss the implications for fertility (see recommendation 1.5). Throughout pubertal induction, an MHP and a pediatric endocrinologist (or other clinician competent in the evaluation and induction of pubertal development) should monitor the adolescent. In addition to monitoring therapy, it is also important to pay attention to general adolescent health issues, including healthy life style choices, such as not smoking, contraception, and appropriate vaccinations (*e.g.*, human papillomavirus).

For the induction of puberty, clinicians can use a similar dose scheme for hypogonadal adolescents with GD/gender incongruence as they use in other individuals with hypogonadism, carefully monitoring for desired and undesired effects (Table 8). In transgender female adolescents, transdermal 17β-estradiol may be an alternative for oral 17β-estradiol. It is increasingly used for pubertal induction in hypogonadal females. However, the absence of low-dose estrogen patches may be a problem. As a result, individuals may need to cut patches to size themselves to achieve appropriate dosing (123). In transgender male adolescents, clinicians can give testosterone injections intramuscularly or subcutaneously (124, 125).

When puberty is initiated with a gradually increasing schedule of sex steroid doses, the initial levels will not be high enough to suppress endogenous sex steroid secretion. Gonadotropin secretion and endogenous production of testosterone may resume and interfere with the effectiveness of estrogen treatment, in transgender female adolescents (126, 127). Therefore, continuation of GnRH analog treatment is advised until gonadectomy. Given that GD/gender-incongruent adolescents may opt not to have gonadectomy, long-term studies are necessary to examine the potential risks of prolonged GnRH analog treatment. Alternatively, in transgender male adolescents, GnRH analog treatment can be discontinued once an adult dose of testosterone has been reached and the individual is well virilized. If uterine bleeding occurs, a progestin can be added. However, the combined use of a GnRH analog (for ovarian suppression) and testosterone may enable phenotypic transition with a lower dose of testosterone in comparison with testosterone alone. If there is a wish or need to discontinue GnRH analog treatment in transgender female adolescents, they may be treated with an antiandrogen that directly suppresses androgen synthesis or action (see section 3.0 "Hormonal Therapy for Transgender Adults").

Values and preferences

The recommendation to initiate pubertal induction only when the individual has sufficient mental capacity (roughly age 16 years) to give informed consent for this partly irreversible treatment places a higher value on the ability of the adolescent to fully understand and oversee the partially irreversible consequences of sex hormone treatment and to give informed consent. It places a lower value on the possible negative effects of delayed puberty. We may not currently have the means to weigh adequately the potential benefits of waiting until around age 16 years to initiate sex hormones vs the potential risks/harm to BMD and the sense of social isolation from having the timing of puberty be so out of sync with peers (128).

Remarks

Before starting sex hormone treatment, effects on fertility and options for fertility preservation should be discussed. Adult height may be a concern in transgender adolescents. In a transgender female adolescent, clinicians may consider higher doses of estrogen or a more rapid tempo of dose escalation during pubertal induction. There are no established treatments yet to augment adult height in a transgender male adolescent with open epiphyses during pubertal induction. It is not uncommon for transgender adolescents to present for clinical services after having completed or nearly completed puberty. In such cases, induction of puberty with sex hormones can be done more rapidly (see Table 8). Additionally, an adult dose of testosterone in transgender male adolescents may suffice to suppress the gonadal axis without the need to use a separate agent. At the appropriate time, the multidisciplinary team should adequately prepare the adolescent for transition to adult care.

3.0 Hormonal Therapy for Transgender Adults

The two major goals of hormonal therapy are (1) to reduce endogenous sex hormone levels, and thus reduce

the secondary sex characteristics of the individual's designated gender, and (2) to replace endogenous sex hormone levels consistent with the individual's gender identity by using the principles of hormone replacement treatment of hypogonadal patients. The timing of these two goals and the age at which to begin treatment with the sex hormones of the chosen gender is codetermined in collaboration with both the person pursuing transition and the health care providers. The treatment team should include a medical provider knowledgeable in transgender hormone therapy, an MHP knowledgeable in GD/gender incongruence and the mental health concerns of transition, and a primary care provider able to provide care appropriate for transgender individuals. The physical changes induced by this sex hormone transition are usually accompanied by an improvement in mental well-being (129, 130).

3.1. We recommend that clinicians confirm the diagnostic criteria of GD/gender incongruence and the criteria for the endocrine phase of gender transition before beginning treatment. (1 |⊕⊕⊕◯)

3.2. We recommend that clinicians evaluate and address medical conditions that can be exacerbated by hormone depletion and treatment with sex hormones of the affirmed gender before beginning treatment (Table 10). (1 |⊕⊕⊕◯)

3.3. We suggest that clinicians measure hormone levels during treatment to ensure that endogenous sex steroids are suppressed and administered sex steroids are maintained in the normal physiologic range for the affirmed gender. (2 |⊕⊕◯◯)

Evidence

It is the responsibility of the treating clinician to confirm that the person fulfills criteria for treatment. The treating clinician should become familiar with the terms and criteria presented in Tables 1–5 and take a thorough history from the patient in collaboration with the other members of the treatment team. The treating clinician must ensure that the desire for transition is appropriate; the consequences, risks, and benefits of treatment are well understood; and the desire for transition persists. They also need to discuss fertility preservation options (see recommendation 1.3) (67, 68).

Transgender males

Clinical studies have demonstrated the efficacy of several different androgen preparations to induce masculinization in transgender males (Appendix A) (113, 114, 131–134). Regimens to change secondary sex characteristics follow the general principle of hormone replacement treatment of male hypogonadism (135). Clinicians can use either parenteral or transdermal preparations to achieve testosterone values in the normal male range (this is dependent on the specific assay, but is typically 320 to 1000 ng/dL) (Table 11) (136). Sustained supraphysiologic levels of testosterone increase the risk of adverse reactions (see section 4.0 "Adverse Outcome Prevention and Long-Term Care") and should be avoided.

Similar to androgen therapy in hypogonadal men, testosterone treatment in transgender males results in increased muscle mass and decreased fat mass, increased facial hair and acne, male pattern baldness in those genetically predisposed, and increased sexual desire (137).

Table 10. Medical Risks Associated With Sex Hormone Therapy

Transgender female: estrogen
Very high risk of adverse outcomes:
•Thromboembolic disease
Moderate risk of adverse outcomes:
•Macroprolactinoma
•Breast cancer
•Coronary artery disease
•Cerebrovascular disease
•Cholelithiasis
•Hypertriglyceridemia
Transgender male: testosterone
Very high risk of adverse outcomes:
•Erythrocytosis (hematocrit > 50%)
Moderate risk of adverse outcomes:
•Severe liver dysfunction (transaminases > threefold upper limit of normal)
•Coronary artery disease
•Cerebrovascular disease
•Hypertension
•Breast or uterine cancer

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Table 11. Hormone Regimens in Transgender Persons

Transgender females[a]	
Estrogen	
Oral	
Estradiol	2.0–6.0 mg/d
Transdermal	
Estradiol transdermal patch (New patch placed every 3–5 d)	0.025–0.2 mg/d
Parenteral	
Estradiol valerate or cypionate	5–30 mg IM every 2 wk 2–10 mg IM every week
Anti-androgens	
Spironolactone	100–300 mg/d
Cyproterone acetate[b]	25–50 mg/d
GnRH agonist	3.75 mg SQ (SC) monthly 11.25 mg SQ (SC) 3-monthly
Transgender males	
Testosterone	
Parenteral testosterone	
Testosterone enanthate or cypionate	100–200 mg SQ (IM) every 2 wk or SQ (SC) 50% per week
Testosterone undecanoate[c]	1000 mg every 12 wk
Transdermal testosterone	
Testosterone gel 1.6%[d]	50–100 mg/d
Testosterone transdermal patch	2.5–7.5 mg/d

Abbreviations: IM, intramuscularly; SQ, sequentially; SC, subcutaneously.

[a]Estrogens used with or without antiandrogens or GnRH agonist.

[b]Not available in the United States.

[c]One thousand milligrams initially followed by an injection at 6 wk then at 12-wk intervals.

[d]Avoid cutaneous transfer to other individuals.

In transgender males, testosterone will result in clitoromegaly, temporary or permanent decreased fertility, deepening of the voice, cessation of menses (usually), and a significant increase in body hair, particularly on the face, chest, and abdomen. Cessation of menses may occur within a few months with testosterone treatment alone, although high doses of testosterone may be required. If uterine bleeding continues, clinicians may consider the addition of a progestational agent or endometrial ablation (138). Clinicians may also administer GnRH analogs or depot medroxyprogesterone to stop menses prior to testosterone treatment.

Transgender females

The hormone regimen for transgender females is more complex than the transgender male regimen (Appendix B). Treatment with physiologic doses of estrogen alone is insufficient to suppress testosterone levels into the normal range for females (139). Most published clinical studies report the need for adjunctive therapy to achieve testosterone levels in the female range (21, 113, 114, 132–134, 139, 140).

Multiple adjunctive medications are available, such as progestins with antiandrogen activity and GnRH agonists (141). Spironolactone works by directly blocking androgens during their interaction with the androgen receptor (114, 133, 142). It may also have estrogenic activity (143). Cyproterone acetate, a progestational compound with antiandrogenic properties (113, 132, 144), is widely used in Europe. 5α-Reductase inhibitors do not reduce testosterone levels and have adverse effects (145).

Dittrich *et al.* (141) reported that monthly doses of the GnRH agonist goserelin acetate in combination with estrogen were effective in reducing testosterone levels with a low incidence of adverse reactions in 60 transgender females. Leuprolide and transdermal estrogen were as effective as cyproterone and transdermal estrogen in a comparative retrospective study (146).

Patients can take estrogen as oral conjugated estrogens, oral 17β-estradiol, or transdermal 17β-estradiol. Among estrogen options, the increased risk of thromboembolic events associated with estrogens in general seems most concerning with ethinyl estradiol specifically (134, 140, 141), which is why we specifically suggest that it not be used in any transgender treatment plan. Data distinguishing among other estrogen options are less well established although there is some thought that oral routes of administration are more thrombogenic due to the "first pass effect" than are transdermal and parenteral routes, and that the risk of thromboembolic events is dose-dependent. Injectable estrogen and sublingual

estrogen may benefit from avoiding the first pass effect, but they can result in more rapid peaks with greater overall periodicity and thus are more difficult to monitor (147, 148). However, there are no data demonstrating that increased periodicity is harmful otherwise.

Clinicians can use serum estradiol levels to monitor oral, transdermal, and intramuscular estradiol. Blood tests cannot monitor conjugated estrogens or synthetic estrogen use. Clinicians should measure serum estradiol and serum testosterone and maintain them at the level for premenopausal females (100 to 200 pg/mL and <50 ng/dL, respectively). The transdermal preparations and injectable estradiol cypionate or valerate preparations may confer an advantage in older transgender females who may be at higher risk for thromboembolic disease (149).

Values

Our recommendation to maintain levels of gender-affirming hormones in the normal adult range places a high value on the avoidance of the long-term complications of pharmacologic doses. Those patients receiving endocrine treatment who have relative contraindications to hormones should have an in-depth discussion with their physician to balance the risks and benefits of therapy.

Remarks

Clinicians should inform all endocrine-treated individuals of all risks and benefits of gender-affirming hormones prior to initiating therapy. Clinicians should strongly encourage tobacco use cessation in transgender females to avoid increased risk of VTE and cardiovascular complications. We strongly discourage the unsupervised use of hormone therapy (150).

Not all individuals with GD/gender incongruence seek treatment as described (*e.g.*, male-to-eunuchs and individuals seeking partial transition). Tailoring current protocols to the individual may be done within the context of accepted safety guidelines using a multidisciplinary approach including mental health. No evidence-based protocols are available for these groups (151). We need prospective studies to better understand treatment options for these persons.

3.4. We suggest that endocrinologists provide education to transgender individuals undergoing treatment about the onset and time course of physical changes induced by sex hormone treatment. (2 |⊕○○○)

Evidence

Transgender males

Physical changes that are expected to occur during the first 1 to 6 months of testosterone therapy include cessation of menses, increased sexual desire, increased facial and body hair, increased oiliness of skin, increased muscle, and redistribution of fat mass. Changes that occur within the first year of testosterone therapy include deepening of the voice (152, 153), clitoromegaly, and male pattern hair loss (in some cases) (114, 144, 154, 155) (Table 12).

Transgender females

Physical changes that may occur in transgender females in the first 3 to 12 months of estrogen and antiandrogen therapy include decreased sexual desire, decreased spontaneous erections, decreased facial and body hair (usually mild), decreased oiliness of skin, increased breast tissue growth, and redistribution of fat mass (114, 139, 149, 154, 155, 161) (Table 13). Breast development is generally maximal at 2 years after initiating hormones (114, 139, 149, 155). Over a long period of time, the prostate gland and testicles will undergo atrophy.

Although the time course of breast development in transgender females has been studied (150), precise information about other changes induced by sex hormones is lacking (141). There is a great deal of variability among individuals, as evidenced during pubertal development. We all know that a major concern for transgender females is breast development. If we work with estrogens, the result will be often not what the transgender female expects.

Alternatively, there are transgender females who report an anecdotal improved breast development, mood, or sexual desire with the use of progestogens. However, there have been no well-designed studies of the role of progestogens in feminizing hormone regimens, so the question is still open.

Our knowledge concerning the natural history and effects of different cross-sex hormone therapies on breast

Table 12. Masculinizing Effects in Transgender Males

Effect	Onset	Maximum
Skin oiliness/acne	1–6 mo	1–2 y
Facial/body hair growth	6–12 mo	4–5 y
Scalp hair loss	6–12 mo	—[a]
Increased muscle mass/strength	6–12 mo	2–5 y
Fat redistribution	1–6 mo	2–5 y
Cessation of menses	1–6 mo	—[b]
Clitoral enlargement	1–6 mo	1–2 y
Vaginal atrophy	1–6 mo	1–2 y
Deepening of voice	6–12 mo	1–2 y

Estimates represent clinical observations: Toorians *et al.* (149), Asscheman *et al.* (156), Gooren *et al.* (157), Wierckx *et al.* (158).

[a] Prevention and treatment as recommended for biological men.

[b] Menorrhagia requires diagnosis and treatment by a gynecologist.

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Table 13. Feminizing Effects in Transgender Females

Effect	Onset	Maximum
Redistribution of body fat	3–6 mo	2–3 y
Decrease in muscle mass and strength	3–6 mo	1–2 y
Softening of skin/decreased oiliness	3–6 mo	Unknown
Decreased sexual desire	1–3 mo	3–6 mo
Decreased spontaneous erections	1–3 mo	3–6 mo
Male sexual dysfunction	Variable	Variable
Breast growth	3–6 mo	2–3 y
Decreased testicular volume	3–6 mo	2–3 y
Decreased sperm production	Unknown	>3 y
Decreased terminal hair growth	6–12 mo	>3 y[a]
Scalp hair	Variable	—[b]
Voice changes	None	—[c]

Estimates represent clinical observations: Toorians *et al.* (149), Asscheman *et al.* (156), Gooren *et al.* (157).

[a]Complete removal of male sexual hair requires electrolysis or laser treatment or both.

[b]Familial scalp hair loss may occur if estrogens are stopped.

[c]Treatment by speech pathologists for voice training is most effective.

development in transgender females is extremely sparse and based on the low quality of evidence. Current evidence does not indicate that progestogens enhance breast development in transgender females, nor does evidence prove the absence of such an effect. This prevents us from drawing any firm conclusion at this moment and demonstrates the need for further research to clarify these important clinical questions (162).

Values and preferences

Transgender persons have very high expectations regarding the physical changes of hormone treatment and are aware that body changes can be enhanced by surgical procedures (*e.g.*, breast, face, and body habitus). Clear expectations for the extent and timing of sex hormone–induced changes may prevent the potential harm and expense of unnecessary procedures.

4.0 Adverse Outcome Prevention and Long-Term Care

Hormone therapy for transgender males and females confers many of the same risks associated with sex hormone replacement therapy in nontransgender persons. The risks arise from and are worsened by inadvertent or intentional use of supraphysiologic doses of sex hormones, as well as use of inadequate doses of sex hormones to maintain normal physiology (131, 139).

4.1. We suggest regular clinical evaluation for physical changes and potential adverse changes in response to sex steroid hormones and laboratory monitoring of sex steroid hormone levels every 3 months during the first year of hormone therapy for transgender males and females and then once or twice yearly. (2 |⊕⊕◯◯)

Evidence

Pretreatment screening and appropriate regular medical monitoring are recommended for both transgender males and females during the endocrine transition and periodically thereafter (26, 155). Clinicians should monitor weight and blood pressure, conduct physical exams, and assess routine health questions, such as tobacco use, symptoms of depression, and risk of adverse events such as deep vein thrombosis/pulmonary embolism and other adverse effects of sex steroids.

Transgender males

Table 14 contains a standard monitoring plan for transgender males on testosterone therapy (154, 159). Key issues include maintaining testosterone levels in the physiologic normal male range and avoiding adverse events resulting from excess testosterone therapy, particularly erythrocytosis, sleep apnea, hypertension, excessive weight gain, salt retention, lipid changes, and excessive or cystic acne (135).

Because oral 17-alkylated testosterone is not recommended, serious hepatic toxicity is not anticipated with parenteral or transdermal testosterone use (163, 164). Past concerns regarding liver toxicity with testosterone have been alleviated with subsequent reports that indicate the risk of serious liver disease is minimal (144, 165, 166).

Transgender females

Table 15 contains a standard monitoring plan for transgender females on estrogens, gonadotropin suppression, or antiandrogens (160). Key issues include avoiding supraphysiologic doses or blood levels of estrogen that may lead to increased risk for thromboembolic disease, liver dysfunction, and hypertension. Clinicians should monitor serum estradiol levels using laboratories participating in external quality control, as measurements of estradiol in blood can be very challenging (167).

VTE may be a serious complication. A study reported a 20-fold increase in venous thromboembolic disease in a large cohort of Dutch transgender subjects (161). This increase may have been associated with the use of the synthetic estrogen, ethinyl estradiol (149). The incidence decreased when clinicians stopped administering ethinyl estradiol (161). Thus, the use of synthetic estrogens and conjugated estrogens is undesirable because of the inability to regulate doses by measuring serum levels and the risk of thromboembolic disease. In a German gender clinic, deep vein thrombosis occurred in 1 of 60 of transgender females treated with a GnRH analog and oral

Table 14. Monitoring of Transgender Persons on Gender-Affirming Hormone Therapy: Transgender Male

1. Evaluate patient every 3 mo in the first year and then one to two times per year to monitor for appropriate signs of virilization and for development of adverse reactions.
2. Measure serum testosterone every 3 mo until levels are in the normal physiologic male range:[a]
   a. For testosterone enanthate/cypionate injections, the testosterone level should be measured midway between injections. The target level is 400–700 ng/dL to 400 ng/dL. Alternatively, measure peak and trough levels to ensure levels remain in the normal male range.
   b. For parenteral testosterone undecanoate, testosterone should be measured just before the following injection. If the level is <400 ng/dL, adjust dosing interval.
   c. For transdermal testosterone, the testosterone level can be measured no sooner than after 1 wk of daily application (at least 2 h after application).
3. Measure hematocrit or hemoglobin at baseline and every 3 mo for the first year and then one to two times a year. Monitor weight, blood pressure, and lipids at regular intervals.
4. Screening for osteoporosis should be conducted in those who stop testosterone treatment, are not compliant with hormone therapy, or who develop risks for bone loss.
5. If cervical tissue is present, monitoring as recommended by the American College of Obstetricians and Gynecologists.
6. Ovariectomy can be considered after completion of hormone transition.
7. Conduct sub- and periareolar annual breast examinations if mastectomy performed. If mastectomy is not performed, then consider mammograms as recommended by the American Cancer Society.

[a]Adapted from Lapauw *et al.* (154) and Ott *et al.* (159).

estradiol (141). The patient who developed a deep vein thrombosis was found to have a homozygous C677 T mutation in the methylenetetrahydrofolate reductase gene. In an Austrian gender clinic, administering gender-affirming hormones to 162 transgender females and 89 transgender males was not associated with VTE, despite an 8.0% and 5.6% incidence of thrombophilia (159). A more recent multinational study reported only 10 cases of VTE from a cohort of 1073 subjects (168). Thrombophilia screening of transgender persons initiating hormone treatment should be restricted to those with a personal or family history of VTE (159). Monitoring D-dimer levels during treatment is not recommended (169).

4.2. We suggest periodically monitoring prolactin levels in transgender females treated with estrogens. (2 ⊕⊕◯◯)

Evidence

Estrogen therapy can increase the growth of pituitary lactrotroph cells. There have been several reports of prolactinomas occurring after long-term, high-dose estrogen therapy (170–173). Up to 20% of transgender females treated with estrogens may have elevations in prolactin levels associated with enlargement of the pituitary gland (156). In most cases, the serum prolactin levels will return to the normal range with a reduction or discontinuation of the estrogen therapy or discontinuation of cyproterone acetate (157, 174, 175).

The onset and time course of hyperprolactinemia during estrogen treatment are not known. Clinicians should measure prolactin levels at baseline and then at least annually during the transition period and every 2 years thereafter. Given that only a few case studies reported prolactinomas, and prolactinomas were not reported in large cohorts of estrogen-treated persons, the risk is likely to be very low. Because the major presenting findings of microprolactinomas (hypogonadism and sometimes gynecomastia) are not apparent in transgender females, clinicians may perform radiologic examinations of the pituitary in those patients whose prolactin levels persistently increase despite stable or reduced estrogen levels. Some transgender individuals receive psychotropic medications that can increase prolactin levels (174).

Table 15. Monitoring of Transgender Persons on Gender-Affirming Hormone Therapy: Transgender Female

1. Evaluate patient every 3 mo in the first year and then one to two times per year to monitor for appropriate signs of feminization and for development of adverse reactions.
2. Measure serum testosterone and estradiol every 3 mo.
   a. Serum testosterone levels should be <50 ng/dL.
   b. Serum estradiol should not exceed the peak physiologic range: 100–200 pg/mL.
3. For individuals on spironolactone, serum electrolytes, particularly potassium, should be monitored every 3 mo in the first year and annually thereafter.
4. Routine cancer screening is recommended, as in nontransgender individuals (all tissues present).
5. Consider BMD testing at baseline (160). In individuals at low risk, screening for osteoporosis should be conducted at age 60 years or in those who are not compliant with hormone therapy.

This table presents strong recommendations and does not include lower level recommendations.

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4.3. We suggest that clinicians evaluate transgender persons treated with hormones for cardiovascular risk factors using fasting lipid profiles, diabetes screening, and/or other diagnostic tools. (2 ⊕⊕◯◯)

Evidence

Transgender males

Administering testosterone to transgender males results in a more atherogenic lipid profile with lowered high-density lipoprotein cholesterol and higher triglyceride and low-density lipoprotein cholesterol values (176–179). Studies of the effect of testosterone on insulin sensitivity have mixed results (178, 180). A randomized, open-label uncontrolled safety study of transgender males treated with testosterone undecanoate demonstrated no insulin resistance after 1 year (181, 182). Numerous studies have demonstrated the effects of sex hormone treatment on the cardiovascular system (160, 179, 183, 184). Long-term studies from The Netherlands found no increased risk for cardiovascular mortality (161). Likewise, a meta-analysis of 19 randomized trials in nontransgender males on testosterone replacement showed no increased incidence of cardiovascular events (185). A systematic review of the literature found that data were insufficient (due to very low–quality evidence) to allow a meaningful assessment of patient-important outcomes, such as death, stroke, myocardial infarction, or VTE in transgender males (176). Future research is needed to ascertain the potential harm of hormonal therapies (176). Clinicians should manage cardiovascular risk factors as they emerge according to established guidelines (186).

Transgender females

A prospective study of transgender females found favorable changes in lipid parameters with increased high-density lipoprotein and decreased low-density lipoprotein concentrations (178). However, increased weight, blood pressure, and markers of insulin resistance attenuated these favorable lipid changes. In a meta-analysis, only serum triglycerides were higher at ≥24 months without changes in other parameters (187). The largest cohort of transgender females (mean age 41 years, followed for a mean of 10 years) showed no increase in cardiovascular mortality despite a 32% rate of tobacco use (161).

Thus, there is limited evidence to determine whether estrogen is protective or detrimental on lipid and glucose metabolism in transgender females (176). With aging, there is usually an increase of body weight. Therefore, as with nontransgender individuals, clinicians should monitor and manage glucose and lipid metabolism and blood pressure regularly according to established guidelines (186).

4.4. We recommend that clinicians obtain BMD measurements when risk factors for osteoporosis exist, specifically in those who stop sex hormone therapy after gonadectomy. (1 ⊕⊕◯◯)

Evidence

Transgender males

Baseline bone mineral measurements in transgender males are generally in the expected range for their pretreatment gender (188). However, adequate dosing of testosterone is important to maintain bone mass in transgender males (189, 190). In one study (190), serum LH levels were inversely related to BMD, suggesting that low levels of sex hormones were associated with bone loss. Thus, LH levels in the normal range may serve as an indicator of the adequacy of sex steroid administration to preserve bone mass. The protective effect of testosterone may be mediated by peripheral conversion to estradiol, both systemically and locally in the bone.

Transgender females

A baseline study of BMD reported T scores less than −2.5 in 16% of transgender females (191). In aging males, studies suggest that serum estradiol more positively correlates with BMD than does testosterone (192, 193) and is more important for peak bone mass (194). Estrogen preserves BMD in transgender females who continue on estrogen and antiandrogen therapies (188, 190, 191, 195, 196).

Fracture data in transgender males and females are not available. Transgender persons who have undergone gonadectomy may choose not to continue consistent sex steroid treatment after hormonal and surgical sex reassignment, thereby becoming at risk for bone loss. There have been no studies to determine whether clinicians should use the sex assigned at birth or affirmed gender for assessing osteoporosis (*e.g.*, when using the FRAX tool). Although some researchers use the sex assigned at birth (with the assumption that bone mass has usually peaked for transgender people who initiate hormones in early adulthood), this should be assessed on a case-by-case basis until there are more data available. This assumption will be further complicated by the increasing prevalence of transgender people who undergo hormonal transition at a pubertal age or soon after puberty. Sex for comparison within risk assessment tools may be based on the age at which hormones were initiated and the length of exposure to hormones. In some cases, it may be

reasonable to assess risk using both the male and female calculators and using an intermediate value. Because all subjects underwent normal pubertal development, with known effects on bone size, reference values for birth sex were used for all participants (154).

4.5. We suggest that transgender females with no known increased risk of breast cancer follow breast-screening guidelines recommended for those designated female at birth. (2 |⊕⊕◯◯)

4.6. We suggest that transgender females treated with estrogens follow individualized screening according to personal risk for prostatic disease and prostate cancer. (2 |⊕◯◯◯)

Evidence

Studies have reported a few cases of breast cancer in transgender females (197–200). A Dutch study of 1800 transgender females followed for a mean of 15 years (range of 1 30 years) found one case of breast cancer. The Women's Health Initiative study reported that females taking conjugated equine estrogen without progesterone for 7 years did not have an increased risk of breast cancer as compared with females taking placebo (137).

In transgender males, a large retrospective study conducted at the U.S. Veterans Affairs medical health system identified seven breast cancers (194). The authors reported that this was not above the expected rate of breast cancers in cisgender females in this cohort. Furthermore, they did report one breast cancer that developed in a transgender male patient after mastectomy, supporting the fact that breast cancer can occur even after mastectomy. Indeed, there have been case reports of breast cancer developing in subareolar tissue in transgender males, which occurred after mastectomy (201, 202).

Women with primary hypogonadism (Turner syndrome) treated with estrogen replacement exhibited a significantly decreased incidence of breast cancer as compared with national standardized incidence ratios (203, 204). These studies suggest that estrogen therapy does not increase the risk of breast cancer in the short term (<20 to 30 years). We need long-term studies to determine the actual risk, as well as the role of screening mammograms. Regular examinations and gynecologic advice should determine monitoring for breast cancer.

Prostate cancer is very rare before the age of 40, especially with androgen deprivation therapy (205). Childhood or pubertal castration results in regression of the prostate and adult castration reverses benign prostate hypertrophy (206). Although van Kesteren *et al.* (207) reported that estrogen therapy does not induce hypertrophy or premalignant changes in the prostates of transgender females, studies have reported cases of benign prostatic hyperplasia in transgender females treated with estrogens for 20 to 25 years (208, 209). Studies have also reported a few cases of prostate carcinoma in transgender females (210–214).

Transgender females may feel uncomfortable scheduling regular prostate examinations. Gynecologists are not trained to screen for prostate cancer or to monitor prostate growth. Thus, it may be reasonable for transgender females who transitioned after age 20 years to have annual screening digital rectal examinations after age 50 years and prostate-specific antigen tests consistent with U.S. Preventive Services Task Force Guidelines (215).

4.7. We advise that clinicians determine the medical necessity of including a total hysterectomy and oophorectomy as part of gender-affirming surgery. (Ungraded Good Practice Statement)

Evidence

Although aromatization of testosterone to estradiol in transgender males has been suggested as a risk factor for endometrial cancer (216), no cases have been reported. When transgender males undergo hysterectomy, the uterus is small and there is endometrial atrophy (217, 218). Studies have reported cases of ovarian cancer (219, 220). Although there is limited evidence for increased risk of reproductive tract cancers in transgender males, health care providers should determine the medical necessity of a laparoscopic total hysterectomy as part of a gender-affirming surgery to prevent reproductive tract cancer (221).

Values

Given the discomfort that transgender males experience accessing gynecologic care, our recommendation for the medical necessity of total hysterectomy and oophorectomy places a high value on eliminating the risks of female reproductive tract disease and cancer and a lower value on avoiding the risks of these surgical procedures (related to the surgery and to the potential undesirable health consequences of oophorectomy) and their associated costs.

Remarks

The sexual orientation and type of sexual practices will determine the need and types of gynecologic care required following transition. Additionally, in certain countries, the approval required to change the sex in a birth certificate for transgender males may be dependent on having a complete hysterectomy. Clinicians should help patients research nonmedical administrative criteria and

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provide counseling. If individuals decide not to undergo hysterectomy, screening for cervical cancer is the same as all other females.

5.0 Surgery for Sex Reassignment and Gender Confirmation

For many transgender adults, genital gender-affirming surgery may be the necessary step toward achieving their ultimate goal of living successfully in their desired gender role. The type of surgery falls into two main categories: (1) those that directly affect fertility and (2) those that do not. Those that change fertility (previously called sex reassignment surgery) include genital surgery to remove the penis and gonads in the male and removal of the uterus and gonads in the female. The surgeries that effect fertility are often governed by the legal system of the state or country in which they are performed. Other gender-conforming surgeries that do not directly affect fertility are not so tightly governed.

Gender-affirming surgical techniques have improved markedly during the past 10 years. Reconstructive genital surgery that preserves neurologic sensation is now the standard. The satisfaction rate with surgical reassignment of sex is now very high (187). Additionally, the mental health of the individual seems to be improved by participating in a treatment program that defines a pathway of gender-affirming treatment that includes hormones and surgery (130, 144) (Table 16).

Surgery that affects fertility is irreversible. The World Professional Association for Transgender Health Standards of Care (222) emphasizes that the "threshold of 18 should not be seen as an indication in itself for active intervention." If the social transition has not been satisfactory, if the person is not satisfied with or is ambivalent about the effects of sex hormone treatment, or if the person is ambivalent about surgery then the individual should not be referred for surgery (223, 224).

Gender-affirming genital surgeries for transgender females that affect fertility include gonadectomy, penectomy, and creation of a neovagina (225, 226). Surgeons often invert the skin of the penis to form the wall of the vagina, and several literatures reviews have reported on outcomes (227). Sometimes there is inadequate tissue to form a full neovagina, so clinicians have revisited using intestine and found it to be successful (87, 228, 229). Some newer vaginoplasty techniques may involve autologuous oral epithelial cells (230, 231).

The scrotum becomes the labia majora. Surgeons use reconstructive surgery to fashion the clitoris and its hood, preserving the neurovascular bundle at the tip of the penis as the neurosensory supply to the clitoris. Some surgeons are also creating a sensate pedicled-spot adding a G spot to the neovagina to increase sensation (232). Most recently, plastic surgeons have developed techniques to fashion labia minora. To further complete the feminization, uterine transplants have been proposed and even attempted (233).

Neovaginal prolapse, rectovaginal fistula, delayed healing, vaginal stenosis, and other complications do sometimes occur (234, 235). Clinicians should strongly remind the transgender person to use their dilators to maintain the depth and width of the vagina throughout the postoperative period. Genital sexual responsivity and other aspects of sexual function are usually preserved following genital gender-affirming surgery (236, 237).

Ancillary surgeries for more feminine or masculine appearance are not within the scope of this guideline. Voice therapy by a speech language pathologist is available to transform speech patterns to the affirmed gender (148). Spontaneous voice deepening occurs during testosterone treatment of transgender males (152, 238). No studies have compared the effectiveness of speech therapy, laryngeal surgery, or combined treatment.

Breast surgery is a good example of gender-confirming surgery that does not affect fertility. In all females, breast size exhibits a very broad spectrum. For transgender females to make the best informed decision, clinicians should delay breast augmentation surgery until the patient has completed at least 2 years of estrogen therapy, because the breasts continue to grow during that time (141, 155).

Another major procedure is the removal of facial and masculine-appearing body hair using either electrolysis or

Table 16. Criteria for Gender-Affirming Surgery, Which Affects Fertility

1. Persistent, well-documented gender dysphoria
2. Legal age of majority in the given country
3. Having continuously and responsibly used gender-affirming hormones for 12 mo (if there is no medical contraindication to receiving such therapy)
4. Successful continuous full-time living in the new gender role for 12 mo
5. If significant medical or mental health concerns are present, they must be well controlled
6. Demonstrable knowledge of all practical aspects of surgery (*e.g.*, cost, required lengths of hospitalizations, likely complications, postsurgical rehabilitation)

laser treatments. Other feminizing surgeries, such as that to feminize the face, are now becoming more popular (239–241).

In transgender males, clinicians usually delay gender-affirming genital surgeries until after a few years of androgen therapy. Those surgeries that affect fertility in this group include oophorectomy, vaginectomy, and complete hysterectomy. Surgeons can safely perform them vaginally with laparoscopy. These are sometimes done in conjunction with the creation of a neopenis. The cosmetic appearance of a neopenis is now very good, but the surgery is multistage and very expensive (242, 243). Radial forearm flap seems to be the most satisfactory procedure (228, 244). Other flaps also exist (245). Surgeons can make neopenile erections possible by reinervation of the flap and subsequent contraction of the muscle, leading to stiffening of the neopenis (246, 247), but results are inconsistent (248). Surgeons can also stiffen the penis by imbedding some mechanical device (*e.g.*, a rod or some inflatable apparatus) (249, 250). Because of these limitations, the creation of a neopenis has often been less than satisfactory. Recently, penis transplants are being proposed (233).

In fact, most transgender males do not have any external genital surgery because of the lack of access, high cost, and significant potential complications. Some choose a metaoidioplasty that brings forward the clitoris, thereby allowing them to void in a standing position without wetting themselves (251, 252). Surgeons can create the scrotum from the labia majora with good cosmetic effect and can implant testicular prostheses (253).

The most important masculinizing surgery for the transgender male is mastectomy, and it does not affect fertility. Breast size only partially regresses with androgen therapy (155). In adults, discussions about mastectomy usually take place after androgen therapy has started. Because some transgender male adolescents present after significant breast development has occurred, they may also consider mastectomy 2 years after they begin androgen therapy and before age 18 years. Clinicians should individualize treatment based on the physical and mental health status of the individual. There are now newer approaches to mastectomy with better outcomes (254, 255). These often involve chest contouring (256). Mastectomy is often necessary for living comfortably in the new gender (256).

5.1. We recommend that a patient pursue genital gender-affirming surgery only after the MHP and the clinician responsible for endocrine transition therapy both agree that surgery is medically necessary and would benefit the patient's overall health and/or well-being. (1 |⊕⊕◯◯)

5.2. We advise that clinicians approve genital gender-affirming surgery only after completion of at least 1 year of consistent and compliant hormone treatment, unless hormone therapy is not desired or medically contraindicated. (Ungraded Good Practice Statement)

5.3. We advise that the clinician responsible for endocrine treatment and the primary care provider ensure appropriate medical clearance of transgender individuals for genital gender-affirming surgery and collaborate with the surgeon regarding hormone use during and after surgery. (Ungraded Good Practice Statement)

5.4. We recommend that clinicians refer hormone-treated transgender individuals for genital surgery when: (1) the individual has had a satisfactory social role change, (2) the individual is satisfied about the hormonal effects, and (3) the individual desires definitive surgical changes. (1 |⊕◯◯◯)

5.5. We suggest that clinicians delay gender-affirming genital surgery involving gonadectomy and/or hysterectomy until the patient is at least 18 years old or legal age of majority in his or her country. (2 |⊕⊕◯◯).

5.6. We suggest that clinicians determine the timing of breast surgery for transgender males based upon the physical and mental health status of the individual. There is insufficient evidence to recommend a specific age requirement. (2 |⊕◯◯◯)

Evidence

Owing to the lack of controlled studies, incomplete follow-up, and lack of valid assessment measures, evaluating various surgical approaches and techniques is difficult. However, one systematic review including a large numbers of studies reported satisfactory cosmetic and functional results for vaginoplasty/neovagina construction (257). For transgender males, the outcomes are less certain. However, the problems are now better understood (258). Several postoperative studies report significant long-term psychological and psychiatric pathology (259–261). One study showed satisfaction with breasts, genitals, and femininity increased significantly and showed the importance of surgical treatment as a key therapeutic option for transgender females (262). Another analysis demonstrated that, despite the young average age at death following surgery and the relatively larger number of individuals with somatic morbidity, the study does not allow for determination of

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causal relationships between, for example, specific types of hormonal or surgical treatment received and somatic morbidity and mortality (263). Reversal surgery in regretful male-to-female transsexuals after sexual reassignment surgery represents a complex, multistage procedure with satisfactory outcomes. Further insight into the characteristics of persons who regret their decision postoperatively would facilitate better future selection of applicants eligible for sexual reassignment surgery. We need more studies with appropriate controls that examine long-term quality of life, psychosocial outcomes, and psychiatric outcomes to determine the long-term benefits of surgical treatment.

When a transgender individual decides to have gender-affirming surgery, both the hormone prescribing clinician and the MHP must certify that the patient satisfies criteria for gender-affirming surgery (Table 16).

There is some concern that estrogen therapy may cause an increased risk for venous thrombosis during or following surgery (176). For this reason, the surgeon and the hormone-prescribing clinician should collaborate in making a decision about the use of hormones before and following surgery. One study suggests that preoperative factors (such as compliance) are less important for patient satisfaction than are the physical postoperative results (56). However, other studies and clinical experience dictate that individuals who do not follow medical instructions and do not work with their physicians toward a common goal do not achieve treatment goals (264) and experience higher rates of postoperative infections and other complications (265, 266). It is also important that the person requesting surgery feels comfortable with the anatomical changes that have occurred during hormone therapy. Dissatisfaction with social and physical outcomes during the hormone transition may be a contraindication to surgery (223).

An endocrinologist or experienced medical provider should monitor transgender individuals after surgery. Those who undergo gonadectomy will require hormone replacement therapy, surveillance, or both to prevent adverse effects of chronic hormone deficiency.

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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. **Civil Action No. 2:21-cv-00316**
Honorable Joseph R. Goodwin, Judge

WEST VIRGINIA STATE BOARD OF EDUCATION,
HARRISON COUNTY BOARD OF EDUCATION,
WEST VIRGINIA SECONDARY SCHOOL
ACTIVITIES COMMISION, W. CLAYTON BURCH
in his official capacity as State Superintendent, and
DORA STUTLER in her official capacity as
Harrison County Superintendent, PATRICK MORRISEY
In his official capacity as Attorney General, and THE
STATE OF WEST VIRGINIA,
Defendants.

CERTIFICATE OF SERVICE

I hereby certify that I, Roberta F. Green, have this day, the 22nd day of November, 2021, served a true and exact copy of ***"WVSSAC's Responses to Plaintiff's First Set of Interrogatories"*** was served on counsel by electronic means:

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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.

Civil Action No. 2:21-cv-00316
Honorable Joseph R. Goodwin, Judge

WEST VIRGINIA STATE BOARD OF EDUCATION, HARRISON COUNTY BOARD OF EDUCATION, WEST VIRGINIA SECONDARY SCHOOL ACTIVITIES COMMISION, W. CLAYTON BURCH in his official capacity as State Superintendent, and DORA STUTLER in her official capacity as Harrison County Superintendent, PATRICK MORRISEY In his official capacity as Attorney General, and THE STATE OF WEST VIRGINIA,
Defendants.

WVSSAC'S RESPONSES TO PLAINTIFF'S FIRST SET OF INTERROGATORIES

Now comes West Virginia Secondary School Activities Commission (WVSSAC), by counsel, and responds as follows to Plaintiff's First Set of Interrogatories to Defendant West Virginia Secondary School Activities Commission.

Defendant has not completed discovery in this civil action and has not completed its preparation for trial. For these reasons, the Defendant's responses are based upon only such information and documents as are presently available and known to WVSSAC. Further discovery and independent investigation may supply additional facts, add meaning to facts, or may establish entirely new factual contentions, and, therefore, additions to, changes in, and/or variations from the Defendant's present responses may be necessary or may unavoidably result. The following responses are given in good faith but without prejudice to the Defendant's right to produce evidence of subsequently discovered facts or documents.

The Defendant avails itself of all rights under the Federal Rules of Civil Procedure and such other applicable rules and law, and objects to the instructions contained in Plaintiff's discovery requests to the extent such instructions attempt to impose burdens on the Defendant that are outside the scope of the Rules or the law generally. The Defendant is not bound to follow any instructions which may be contrary to the Rules and other law.

Without waiving the foregoing, the Defendant provides the following responses.

INTERROGATORIES

INTERROGATORY NO. 1: Identify all PERSONS who provided information in preparation of YOUR Answer and Motion to Dismiss the First Amended Complaint, and for each such PERSON, state the following:

(a) Their name, address, and telephone number;

(b) Their relationship to YOU and/or B.P.J.; and

(c) A detailed description of such knowledge and/or information

RESPONSE:

Objection; attorney work product, attorney client privilege. Beyond those objections and without waiving same, WVSSAC responds as follows:

a. Beyond WVSSAC counsel, WVSSAC Executive Director, Bernie Dolan (contact through undersigned counsel).

b. Executive Director, WVSSAC

c. Mr. Dolan provided factual information relative to the history, structure and funding of WVSSAC. He further provided information relative to WVSSAC rules, regulations, policies and practices.

INTERROGATORY NO. 2: Identify all financial funding YOU received in 2019 to the present. For each identified funding, please state the following:

(a) Who provided the funding, and

(b) What the funding was allocated to.

RESPONSE:

West Virginia's Secondary School Activities Commission (WVSSAC) receives no dues whatsoever from member schools and has not for more than a decade. WVSSAC sustains itself with corporate sponsorships, advertising revenue and gate proceeds from championship meets and tournaments. WVSSAC's corporate sponsorships, which change over time, from 2019 to the present have included West Virginia Dairy Association/Milk Producers, Farmers & Mechanics, U.S. Army, MetroNews, Midstate Automotive, Field Turf, Spalding, and CareSource.

INTERROGATORY NO. 3: Identify all schools that compete in WVSSAC sponsored activities.

RESPONSE:

Member schools compete in WVSSAC sponsored activities. Non-member schools can compete in most WWVSSAC sponsored activities as long as they are indeed organized as schools. For example, Calvary Baptist Church School and Teays Valley Christian are non-member schools who participate over time. Additionally, Wood County Christian is currently a member but

participated as a non-member prior to joining. WVSSAC has 289 member schools that appear on the WVSSAC website at https://www.wvssac.org/school-directory/

INTERROGATORY NO. 4: Identify all COMMUNICATIONS, if any, YOU have received from students, teachers, parents, schools, coaches, legislators, or other PERSONS CONCERNING B.P.J.

RESPONSE:

Bridgeport Middle School's eligibility list was posted per the Rules on the WVSSC website.

INTERROGATORY NO. 5: Identify all COMMUNICATIONS if any, YOU have received from students, teachers, parents, schools, coaches, legislators, or other PERSONS CONCERNING students who are transgender participating in school sports of any level in West Virginia.

RESPONSE:

WVSSAC received one inquiry two years ago directly from an athlete with a male birth gender interested in volleyball and considering female gender purportedly to be eligible to play volleyball. WVSSAC heard nothing further. More recently, WVSSAC had one inquiry from a transgender athlete with a female birth gender. *See also* more generally response to interrogatory numbered 7.

INTERROGATORY NO. 6: Identify the number of students who are transgender that YOU are aware of who play or have played school sports in West Virginia, and for each student, please specify the sport(s) played by the student and current school level of that student.

RESPONSE:

On information and belief and as reflected in instant pleadings, BPJ (cross country at Bridgeport Middle School). WVSSAC has no knowledge of other transgender participants. However, given that WVSSAC's policies and practices are gender neutral, it would have no reason to know of other transgender athletes unless contacted by the athlete or the school.

INTERROGATORY NO. 7: Identify all PERSONS YOU communicated with CONCERNING H.B. 3293 and the date and content of the COMMUNICATION.

RESPONSE:

In late March 2021, Mr. Dolan received texts from Senator Baldwin, asking him to appear before the Senate Democratic Caucus. Mr. Dolan was asked to appear to 'discuss the transgender athlete bill.' Also referenced at regional principal's meetings at ten locations across West Virginia from July 28 to August 12, 2021.

INTERROGATORY NO. 8: Identify all PERSONS responsible for creating, enforcing, and monitoring YOUR policies for school athletics.

RESPONSE:

The Board of Control is where member schools vote on proposals and create the rules and regulations, which are approved by the State Board of Education and then enforced and monitored by the schools. WVSSAC becomes involved in instances of disputes or appeals.

INTERROGATORY NO. 9: Identify all steps YOU have taken to contemplate, prepare for, monitor, implement, and/or enforce POLICIES and rules CONCERNING the implementation of H.B. 3293.

RESPONSE:

None.

INTERROGATORY NO. 10: Identify all PERSONS responsible for determining student eligibility on sports teams under YOUR POLICIES for school athletics.

RESPONSE:

All of the member schools.

In the instance of disputes, Executive Director Bernie Dolan, Assistant Executive Director Greg Reed, Assistant Executive Director Wayne Ryan, Assistant Executive Director Dr. Cindy Daniels.

INTERROGATORY NO. 11: Identify all YOUR public and private school members, and for each such member state whether they are public or private.

RESPONSE:

WVSSAC has 289 member schools identified here (private schools underlined), which schools also appear on the WVSSAC website at https://www.wvssac.org/school-directory/

Andrew Jackson Middle – Kanawha Co. (Cross Lanes, WV); Aurora School – Preston Co. (Aurora, WV); Baileysville Elementary – Wyoming Co. (Brenton, WV); Barboursville Middle – Cabell Co. (Barboursville, WV); Barrackville Middle – Marion Co. (Barrackville, WV); Beckley-Stratton Middle School – Raleigh Co. (Beckley, WV); Belington Middle – Barbour Co. (Belington, WV); Berkeley Springs – Morgan Co. (Berkeley Springs, WV); Blennerhassett Middle School – Wood Co. (Parkersburg, WV); Bluefield – Mercer Co. (Bluefield, WV); Bluefield Middle School – Mercer Co. (Bluefield, WV); Braxton County – Braxton Co. (Sutton, WV); Braxton County Middle – Braxton Co. (Sutton, WV); Bridge Street Middle – Ohio Co. (Wheeling, WV); Bridgeport Middle – Harrison Co. (Bridgeport, WV); Bridgeport Senior High School – Harrison Co. (Bridgeport, WV); Brooke High School – Brooke Co. (Wellsburg, WV); Brooke Middle School – Brooke Co. (Wellsburg, WV); Bruceton School – Preston Co. (Bruceton Mills, WV); Buckhannon-Upshur – Upshur Co. (Buckhannon, WV); Buckhanon-Upshur Middle – Upshur Co. (Buckhannon, WV); Buffalo – Putnam Co. (Buffalo, WV); Buffalo Middle – Wayne Co. (Kenova, WV); Burch Middle School – Mingo Co. (Delbarton, WV); Cabell Midland – Cabell Co. (Ona, WV); Calhoun County Middle/High School – Calhoun Co. (Mt. Zion, WV); Cameron – (Cameron, WV); Capital High School – Kanawha Co. (Charleston, WV); Capon Bridge Middle – Hampshire Co. (Capon Bridge, WV); Cedar Grove Middle School – Kanawha Co. (Cedar Grove, WV); Central Preston Middle School – Preston Co. (Kingwood, WV); Ceredo-Kenova Middle – Wayne Co. (Ceredo, WV); Chapmanville Middle – Logan Co. (Chapmanville, WV); Chapmanville Regional High School – Logan Co. (Chapmanville, WV); Charles Town Middle School – Jefferson Co. (Charles Town, WV); Charleston Catholic – Kanawha Co. (Charleston, WV); Clay County High School – Clay Co. (Clay, WV); Clay County Middle – Clay Co. (Clay, WV); Clay Battelle – Monongalia Co. (Blacksville, WV); Covenant Christian School – Monongalia Co. (Morgantown, WV); Crum Middle – Wayne Co. (Crum, WV); Davis Thomas Elementary Middle – Tucker Co. (Thomas, WV); Doddridge County – Doddridge Co. (West Union, WV); Doddridge County Middle – Doddridge Co. (West Union, WV); Dunbar Middle – Kanawha Co. (Dunbar, WV); Dupont Middle – Kanawha Co. (Belle, WV); Duval Middle School – Lincoln Co. (Griffithsville, WV); East Bank Middle – Kanawha Co. (East Bank, WV); East Fairmont – Marion Co. (Fairmont, WV); East Fairmont Middle School - Marion Co. (Fairmont, WV); East Hardy – Hardy Co. (Baker, WV); East Hardy Early Middle – Hardy Co. (Baker, WV); Eastern Greenbrier Middle School – Greenbrier Co. (Ronceverte, WV); Edison Middle School – Wood Co. (Parkersburg, WV); Elkins – Randolph Co. (Elkins, WV); Elkins Middle – Randolph Co. (Elkins, WV); Elkview Middle – Kanawha Co. (Elkview, WV); Enoch High School; Fairmont Catholic Jr. High – Marion Co. (Fairmont, WV); Fairmont Senior High School – Marion Co. (Fairmont, WV); Fairview Middle – Marion Co. (Fairview, WV); Fayetteville Pre K-8 – Fayette Co. (Fayetteville, WV); Fort Gay Pre K-8 – Wayne Co. (Fort Gay, WV); Frankfort – Mineral Co. (Ridgeley, WV); Frankfort Middle – Mineral Co. (Ridgeley, WV); Geary Middle School – Roane Co. (Left Hand, WV); George Washington

– Kanawha Co. (Charleston, WV); George Washington Middle School – Putnam Co. (Eleanor, WV); Gilbert Middle School – Mingo Co. (Gilbert, WV); Gilmer County – Gilmer Co. (Glenville, WV); Glen Fork Middle – Wyoming Co. (Glen Fork, WV); Glenwood School – Mercer Co. (Princeton, WV); Grafton – Taylor Co. (Grafton, WV); Greater Beckley Christian – Raleigh Co. (Prosperity, WV); Green Bank Middle – Pocahontas Co. (Green Bank, WV); Greenbrier East – Greenbrier Co. (Lewisburg, WV); Greenbrier West – Greenbrier Co. (Charmco, WV); Guyan Valley Middle School – Lincoln Co. (Branchland, WV); Hamilton Middle School – Wood Co. (Parkersburg, WV); Hamlin Middle School – Lincoln Co. (Hamlin, WV); Hampshire – Hampshire Co. (Romney, WV); Hannan Senior/Middle School – Mason Co. (Ashton, WV); Harman – Randolph Co. (Harman, WV); Harpers Ferry Middle School – Jefferson Co. (Harpers Ferry, WV); Harts PK-8 – Lincoln Co. (Harts, WV); Hayes Middle School – Kanawha Co. (St. Albans, WV); Hedgesville Middle – Berkeley Co. (Hedgesville, WV); Hedgesville Senior High School – Berkeley Co. (Hedgesville, WV); Herbert Hoover – Kanawha Co. (Elkview, WV); Herndon Consolidated – Wyoming Co. (Bud, WV); Horace Mann Middle School – Kanawha Co. (Charleston, WV); Huff Consolidated Middle School – Wyoming Co. (Hanover, WV); Hundred – Wetzel Co. (Hundred, WV); Huntington – Cabell Co. (Huntington, WV); Huntington East Middle – Cabell Co. (Huntington, WV); Huntington Middle School – Cabell Co. (Huntington, WV); Hurricane – Putnam Co. (Hurricane, WV); Hurricane Middle – Putnam Co. (Hurricane, WV); Independence Middle School – Raleigh Co. (Sophia, WV); Independence Senior – Raleigh Co. (Coal City, WV); Jackson Middle School – Wood Co. (Vienna, WV); James Monroe – Monroe Co. (Lindside, WV); Jefferson – Jefferson Co. (Shenandoah Junction, WV); John Adams Middle School – Kanawha Co. (Charleston, WV); John Marshall – Marshall Co. (Glen Dale, WV); Kasson Middle School – Barbour Co. (Moatsville, WV); Kermit Area – Mingo Co. (Kermit, WV); Keyser – Mineral Co. (Keyser, WV); Keyser Primary/Middle – Mineral Co. (Keyser, WV); Lenore K-8 – Mingo Co. (Williamson, WV); Lewis County – Lewis Co. (Weston, WV); Liberty (Harrison) – Harrison Co. (Clarksburg, WV); Liberty – Raleigh Co. (Glen Daniel, WV); Lincoln – Harrison Co. (Shinnston, WV); Lincoln County High School – Lincoln Co. (Hamlin, WV); Lincoln Middle School – Harrison Co. (Shinnston, WV); Logan – Logan Co. (Logan, WV); Logan Middle School – Logan Co. (Logan, WV); Long Drain Middle – Wetzel Co. (Metz, WV); Madison Middle – Boone Co. (Madison, WV); Madonna – Hancock Co. (Weirton, WV); Magnolia High School – Wetzel Co. (New Martinsville, WV); Man High School – Logan Co. (Man, WV); Man Middle School – Logan Co. (Mallory, WV); Mannington Middle – Marion Co. (Mannington, WV); Marlinton Middle – Pocahontas Co. (Buckeye, WV); Martinsburg – Berkeley Co. (Martinsburg, WV); Martinsburg South Middle – Berkeley Co. (Martinsburg, WV); Matewan – Mingo Co. (Matewan, WV); McKinley Middle School – Kanawha Co. (St. Albans, WV); Meadow Bridge High – Fayette Co. (Meadow Bridge, WV); Midland Trail High School – Fayette Co. (Hico , WV); Milton Middle – Cabell Co. (Milton, WV); Mingo Central – Mingo Co. (Delbarton, WV); Monongah Middle – Marion Co. (Monongah, WV); Montcalm – Mercer Co. (Rock, WV); Moorefield – Hardy Co. (Moorefield, WV); Moorefield Middle – Hardy Co. (Moorefield, WV); Morgantown – Monongalia Co. (Morgantown, WV); Moundsville Middle School – Marshall Co. (Moundsville, WV); Mount View High School – McDowell Co. (Welch, WV); Mount View Middle School – McDowell Co. (Welch, WV); Mountain Ridge Middle School – Berkeley Co. (Gerrardstown, WV); Mountain View Middle School – Monroe Co. (Union, WV); Mountaineer (M) Middle – Monongalia Co. (Morgantown, WV); Mountaineer Middle School – Harrison Co. (Clarksburg, WV); Mullens

Middle – Wyoming Co. (Mullens, WV); Musselman – Berkeley Co. (Inwood, WV); Musselman Middle – Berkeley Co. (Bunker Hill, WV); New Martinsville Middle – Wetzel Co. (New Martinsville, WV); Nicholas County – Nicholas Co. (Summersville, WV); Nitro – Kanawha Co. (Nitro, WV); North Marion – Marion Co. (Farmington, WV); North Middle – Berkeley Co. (Martinsburg, WV); Notre Dame – Harrison Co. (Clarksburg, WV); Oak Glen High School – Hancock Co. (New Cumberland, WV); Oak Glen Middle – (New Cumberland, WV); Oak Hill – Fayette Co. (Oak Hill, WV); Oak Hill Middle – Fayette Co. (Oak Hill, WV);

Oceana Middle – Wyoming Co. (Oceana, WV); Our Lady of Fatima Parish School – Cabell Co. (Huntington, WV); Paden City High School – Wetzel Co. (Paden City, WV); Park Middle – Raleigh Co. (Beckley, WV); Parkersburg – Wood Co. (Parkersburg, WV); Parkersburg Catholic – Wood Co. (Parkersburg, WV); Parkersburg South – Wood Co. (Parkersburg, WV); Paw Paw – Morgan Co. (Paw Paw, WV); Pendleton County – Pendleton Co. (Franklin, WV); Petersburg – Grant Co. (Petersburg, WV); Peterstown Middle – Monroe Co. (Peterstown, WV); Philip Barbour High School – Barbour Co. (Philippi, WV); Philippi Middle – Barbour Co. (Philippi, WV); Pickens School; Pikeview – Mercer Co. (Princeton, WV); Pikeview Middle School – Mercer Co. (Princeton, WV); Pineville Middle – Wyoming Co. (Pineville, WV); Pleasants County Middle School – Pleasants Co. (Belmont, WV); Poca – Kanawha Co. (Poca, WV); Poca Middle – Kanawha Co. (Poca, WV); Pocahontas County – Pocahontas Co. (Dunmore, WV); Point Pleasant Senior/Middle School – Mason Co. (Point Pleasant, WV); Preston High School – Preston Co. (Kingwood, WV); Princeton Middle School – Mercer Co. (Princeton, WV); Princeton Senior – Mercer Co. (Princeton, WV); Ravenswood – Jackson Co. (Ravenswood, WV); Ravenswood Middle – Jackson Co. (Ravenswood, WV); Richwood - Nicholas Co. (Craigsville, WV); Richwood Middle School – Nicholas Co. (Richwood, WV); Ripley – Jackson Co. (Ripley, WV); Ripley Middle – Jackson Co. (Ripley, WV);Ritchie County – Ritchie Co. (Ellenboro, WV); Ritchie County Middle – Ritchie Co. (Ellenboro, WV); River View – McDowell Co. (Bradshaw, WV); Riverside – Kanawha Co. (Belle, WV); Rivesville Middle – Marion Co. (Rivesville, WV); Road Branch Jr. High – Wyoming Co. (Cyclone, WV); Roane County – Roane Co. (Spencer, WV); Robert C. Byrd – Harrison Co. (Clarksburg, WV); Robert L. Bland Middle – Lewis Co. (Weston, WV); Romney Middle – Hampshire Co. (Romney, WV); Rowlesburg School – Preston Co. (Rowlesburg, WV); Saint Joseph Central – Cabell Co. (Huntington, WV); Saint Joseph School – Berkeley Co. (Martinsburg, WV); Sandy River Middle School – McDowell Co. (Avondale, WV); Scott – Boone Co. (Madison, WV); Shady Spring – Raleigh Co. (Shady Spring, WV); Shady Spring Middle School -Raleigh Co. (Shady Spring, WV); Shepherdstown Middle School – Jefferson Co. (Shepherdstown, WV); Sherman – Boone Co. (Seth, WV); Sherman Junior High School – Boone Co. (Seth, WV); Sherrard Middle School – Marshall Co. (Wheeling, WV); Short Line Middle – Wetzel Co. (Reader, WV); Sissonville – Kanawha Co. (Charleston, WV); Sissonville Middle – Kanawha Co. (Charleston, WV); South Charleston – Kanawha Co. (South Charleston, WV); South Charleston Middle School – Kanawha Co. (South Charleston, WV); South Harrison – Harrison Co. (Lost Creek, WV); South Harrison Middle School – Harrison Co. (Lost Creek, WV); South Middle – Monongalia Co. (Morgantown, WV); South Preston School – Preston Co. (Tunnelton, WV); Southside School – McDowell Co. (War, WV); Spencer Middle – Roane Co. (Spencer, WV); Spring Mills High School – Berkeley Co. (Martinsburg, WV); Spring Mills Middle – Berkeley Co. (Martinsburg, WV); Spring Valley – Wayne Co. (Huntington, WV); St. Albans High School – Kanawha Co. (St. Albans, WV); St. Francis Central Middle School – Monongalia Co. (Morgantown, WV); St. Francis Desales

School – Raleigh Co. (Beckley, WV); St. Mary's – Pleasants Co. (St. Mary's, WV); St. Patrick School – Lewis Co. (Weston, WV); Stonewall-Jackson Middle School – Kanawha Co. (Charleston, WV); Summers County High School – Summers Co. (Hinton, WV); Summers Middle School – Summers Co. (Hinton, WV); Summersville Middle School – Nicholas Co. (Summersville, WV); Suncrest Middle – Monongalia Co. (Morgantown, WV); Taylor County Middle – Taylor Co. (Grafton, WV); Terra Alta East Preston – Preston Co. (Terra Alta, WV); Tolsia – Wayne Co. (Fort Gay, WV); Trap Hill Middle – Raleigh Co. (Glen Daniel, WV); Trialelphia Middle School – Ohio Co. (Wheeling, WV); Trinity Christian School – Monongalia Co. (Morgantown, WV); Tucker County – Tucker Co. (Hambleton, WV); Tucker Valley Middle – Tucker Co. (Hambleton, WV); Tug Valley – Mingo Co. (Williamson, WV); Tygarts Valley Middle/Senior High – Randolph Co. (Mill Creek, WV); Tyler Consolidated – Tyler Co. (Sistersville, WV); Tyler Consolidated Middle – Tyler Co. (Sistersville, WV); Union – Grant Co. (Mt. Storm, WV); University – Monongalia Co. (Morgantown, WV); Valley (Fayette) – Fayette Co. (Smithers, WV); Valley (Wetzel) – Wetzel Co. (Pine Grove, WV); Valley Pre K-8 – Fayette Co. (Smithers, WV); Van Senior/Middle School – (Van, WV); Vandevender Middle School – Wood Co. (Parkersburg, WV); Vinson Middle School – Wayne Co. (Huntington, WV); Wahama Senior/Middle School – Mason Co. (Mason, WV); Walton Middle – Roane Co. (Walton, WV); Warm Springs Middle – Morgan Co. (Berkeley Springs, WV); Warwood Middle – Ohio Co. (Wheeling, WV); Washington High School – Jefferson Co. (Charles Town, WV); Washington-Irving Middle – Harrison Co. (Clarksburg, WV); Wayne – Wayne Co. (Wayne, WV); Wayne Middle – Wayne Co. (Wayne, WV); Webster County High School – Webster Co. (Upper Glade, WV); Weir – Hancock Co. (Weirton, WV); Weir Middle – Hancock Co. (Weirton, WV); West Fairmont Middle School – Marion Co. (Fairmont, WV); West Preston Middle School – Preston Co. (Arthurdale, WV); Western Greenbrier Middle School – Greenbrier Co. (Crawley, WV); Westside – Wyoming Co. (Clear Fork, WV); Westwood Middle – Monongalia Co. (Morgantown, WV); Wheeling Central Catholic – Ohio Co. (Wheeling, WV); Wheeling Middle – Ohio Co. (Wheeling, WV); Wheeling Park – Ohio Co. (Wheeling, WV); Middle School – Jefferson Co. (Shenandoah Junction, WV); Williamson Pre K-8 – Mingo Co. (Williamson, WV); Williamstown – Wood Co. (Williamstown, WV); Winfield – Putnam Co. (Winfield, WV); Winfield Middle – Putnam Co. (Winfield, WV); Wirt County – Wirt Co. (Elizabeth, WV); Wirt County Middle – Wirt Co. (Elizabeth, WV); Wood County Christian – Wood Co. (Williamstown, WV); Woodrow Wilson – Raleigh Co. (Beckley, WV); WV School for the Blind – Hampshire Co. (Romney, WV); WV School for the Deaf – Hampshire Co. (Romney, WV);Wyoming East – Wyoming Co. (New Richmond, WV)

INTERROGATORY NO. 12: Identify each member of YOUR governing board. For each member, please state the following:

(a) Their name, address, and telephone number;

(b) Their role; and

(c) A detailed description of how they were selected.

RESPONSE:

WVSSAC has a Board of Control and a Board of Directors. As set out in 127 CSR -1-5, the administration of the WVSSAC shall be vested in a Board of Control. The Board of Control shall determine the regulation of interscholastic athletic and band activities among the schools represented by the members of the Commission and shall have charge of all Commission funds, and in order to expedite the regulations of activities shall delegate and assign to the Board of Directors hereinafter constituted, and the Executive Director, hereinafter constituted, and working through the Board of Directors, authority to interpret and enforce these regulations.

Five members of the Board of Directors are elected from the Board of Control, while two are appointment, all as set out in 127 CSR 1-6, detailing appointment and voting protocols. *See Mayo v. WVSSAC*, 223 W. Va. 88, 672 S.E.2d 224 (2008). The current Board members (who should be contacted through undersigned counsel) are as follows:

- **Region 1 Member** – Gregory Moore, Principal, **President**
- **Region 2 Member** – David Cottrell, Principal
- **Region 3 Member** – Michael Kelley, Principal, **Vice President**
- **Region 4 Member** – Jimmy Frashier, Principal
- **Region 5 Member** – Craig Lee Loy, Principal

- **Member** – Steve Campbell, Athletic Directors Association
- **Member** – Dr. Eddie Campbell, County Superintendents
- **Member** – Jim Crawford, County Boards of Education
- **Member** – Robert Dunlevy, WV State Superintendent Designee
- **Member** – Dr. James Wilson, WV State Board of Education

Board members should be contacted through undersigned counsel.

INTERROGATORY NO. 13: Identify all employees, contractors, or other personnel affiliated with YOU who maintain records CONCERNING B.P.J. and describe the general nature of those records.

RESPONSE:

On information and belief, member school Bridgeport Middle School's eligibility form.

WEST VIRGINIA SECONDARY SCHOOL ACTIVITIES COMMISSION,
By Counsel.

/S/ Roberta F. Green

Roberta F. Green (WVSB #6598)
Kimberly M. Bandy (WVSB #10081)
SHUMAN MCCUSKEY SLICER PLLC
Post Office Box 3953 (25339)
1411 Virginia Street East, Suite 200 (25301
Charleston, WV 25339
(304) 345-1400
(304) 343-1826 FAX
rgreen@shumanlaw.com
kbandy@shumanlaw.com

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. **Civil Action No. 2:21-cv-00316**
Honorable Joseph R. Goodwin, Judge

WEST VIRGINIA STATE BOARD OF EDUCATION,
HARRISON COUNTY BOARD OF EDUCATION,
WEST VIRGINIA SECONDARY SCHOOL
ACTIVITIES COMMISION, W. CLAYTON BURCH
in his official capacity as State Superintendent, and
DORA STUTLER in her official capacity as
Harrison County Superintendent, PATRICK MORRISEY
In his official capacity as Attorney General, and THE
STATE OF WEST VIRGINIA,
Defendants.

VERIFICATION

STATE OF WEST VIRGINIA;

COUNTY OF WOOD, to-wit:

Bernie Dolan, being first duly sworn, upon his oath does hereby depose and say that he has read the answers to interrogatories in the foregoing and believes that the facts contained therein, except insofar as they are stated to be upon information and belief, are believed to be true; that the responses set forth herein, subject to inadvertent and undiscovered errors, are based on and therefore necessarily limited by the records and information in existence, presently recollected and thus far discovered in the course of the preparation of these responses; that consequently, he reserves the right to make any changes in the responses if it appears at any time that omissions or errors have been made therein or that more accurate information is available; and that subject to the limitations set forth herein, said responses are true to the best of his knowledge, information and belief.

By: Bernie Dolan
Bernie Dolan

Taken, subscribed and sworn to before me this 22 day of November, 2021.

My commission expires: July 3, 2022.

Laura Wallace
Notary Public

[SEAL]

LAURA WALLACE
Notary Public Official Seal
State of West Virginia
My Comm. Expires Jul 3, 2022
2875 Staunton Turnpike Parkersburg WV 26104

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

LAINEY ARMISTEAD,

Defendant-Intervenor.

Case No. 2:21-cv-00316

Hon. Joseph R. Goodwin

INTERVENOR LAINEY ARMISTEAD'S
FIRST SUPPLEMENTAL DISCLOSURES PURSUANT TO RULE 26(A)(1)

Pursuant to Fed. R. Civ. P. 26(a)(1), Intervenor Lainey Armistead submits her first supplemental disclosures.

I. Individuals likely to have discoverable information.

Armistead discloses the following individuals likely to have discoverable information that may be used to support her claims.

1. Lainey Armistead
   c/o Christiana Holcomb
   Alliance Defending Freedom
   440 First Street NW, Suite 600
   Washington, DC 20001
   (202) 393-8690

   Lainey Armistead may have discoverable information pertaining to the facts and

issues set forth within Intervenor Lainey Armistead's Memorandum in Support of Her Motion for Intervene, including, but not limited to, Armistead's experiences playing soccer growing up, the several benefits of participating in a team sport, her experience in competing at the collegiate level against female athletes, and the expected impact competing against males would have, on her and others.

2. B.P.J.
c/o Loree Stark
American Civil Liberties Union of West Virginia Foundation
P.O. Box 3952
Charleston, WV 25339-3952
(914) 393-4614

B.P.J. is likely to have discoverable information pertaining to this case, including, but not limited to the allegations within Plaintiff's First Amended Complaint.

3. Heather Jackson
c/o Loree Stark
American Civil Liberties Union of West Virginia Foundation
405 Capitol Street
Suite 507
Charleston, WV 25301
(914) 393-4614

Heather Jackson is likely to have discoverable information pertaining to this case, including, but not limited to the allegations within Plaintiff's First Amended Complaint.

4. Person Most Knowledgeable
West Virginia State Board of Education
c/o Kelly C. Morgan
c/o Kristen Vickers Hammond
c/o Michael W. Taylor
Bailey & Wyant
P.O. Box 3710
Charleston, WV 25337-3710

The person most knowledgeable of the West Virginia State Board of Education is likely to have discoverable information pertaining to general matters relating to this case, including the adoption of West Virginia Code § 18-2-25d ("the Sports Act"),

and policies of West Virginia State Board of Education.

5. Person Most Knowledgeable
Harrison County Board of Education
c/o Susah L. Deniker
Steptoe & Johnson
400 White Oaks Blvd.
Bridgeport, WV 26330

The person most knowledgeable of the Harrison County Board of Education is likely to have discoverable information pertaining to general matters relating to this case, including the adoption of the Sports Act, and policies of Harrison County Board of Education.

6. Person Most Knowledgeable
West Virginia Secondary School Activities Commission
c/o Anthony E. Nortz
Shuman McCusky & Slicer
P.O. Box 3952
Charleston, WV 25339

The person most knowledgeable of the West Virginia Secondary School Activities Commission is likely to have discoverable information pertaining to general matters relating to this case, including the adoption of the Sports Act, and policies of West Virginia Secondary School Activities Commission.

7. W. Clayton Burch, in his capacity of State Superintendent
c/o Kelly C. Morgan
c/o Kristen Vickers Hammond
c/o Michael W. Taylor
Bailey & Wyant
P.O. Box 3710
Charleston, WV 25337-3710

Mr. Burch is likely to have discoverable information pertaining to general matters relating to this case, including the adoption of the Sports Act, and policies of and as State Superintendent.

8. Dora Stutler, in her official capacity as Harrison County Superintendent
c/o Susah L. Deniker
Steptoe & Johnson

400 White Oaks Blvd.
Bridgeport, WV 26330

Dora Stutler is likely to have discoverable information pertaining to general matters relating to this case, including the adoption of the Sports Act, and policies of and as Harrison County Superintendent.

9. Patrick Morrissey, in his official capacity as Attorney General
c/o Curtis R. Capehart
WV Attorney General's Office
Building 1, Room 26e
1900 Kanawa Boulevard, East
Charleston, WV 25305

Mr. Morrissey is likely to have discoverable information pertaining to general matters relating to this case, including the adoption of the Sports Act, and policies of and as Attorney General.

10. Person Most Knowledgeable
The State of West Virginia
c/o Curtis R. Capehart
WV Attorney General's Office
Building 1, Room 26e
1900 Kanawa Boulevard, East
Charleston, WV 25305

The person most knowledgeable of the State of West Virginia is likely to have discoverable information pertaining to general matters relating to this case, including the adoption of the Sports Act, and policies of the State of West Virginia.

11. Selina Soule
c/o Christiana Holcomb
Alliance Defending Freedom
440 First Street NW, Suite 600
Washington, DC 20001
(202) 393-8690

Selina Soule may have discoverable information pertaining to the facts and issues set forth in this case, including the benefits of competing in girls-only sports, the experience of competing against two male athletes in girls' high school track and field, and the impact it had on her and other female competitors.

12. Chelsea Mitchell
c/o Christiana Holcomb
Alliance Defending Freedom
440 First Street NW, Suite 600
Washington, DC 20001
(202) 393-8690

Chelsea Mitchell may have discoverable information pertaining to the facts and issues set forth in this case, including the benefits of competing in girls-only sports, the experience of competing against two male athletes in girls' high school track and field, and the impact it had on her and other female competitors.

13. Christina Mitchell
c/o Christiana Holcomb
Alliance Defending Freedom
440 First Street NW, Suite 600
Washington, DC 20001
(202) 393-8690

Christina Mitchell may have discoverable information pertaining to the facts and issues set forth in this case, including the benefits of competing in girls-only sports, her daughter's experience competing against male athletes in girls' high school track and field, and the impact it had on her and other female competitors.

14. Alanna Smith
c/o Christiana Holcomb
Alliance Defending Freedom
440 First Street NW, Suite 600
Washington, DC 20001
(202) 393-8690

Alanna Smith may have discoverable information pertaining to the facts and issues set forth in this case, including the benefits of competing in girls-only sports, the experience of competing against a male athlete in girls' high school track and field, and the impact it had on her and other female competitors.

15. Linnea Saltz
4114 Davis Place, Northwest, Unit 207
Washington DC 20007
(702) 523-0545

Linnea Saltz may have discoverable information pertaining to the facts and issues set

forth in this case, including the benefits of competing in girls-only sports, the experience of competing against a male athlete in girls' college track and field, and the impact it had on her, and other female competitors.

16. Margaret O'Neal
917 Kana Place
Lahaina, Hawaii 96761
(808) 280-4423

Margaret O'Neal may have discoverable information pertaining to the facts and issues set forth in this case, including the benefits of competing in girls-only sports, the deflating experience of competing against a male athlete in girls' high school track and field, and the impact it had on her and other female competitors.

17. Cynthia Monteleone
917 Kana Place
Lahaina, Hawaii 96761
(808) 280-4423

Cynthia Monteleone may have discoverable information pertaining to the facts and issues set forth in this case, including the benefits of competing in girls-only sports, her daughter's experience of competing against a male athlete in girls' high school track and field, and the impact it had on her and other female competitors.

18. Madison Kenyon
c/o Christiana Holcomb
Alliance Defending Freedom
440 First Street NW, Suite 600
Washington, DC 20001
(202) 393-8690

Madison Keyon may have discoverable information pertaining to the facts and issues set forth in this case, including the benefits of competing in girls-only sports, the experience of competing against a male athlete in women's college track and field and cross-country and the impact it had on her, and other female competitors.

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19. Mary Kate Marshall
c/o Christiana Holcomb
Alliance Defending Freedom
440 First Street NW, Suite 600
Washington, DC 20001
(202) 393-8690

Mary Kate Marshall may have discoverable information pertaining to the facts and issues set forth in this case, including the benefits of competing in girls-only sports, the experience of competing against a male athlete in women's college track and field and cross-country and the impact it had on her, and other female competitors.

20. Darcy Aschoff
540 W. 700 South,
Lehi Utah, 84043
(702) 769-4287

Darcy Aschoff may have discoverable information pertaining to the facts and issues set forth in this case, including the benefits of competing in girls-only sports, her daughters' experience competing against a male athlete in girls' high school volleyball and the impact it had on her daughters and other female competitors.

21. Female athletes on the University of Pennsylvania women's swimming and diving team
University of Pennsylvania
Philadelphia, PA 19104
215-898-5000

Female swimmers on the University of Pennsylvania swimming and diving team may have discoverable information pertaining to the facts issues set forth in this case, including the benefits of competing in girls-only sports, the experience of competing against a male athlete in women's collegiate swimming and the impact it had on them and other female competitors.

///

22. Haley Tanne
current address unknown
(801) 796-3235

Haley Tanne may have discoverable information pertaining to the facts and issues set forth in this case, including the benefits of competing in girls-only sports, the experience of competing against a male athlete in women's college track and field and cross-country and the impact it had on her, and other female competitors.

23. The following girls and women may have discoverable information pertaining to the facts issues set forth in this case, including the benefits of competing in female-only sports, the experience of competing against a male athlete in women's sports and the impact it had on them and other female competitors. The contact information for these girls and women is unknown.

- Anna Cameron, College of Siskiyous in 2012
- Shyanna Ashworth, College of the Siskiyous in 2012
- Brianne Burnside, College of the Siskiyous in 2012
- Carrie Watson, College of the Siskiyous in 2012
- Hailey Wales, College of the Siskiyous in 2012
- Mariia Rachiteleva, Los Angeles THC Women in 2022
- Katiana Sladanha, Los Angeles THC Women in 2022
- Patricia Fernandez, Los Angeles THC Women in 2022
- Sabrina Mcgauran, Los Angeles THC Women in 2022
- Natallia Zhelnova, Los Angeles THC Women in 2022
- Robyn Hargrove, competed in 2011 Border States Classic
- Maikayla Malaspina, Northern AZ women's track & field team in 2020
- Malaina Thacker, Idaho State women's track & field team in 2020
- Molly Olsen, Idaho State women's track & field team in 2020
- Pipi Eitel, Northern Arizona women's track & field team in 2020

- Dawn Orwick, competed in Masters Track World Championship in 2019
- Kristen Herup Sovange, competed in Masters Track World Championship in 2019
- Kanani Lodge, 2022 DLS World Rankings
- Katie Calderon, 2022 DLS World Rankings
- Tamikka Brents, MMA fighter in 2014
- Heather Bassett, XFO 50: Xtreme Fighting Organization 50
- Ashlee Evans-Smith, CFA 12: Championship Fighting Alliance 12
- Allanna Jones, CFA 11: Kyle v Wiuff
- Erika Newsome, CFA: 10 McSweeney vs. Staring

II. Documents and tangible items.

Armistead points to L.Armistead__000001-000169 and the forthcoming Defendants' expert reports, and reserves the right to rely on documents produced by the other parties in this case to support her claims and defenses.

III. Computation of damages.

Armistead seeks an award of attorneys' fees pursuant to 42 U.S.C. §1988. Armistead reserves the right to supplement this response.

IV. Insurance Agreements.

Not applicable.

Dated this 11th day of February, 2022.

/s/ Brandon S. Steele

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Attorneys for Defendant-Intervenor

TRANSGENDER POLICY

WVSSAC BOARD OF DIRECTORS

In the event a member school, or its governing authority, determines to permit transgender students to participate in interscholastic athletics, the WVSSAC has adopted the following policy to govern such participation:

I.

Definitions

Transgender Student – a student whose gender identity differs from the student's assigned sex at birth.

Gender Identity – a person's deeply-felt internal sense of being male or female.

II.

WVSSAC Transgender Student Policy

A Transgender Student shall be eligible to participate in interscholastic athletics in a manner consistent with a member school policy that meets the minimum standards designated by the WVSSAC Board of Directors policy.

The WVSSAC Board of Directors has designated the following as the minimum standards a member school must consider when determining whether a transgender student may participate in interscholastic athletics in a particular sport. A separate determination shall be made by the member school for each sport in which the student seeks to participate.

1. The transgender student's school shall make the initial determination as to whether a student may participate in interscholastic athletics in a gender that does not match the gender assigned to him or her at birth. When determining whether a transgender student is eligible to participate in interscholastic athletics in a manner consistent with the student's gender identity a member school must consider the following:
    a. Whether the student is a "transgender student" as determined based upon applicable regulations and policies of the member school or its governing authority.
    b. Whether the student meets all applicable academic and enrollment eligibility requirements.
    c. Whether fair competition among high school teams would be impacted by the student's participation.
2. The determination of a student's gender assignment for interscholastic athletics shall remain in effect for the duration of the student's high school eligibility.
3. Any member school may appeal the eligibility of a transgender student on the grounds that the student's participation in interscholastic athletics would adversely affect competitive equity or safety of teammates or opposing players.
    a. Any such appeal will be heard by the WVSSAC Board of Directors.
    b. The identity of the student shall remain confidential. All discussion and documentation will be kept confidential and the proceedings will also be confidential unless the student and family make a specific request otherwise.
    c. The WVSSAC Board of Directors will not consider whether the school has properly determined the student's sex assignment. The board's deliberations will be limited to the question of whether the transgender student represents a threat to competitive equity or the safety of teammates or opposing players. Factors to be considered will include, but not be limited to, the age of the student; the athletic experience of the student; the degree to which the student presents a risk of harm to other competitors due to his or her strength, size, or speed; the nature of the sport; and the degree to which fair competition among high school teams would be impacted by the student's participation.

THE RULES AND REGULATIONS

of the

West Virginia Secondary School Activities Commission

as set forth in the

Constitution and Bylaws

and

Approved by the West Virginia State Board of Education

Published by

THE BOARD OF DIRECTORS

of

The West Virginia Secondary School Activities Commission

REVISED AND PRINTED AUGUST 2020

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VI

CONSTITUTION AND BYLAWS COMMITTEE

TRENT SHERMAN, Principal
Martinsburg High School
Martinsburg, West Virginia

JEFF SOLE, Principal
St. Marys High School
St. Marys, West Virginia

STEVE WAMSLEY, Principal
Tygarts Valley High School
Mill Creek, West Virginia

MIKE COLLINS, Principal
Bluefield High School
Bluefield, West Virginia

JASON MARLING, Principal
Sherrard Middle School
Wheeling, West Virginia

BOARD OF TRUSTEES

KENT YOHO	Tyler Consolidated High School
VACANT	
RON REEDY	Sissonville High School
KENNY DEMOSS	Parkersburg High School
HOLLY KLOEPPNER	Musselman High School

DISCRIMINATION PROHIBITED: As required by federal laws and regulations, the West Virginia Secondary School Activities Commission does not discriminate on the basis of sex, race, color, religion, handicapping condition, marital status, or national origin to employment or in its programs and activities. Inquiries may be referred to Bernie Dolan, Executive Director, 2875 Staunton Turnpike, Parkersburg, WV 26104. NOTE: State and Federal laws include Title IX, Education Amendments of 1972; Title VI, Civil Rights Act of 1964; Title VII, Civil Rights Act of 1964; Rehabilitation Act of 1973, Section 504; and other State and Federal laws and regulations governing students and employees.

BELIEFS AND OBJECTIVES

The Commission believes that a controlled activities program is a strong factor in the development of courage, personality, cooperation, and leadership. The Commission believes that representatives of a school should be good citizens of that school, hence the need for requirements and regulations governing eligibility that have been standardized.

The Commission is designed to provide means for the unbiased and amicable settlement of disputes regarding activities.

The Commission seeks to present proper ideals of sportsmanship so that coaches, players, school authorities, game officials, and spectators may combine to make any activity enjoyable and productive of physical and social benefits to both sides involved in the contest, with partisanship and prejudice eliminated as far as possible.

To accomplish these objectives the Commission asks the cooperation of its members, all lovers of clean, wholesome activities, and all fans, young and old, who believe in our American system of interscholastics.

HISTORICAL SKETCH

The West Virginia High School Athletic Association was organized June 17, 1916, during a meeting of the West Virginia State Education Association. The original draft of the Constitution and Bylaws as formulated by Mr. R.J. Gorman, Charleston, West Virginia, was submitted to the principals of the high schools by Principal W.C. McKee of Charleston High School.

The charter members were Bluefield, Charleston, Clarksburg (Washington Irving), Elkins, Fairmont West,

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.

Civil Action No. 2:21-cv-00316
Hon. Joseph R. Goodwin, District Judge

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, PATRICK MORRISEY in his official capacity as Attorney General, and THE STATE OF WEST VIRGINIA,

Defendants.

DEFENDANTS HARRISON COUNTY BOARD OF EDUCATION AND DORA STUTLER'S RESPONSES AND OBJECTIONS TO PLAINTIFF'S FIRST SET OF REQUESTS FOR PRODUCTION TO DEFENDANTS HARRISON COUNTY BOARD OF EDUCATION AND DORA STUTLER

Pursuant to Rule 34 of the Federal Rules of Civil Procedure, Defendants Harrison County Board of Education and Dora Stutler (collectively, the "County Board Defendants"), by counsel, hereby respond and object to "Plaintiff's First Set of Request for Production to Defendants Harrison County Board of Education and Dora Stutler" as follows:

GENERAL OBJECTION: The County Board Defendants object to the definitions of "County Board" and "County Superintendent" as set forth in Plaintiff's request for production of documents. Those definitions are overly broad and outside the permissible scope of discovery under the Federal Rules of Civil Procedure as the definitions improperly broaden the identity of parties in this case. For instance, the definitions of the "County Board" and the "County

1. National Federation of State High School Associations' Rules Book, Track and Field and Cross Country (2020), Bates numbered HCBOE 00001 to HCBOE 00051, attached as "Exhibit 1."
2. National Federation of State High School Association, "Track and Field & Cross Country Rules Changes," (Feb. 10, 2021), Bates numbered HCBOE 00052 to HCBOE 00053, attached as "Exhibit 2."
3. West Virginia Secondary School Activities Commission Handbook (2021-2022). This source is available online at https://www.wvssac.org/rules-and-regulations.
4. "2020 – 2021 Track Coaches Packet." This document is already in the record, at Doc. No. 47-1.
5. West Virginia Secondary School Activities Commission's "Athletic Participation/Parental Consent/Physician's Certificate Form" and accompanying documents. These documents are already in the record, at Doc. No. 47-2.

With regard to the various education records related to B.P.J. that were identified in the County Board Defendants' Rule 26(a) initial disclosures, the County Board Defendants have provided a proposed "FERPA Consent to Release Student Information" form to Plaintiff's counsel. After the County Board Defendants receive a signed version of that FERPA Consent form, the County Board Defendants will supplement their response to this request by providing the various education records that were identified in the County Board Defendants' Rule 26(a) initial disclosures.

DAUBERT RESPONSE APPENDIX TO DEFENDANT-INTERVENOR AND THE STATE OF WEST VIRGINIA'S JOINT MEMORANDUMS IN RESPONSE TO PLAINTIFF'S MOTIONS TO EXCLUDE EXPERTS' TESTIMONY

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DAUBERT RESPONSE APPENDIX TO DEFENDANT-INTERVENOR AND THE STATE OF WEST VIRGINIA'S JOINT MEMORANDUMS IN RESPONSE TO PLAINTIFF'S MOTIONS TO EXCLUDE EXPERTS' TESTIMONY

Original article

European normative values for physical fitness in children and adolescents aged 9–17 years: results from 2 779 165 Eurofit performances representing 30 countries

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ABSTRACT

Objective To develop sex-specific and age-specific normative values for the nine Eurofit tests in European children and adolescents aged 9–17 years.

Methods A systematic review was undertaken to identify papers that explicitly reported descriptive results for at least one of nine Eurofit tests (measuring balance, muscular strength, muscular endurance, muscular power, flexibility, speed, speed-agility and cardiorespiratory fitness (CRF)) on children and adolescents. Data were included on apparently healthy (free from known disease/injury) children and adolescents aged 9–17 years. Following harmonisation for methodological variation where appropriate, pseudodata were generated using Monte Carlo simulation, with population-weighted sex-specific and age-specific normative centiles generated using the Lambda Mu Sigma (LMS) method. Sex-specific and age-specific differences were expressed as standardised differences in means, with the percentage of children and adolescents with healthy CRF estimated at the sex-age level.

Results Norms were displayed as tabulated centiles and as smoothed centile curves for the nine Eurofit tests. The final dataset included 2 779 165 results on children and adolescents from 30 European countries, extracted from 98 studies. On average, 78% of boys (95% CI 72% to 85%) and 83% of girls (95% CI 71% to 96%) met the standards for healthy CRF, with the percentage meeting the standards decreasing with age. Boys performed substantially (standardised differences >0.2) better than girls on muscular strength, muscular power, muscular endurance, speed-agility and CRF tests, but worse on the flexibility test. Physical fitness generally improved at a faster rate in boys than in girls, especially during the teenage years.

Conclusion This study provides the largest and most geographically representative sex-specific and age-specific European normative values for children and adolescents, which have utility for health and fitness screening, profiling, monitoring and surveillance.

BACKGROUND

Physical fitness is a good summative measure of the body's ability to perform physical activity and exercise, and it also provides an important summative indicator of health.[1] In adults, cardiorespiratory fitness (CRF) and musculoskeletal fitness (MSF) are strongly associated with mortality and cancer, independent of obesity and physical activity levels.[2–5] Several studies have shown considerably stronger inverse relationships between CRF and mortality than between physical activity and mortality,[6 7] indicating that changes in CRF may be more important to monitor in response to intervention (eg, exercise training). In children and adolescents, favourable associations have been reported linking CRF and MSF to cardiometabolic disease risk, adiposity, mental health and cognition as well as MSF to bone health.[1 8–10] Direct evidence has also emerged indicating that low CRF and MSF in adolescence are significantly associated with all-cause mortality later in life.[11–13] In addition to the health implications, physical fitness is an important determinant of success for many popular youth sports and athletic events (eg, hockey, basketball, football (soccer), running, swimming, rugby).[14]

Since its inception in 1988, the Eurofit has become the most popular test battery used to assess the physical fitness of European children and adolescents and the effectiveness of national physical education curricula.[15 16] The Eurofit comprises numerous health-related and skill-related fitness tests, including: (1) flamingo balance (balance), plate tapping (upper body speed), sit-and-reach (extent flexibility), standing broad jump (lower body muscular power), handgrip strength (upper body muscular strength), sit-ups (abdominal muscular endurance), bent arm hang (upper body muscular endurance), 10×5 m agility shuttle run (running speed-agility) and the 20 m shuttle run (CRF) (see online supplement 1); (2) anthropometric tests measuring height, mass and skinfold (various sites) and (3) age-identification and sex-identification data.[17] The Eurofit has excellent field-based utility because it is cheap and simple to administer, is practical in the school and club settings, requires minimal equipment and personnel and is appropriate for mass testing.[16] The Eurofit tests demonstrate very good test-retest reliability and good criterion validity for tests where appropriate criterion measures have been identified (eg, the 20 m shuttle run, standing broad jump, handgrip strength),[18–21] suggesting that it is a good test battery to measure physical fitness in youth. Criterion-referenced standards have also been developed for some Eurofit tests (eg, CRF) to help identify children and adolescents with apparently healthy cardiometabolic

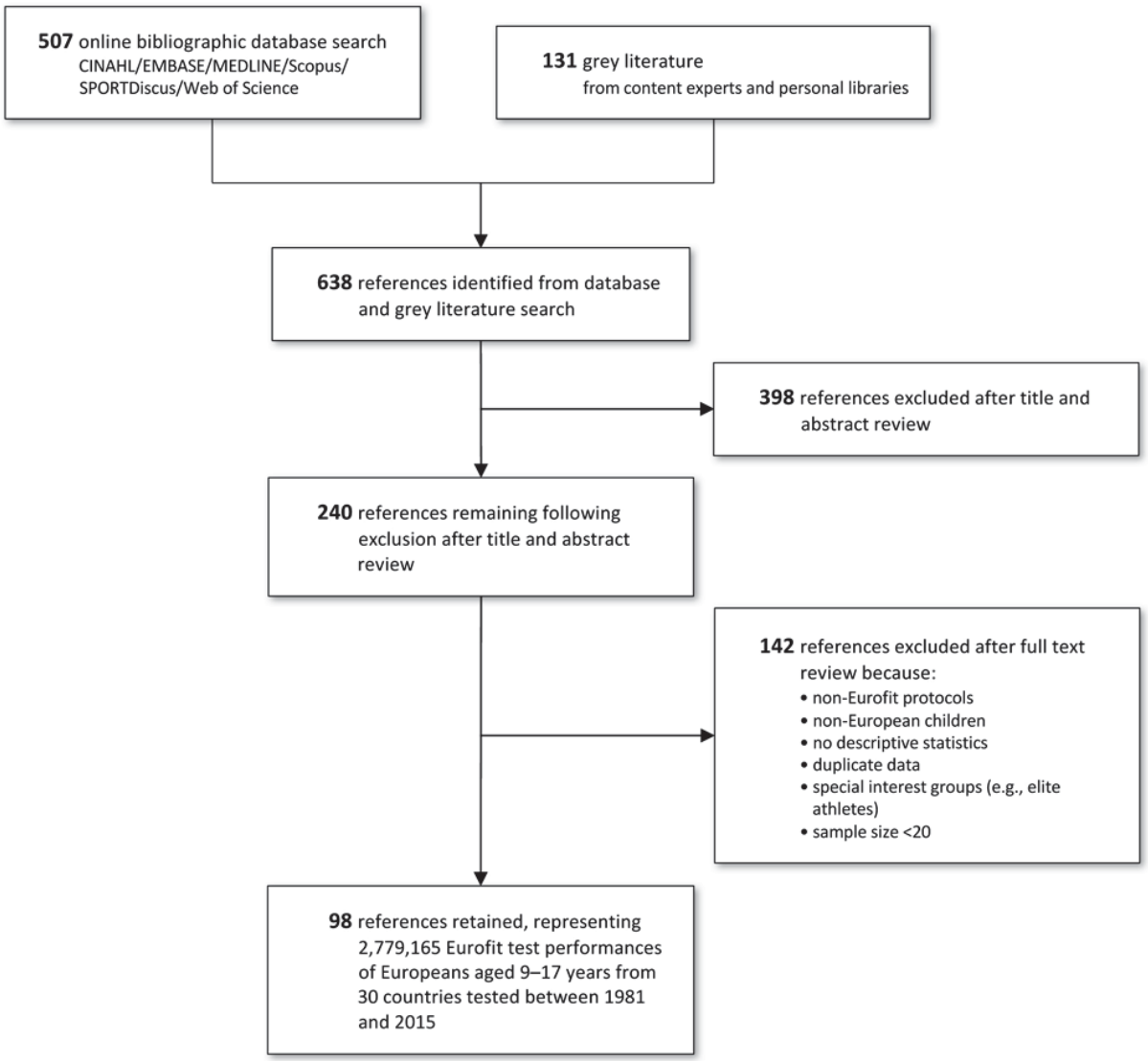

Figure 1 PRISMA flow chart outlining the flow of studies through the review.

profiles.[22 23] Several of the Eurofit tests have been supported by European experts from the ALPHA (Assessing Levels of Physical Activity) project[20] and by North American experts from the IOM (Institute of Medicine) report,[24] both of which provide strong and consistent guidelines about fitness testing in children and adolescents.

In order to extend the utility of the Eurofit as a surveillance instrument, there is a clear need for European normative-referenced standards to help interpret test scores, which are currently only available at the local, state/provincial or national level.[25–29] Previously, Tomkinson *et al*[16] used a method to match and compare Eurofit data in children and adolescents by standardising differences in test protocols and performance metrics. These data helped describe the geographical variability in the Eurofit performance of 1.2 million European children and adolescents aged 7–18 years from 23 countries,[16] and could be updated to provide European norms. Thus, the primary aim of this study was to develop sex-specific and age-specific normative values for physical fitness in European children and adolescents using the Eurofit, which implies a 10-year update to the previous Tomkinson *et al* review.[16] The secondary aim was to estimate the sex-related differences in Eurofit test performance as well as the percentage of European children and adolescents meeting the new international criterion-referenced standards for healthy CRF.[23]

METHODS

Data sources

A systematic review of the scientific literature was prospectively registered (PROSPERO 2013:CRD42013003646) and completed to locate studies that reported descriptive Eurofit data on European children and adolescents aged 9–17 years (see online supplement 2). This review was undertaken according to the Preferred Reporting Items for Systematic review and Meta-Analysis (PRISMA) guidelines for systematic reviews.[30] Studies were identified from January 1988 up until December 2016 using the following bibliographic databases: CINAHL, EMBASE, MEDLINE, Scopus, SPORTDiscus and Web of Science. This search strategy was developed by the author group

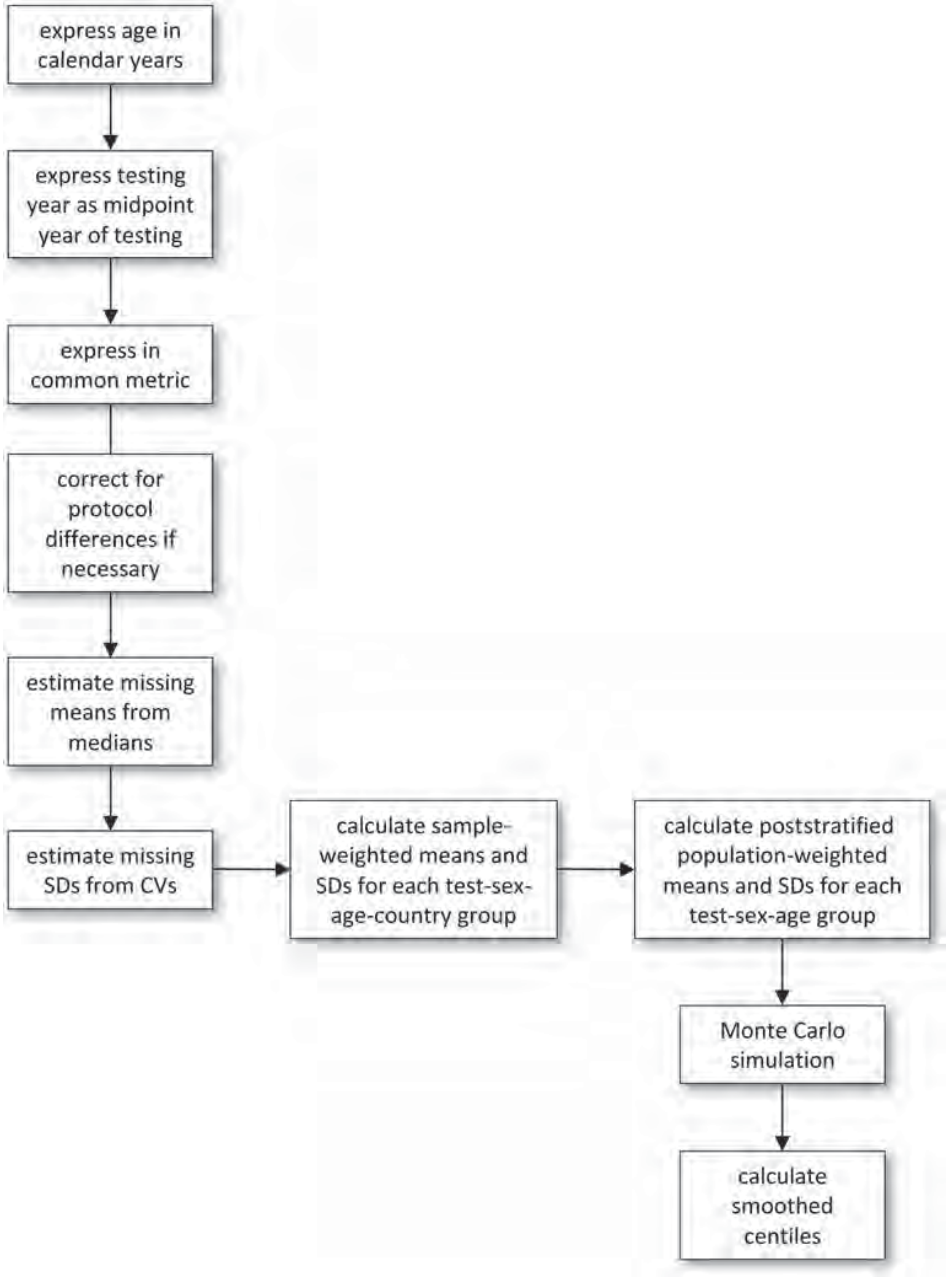

Figure 2 Flow chart showing the methodological procedure used in this study. Results from studies were first expressed in a common metric and corrected for protocol differences. Following the estimation of missing means and SDs if necessary, poststratified population-weighted means and SDs were estimated for each test-sex-age group, with pseudodata and smoothed centiles subsequently generated. CV, coefficient of variation.

in conjunction with a trained academic librarian. The search strategy included the term: Eurofit; with child*, OR adolescen*, OR youth, OR boy*, OR girl*, OR teen*, OR paediatric*, OR pediatric*, as search term modifiers. All studies were extracted as text files, imported into RefWorks (ProQuest, Ann Arbor, Michigan, USA) and assigned a unique reference identification number. Duplicate studies were first removed using RefWorks with the remaining duplicates removed manually. Two independent reviewers screened all titles and abstracts for eligibility, with full-text copies obtained for all studies meeting initial screening criteria according to at least one reviewer. These two independent reviewers then examined all full-text articles and discrepancies were resolved by discussion and consensus. A third reviewer examined an article when the two reviewers were unable to reach consensus, with consensus reached for all included articles. Email contact with the corresponding authors of studies occurred when necessary, in order to provide clarification, to avoid 'double counting' previously reported data and/or to request additional descriptive or raw data. The reference lists of all included studies were manually reviewed by two reviewers to identify new studies. Reviewers contacted content experts to obtain grey literature. In addition, the personal libraries of the authors were examined for relevant studies not identified through the search strategy.

Figure 3 European map indicating the 30 countries (filled in black) for which Eurofit data on children and adolescents aged 9–17 years were available.

Inclusion/exclusion criteria

Studies were included if they explicitly reported descriptive Eurofit data at the test-sex-age-country-year level. Study participants must have been apparently healthy (free from known disease or injury) European children and adolescents aged 9–17 years who were tested from 1981 onwards—the inception year of the provisional Eurofit test battery. Studies were excluded if they reported descriptive Eurofit data on: (1) test-sex-age-country-year groups for which the sample size was less than 20 (because the means and SDs for smaller samples were too labile); (2) duplicate data published in another included study or (3) on only special interest groups that were atypical of their source population (eg, elite athletes, physically or mentally impaired children). Figure 1 shows a PRISMA flow chart of the included studies.

Data treatment and statistical analysis

All descriptive data were extracted into Excel (Microsoft Office 2010, USA) using a standardised data extraction table. The following descriptive data were extracted by one author and checked for accuracy by another: authors, country of testing, year of testing, sex, age, Eurofit test (including data on the name of test, measurement units, sample size, mean, SD and median), sampling method and the sampling base. Mean data were examined for anomalies by running range checks and examining sex-specific and age-specific scatter plots, with means±2 SEs of the mean away from the respective sex-age-test level mean identified and checked for transcription errors. Only data on children and adolescents aged 9–17 years were retained for further analysis.

The general procedure used to generate the sex-specific and age-specific normative centiles from extracted data is described elsewhere[31] and summarised in figure 2. Age was reported as age at last birthday (70% or 69/98 studies), a span of years (6% or 6/98 studies) or as mean and SD years (24% or 23/98 studies). Testing year was recorded as the midpoint year of testing (47% or 46/98 studies), a span of testing years (38% or 37/98 studies) or not reported at all (15% or 15/98 studies). Age and testing year were therefore expressed as age at last birthday and the midpoint year of testing, respectively.[31]

To combine data from different studies, all Eurofit data were standardised to a common metric and protocol. Measurement units reported in the Eurofit handbook[17] were used as the test-specific common metrics and for the presentation of normative centiles. All 20 m shuttle run data were standardised to Léger's 1-min protocol,[32] which starts at a speed of 8.5 km/hour and increases by 0.5 km/hour each minute and the speed at the last completed stage using the procedures described elsewhere.[31 33] The accuracy of the 20 m shuttle run data standardisation procedure is excellent.[33]

As part of the modelling procedure used to generate sex-specific and age-specific norms, means and SDs were required at the study-test-sex-age-country-year level. If no mean was available (1% or 1/98 studies), then mean values were estimated from the reported median values. This was done by first locating all studies reporting both median and mean values at the study-test-sex-age-country-year level and second, by determining the best-fitting and most parsimonious linear or curvilinear (second-order and third-order polynomials) regression models between median (predictor variable) and mean (response variable) values. Furthermore, 4% (4/98) of studies did not report SD values. Missing SD values were estimated by first locating all studies reporting both means and SDs at the study-test-sex-age-country-year level; second, by calculating the corresponding coefficient of variation (CV) values and third, by calculating the sample-weighted mean CVs for boys and girls separately.

Sample-weighted means and SDs (the latter calculated from sample-weighted mean CVs) were then calculated at the test-sex-age-country level. While these data represent the best available Eurofit data, in order to best generate European representative sex-specific and age-specific normative centiles and to correct for systematic bias associated with oversampling and undersampling, means and SDs were corrected using a poststratification population-weighting procedure.[34] This procedure ensures that our norms were standardised to underlying country-sex-age demographics. Thus, population estimates standardised to the mean testing year of 2000 were extracted from the United Nations World Population Prospects report.[35] Monte Carlo simulation was then used to create pseudodata using the detailed methods described elsewhere.[36] This simulation procedure attempts to 'recreate' the unavailable raw data by using a random number generator to produce data points based on population-weighted means and SDs at the sex-age level. Monte Carlo simulation assumes that the distributions are approximately normal, which was not true of all available raw Eurofit data. The simulation procedure described by Tomkinson *et al*[36] however allowed for the recreation of both normal and non-normal pseudodata, with Eurofit data considered to be either normal or non-normal following the assessment of normality by the d'Agostino-Pearson K^2 test[37] using available raw data of the same test. Pseudo-datasets were repeatedly generated until the calculated mean differed from the reported mean by <0.5%, and the calculated SD differed from the reported SD by <2.5%. These pseudo-datasets were then used to generate sex-specific and age-specific normative centiles in LMSchartmaker Pro (V.2.43, The Institute of Child Health, London, UK), which analyses data using the Lambda Mu Sigma (LMS) method.[38] The LMS method fits smooth centile curves to reference data by summarising the changing distribution of three sex-specific and age-specific curves representing the skewness (L; expressed as a Box-Cox power), the median (M) and the CV (S). Using penalised likelihood, the curves can be fitted as cubic splines using non-linear regression, and the extent

Table 1 Flamingo balance (n/60 s) centiles by age and sex based on 123 655 test performances of children and adolescents aged 9–17 years representing 19 countries

Age (years)	n	P_5	P_{10}	P_{20}	P_{30}	P_{40}	P_{50}	P_{60}	P_{70}	P_{80}	P_{90}	P_{95}
Boys												
9	3691	24	21	18	15	13	12	10	9	7	5	4
10	5140	25	22	18	16	14	12	10	8	7	5	3
11	6409	26	22	18	16	14	12	10	8	7	4	3
12	8313	26	23	18	16	14	12	10	8	7	4	3
13	8750	26	23	18	16	14	12	10	8	6	4	3
14	9466	25	21	18	15	13	11	10	8	6	4	3
15	7605	21	18	15	13	11	10	9	7	6	4	3
16	6665	21	18	15	13	11	10	8	7	6	4	3
17	5940	21	18	15	13	11	10	8	7	6	4	3
Girls												
9	3654	23	20	17	14	13	11	10	8	7	5	3
10	4935	23	20	17	15	13	11	10	8	7	5	3
11	6247	24	20	17	15	13	11	10	8	7	5	3
12	8271	24	21	17	15	13	11	10	8	7	5	3
13	8958	23	20	17	15	13	11	10	8	7	5	3
14	9279	23	20	16	14	13	11	10	8	7	5	3
15	7956	21	18	15	13	12	10	9	8	6	4	3
16	6644	19	17	14	12	11	9	8	7	6	4	3
17	5732	18	16	13	12	10	9	8	7	5	4	3

Note: the ages shown represent age at last birthday (eg, 9=9.00–9.99).

of smoothing required can be expressed in terms of smoothing parameters or equivalent df.[39]

The percentage of children and adolescents with healthy CRF (ie, healthy cardiometabolic profiles) was estimated using the new international criterion-referenced standards of 42 and 35 mL/kg/min for boys and girls, respectively.[23] Sex-specific differences in mean Eurofit performance were expressed as standardised differences. Positive differences indicated that Eurofit performances for boys were better than those for girls. Standardised differences of 0.2, 0.5 and 0.8 were used as thresholds for small, moderate and large effect sizes (ES), respectively.[40]

RESULTS

The final dataset included 2 779 165 Eurofit test performances of European children and adolescents aged 9–17 years (6458 study-sex-age-country-year groups extracted from 98 studies), representing 30 countries (figure 3). These 30 countries

Table 2 Plate tapping (s) centiles by age and sex based on 148 093 test performances of children and adolescents aged 9–17 years representing 19 countries

Age (years)	n	P_5	P_{10}	P_{20}	P_{30}	P_{40}	P_{50}	P_{60}	P_{70}	P_{80}	P_{90}	P_{95}
Boys												
9	7543	24.05	22.04	20.00	18.74	17.78	16.96	16.21	15.48	14.70	13.73	13.02
10	9090	21.55	19.90	18.19	17.13	16.31	15.61	14.97	14.33	13.65	12.80	12.17
11	8198	19.48	18.11	16.68	15.77	15.07	14.46	13.90	13.35	12.75	12.00	11.44
12	9799	17.91	16.74	15.51	14.72	14.10	13.57	13.07	12.58	12.05	11.37	10.87
13	9104	16.44	15.44	14.37	13.69	13.15	12.68	12.25	11.81	11.34	10.74	10.28
14	9964	15.12	14.26	13.34	12.74	12.27	11.86	11.48	11.09	10.67	10.13	9.72
15	7797	14.00	13.25	12.45	11.92	11.51	11.14	10.80	10.45	10.07	9.59	9.22
16	7217	13.38	12.70	11.95	11.46	11.08	10.74	10.42	10.10	9.74	9.29	8.94
17	6157	13.11	12.45	11.73	11.26	10.89	10.56	10.25	9.94	9.59	9.15	8.82
Girls												
9	7121	25.25	22.05	19.29	17.77	16.70	15.83	15.06	14.34	13.60	12.72	12.09
10	8904	22.35	19.95	17.77	16.54	15.64	14.90	14.25	13.62	12.97	12.19	11.63
11	8561	19.93	18.11	16.38	15.38	14.63	14.01	13.45	12.91	12.35	11.66	11.16
12	10 089	18.41	16.96	15.53	14.68	14.04	13.50	13.01	12.53	12.03	11.41	10.95
13	9031	16.92	15.76	14.60	13.89	13.35	12.88	12.46	12.05	11.60	11.05	10.64
14	9476	15.51	14.58	13.63	13.03	12.57	12.18	11.81	11.45	11.06	10.58	10.21
15	7690	14.95	14.12	13.25	12.70	12.28	11.91	11.57	11.24	10.87	10.41	10.07
16	6790	14.58	13.80	12.99	12.48	12.07	11.73	11.41	11.08	10.74	10.30	9.97
17	5562	14.54	13.77	12.96	12.45	12.05	11.71	11.39	11.07	10.72	10.28	9.95

Table 3 Sit-and-reach (cm) centiles by age and sex based on 464 807 test performances of children and adolescents aged 9–17 years representing 27 countries

Age (years)	n	P_5	P_{10}	P_{20}	P_{30}	P_{40}	P_{50}	P_{60}	P_{70}	P_{80}	P_{90}	P_{95}
Boys												
9	34 495	6.0	8.1	10.7	12.7	14.4	16.0	17.6	19.4	21.4	24.3	26.8
10	35 532	6.0	8.1	10.8	12.7	14.4	16.1	17.7	19.4	21.5	24.5	26.9
11	35 413	6.0	8.1	10.8	12.7	14.4	16.1	17.7	19.4	21.5	24.5	26.9
12	29 962	6.0	8.2	10.8	12.8	14.5	16.1	17.8	19.6	21.7	24.6	27.1
13	26 840	6.1	8.3	11.1	13.1	14.8	16.5	18.2	20.0	22.2	25.2	27.7
14	25 302	6.7	9.1	12.1	14.3	16.2	18.0	19.9	21.9	24.2	27.5	30.3
15	21 644	7.7	10.3	13.7	16.1	18.3	20.3	22.4	24.6	27.2	30.9	34.0
16	16 285	8.4	11.1	14.6	17.1	19.3	21.4	23.6	25.9	28.6	32.4	35.6
17	9696	9.1	11.9	15.5	18.1	20.4	22.6	24.8	27.2	30.0	33.9	37.2
Girls												
9	33 008	7.9	10.2	13.1	15.2	16.9	18.6	20.3	22.1	24.2	27.2	29.6
10	34 803	8.5	10.8	13.7	15.7	17.5	19.2	20.9	22.7	24.8	27.7	30.1
11	35 250	9.4	11.7	14.5	16.6	18.4	20.1	21.7	23.5	25.6	28.6	31.0
12	29 835	10.6	12.9	15.8	17.9	19.7	21.4	23.1	24.9	27.1	30.0	32.5
13	26 090	11.9	14.4	17.3	19.5	21.3	23.1	24.8	26.7	28.9	31.9	34.4
14	24 563	13.1	15.6	18.6	20.8	22.7	24.5	26.3	28.2	30.4	33.5	36.1
15	20 540	13.9	16.4	19.5	21.7	23.6	25.4	27.2	29.1	31.3	34.4	37.0
16	16 197	14.4	16.9	20.0	22.2	24.1	25.9	27.6	29.5	31.8	34.9	37.5
17	9352	14.7	17.2	20.3	22.5	24.4	26.1	27.9	29.8	32.1	35.2	37.8

Note: a score of 15 cm corresponds to the participant reaching their toes.

represented approximately 65% of Europe's population and 49% of Europe's land area and included 25 high-income and five upper-middle-income countries. Online supplement 3 provides a summary of the 98 included studies.

Tables 1–9 provide normative values as tabulated centiles from 5% to 95% for all nine Eurofit tests. Smoothed centile curves are presented in figure 4 with additional 20 m shuttle run norms (speed at last completed stage, number of laps and relative $\dot{V}O_{2peak}$) presented in online supplement 4.

On average, 78% of boys (95% CI 72% to 85%) and 83% of girls (95% CI 71% to 96%) had healthy CRF, with the percentage of those with healthy CRF decreasing by about 3% (boys) and 7% (girls) per year from the age of 9 years onwards (figure 5). There was considerable variability in healthy CRF levels among different European countries, which increased with age (see online supplement 5). When dividing Europe into two segments at the 45th parallel north,[41 42] a gradient existed where Northern-Central European countries had a higher percentage

Table 4 Standing broad jump (cm) centiles by age and sex based on 464 900 test performances of children and adolescents aged 9–17 years representing 29 countries

Age (years)	n	P_5	P_{10}	P_{20}	P_{30}	P_{40}	P_{50}	P_{60}	P_{70}	P_{80}	P_{90}	P_{95}
Boys												
9	35 148	100.5	107.9	116.8	123.2	128.7	133.8	138.9	144.3	150.7	159.5	166.8
10	36 069	107.6	115.3	124.6	131.3	137.0	142.4	147.7	153.4	160.1	169.3	176.9
11	35 618	115.4	123.5	133.3	140.3	146.3	151.9	157.5	163.5	170.5	180.2	188.2
12	30 631	122.5	131.0	141.2	148.5	154.8	160.7	166.5	172.8	180.1	190.3	198.6
13	24 760	129.7	138.5	149.3	157.0	163.6	169.7	175.9	182.5	190.2	200.9	209.7
14	24 061	138.7	148.1	159.6	167.8	174.8	181.4	188.0	195.0	203.2	214.6	223.9
15	20 334	147.8	157.8	169.8	178.5	186.0	192.9	199.8	207.2	215.9	227.9	237.8
16	18 967	154.2	164.5	176.9	185.9	193.6	200.8	207.9	215.6	224.6	237.0	247.2
17	12 108	158.3	168.9	181.6	190.7	198.5	205.8	213.1	221.0	230.1	242.7	253.2
Girls												
9	34 339	91.2	98.4	107.1	113.4	118.9	123.9	129.0	134.5	140.8	149.7	157.1
10	35 339	98.5	105.9	114.9	121.4	127.0	132.3	137.5	143.2	149.8	159.0	166.6
11	34 992	105.6	113.3	122.6	129.4	135.2	140.6	146.0	151.9	158.7	168.2	176.1
12	29 974	111.1	119.0	128.6	135.6	141.6	147.1	152.7	158.7	165.8	175.6	183.7
13	23 749	113.9	121.9	131.6	138.7	144.8	150.4	156.1	162.2	169.3	179.3	187.5
14	22 416	115.6	123.7	133.6	140.7	146.8	152.5	158.3	164.4	171.6	181.7	190.0
15	16 394	116.8	124.9	134.8	142.0	148.1	153.9	159.6	165.8	173.1	183.1	191.5
16	18 459	117.5	125.6	135.5	142.7	148.8	154.6	160.4	166.6	173.8	183.9	192.2
17	11 542	119.0	127.2	137.2	144.4	150.6	156.4	162.3	168.5	175.8	186.0	194.4

Table 5 Handgrip strength (kg) centiles by age and sex based on 203 295 test performances of children and adolescents aged 9–17 years representing 24 countries

Age (years)	n	P_5	P_{10}	P_{20}	P_{30}	P_{40}	P_{50}	P_{60}	P_{70}	P_{80}	P_{90}	P_{95}
Boys												
9	10 180	8.6	10.1	11.9	13.2	14.3	15.3	16.4	17.5	18.8	20.6	22.1
10	11 965	9.5	11.1	13.0	14.5	15.7	16.8	18.0	19.2	20.6	22.6	24.2
11	11 358	10.8	12.6	14.8	16.4	17.7	19.0	20.3	21.6	23.2	25.4	27.2
12	13 107	13.1	15.2	17.7	19.6	21.2	22.6	24.1	25.7	27.6	30.1	32.3
13	13 070	16.9	19.4	22.5	24.7	26.6	28.4	30.2	32.1	34.3	37.4	39.9
14	13 843	21.6	24.5	27.9	30.4	32.6	34.6	36.6	38.7	41.2	44.7	47.6
15	10 944	25.9	28.9	32.5	35.2	37.4	39.5	41.6	43.9	46.5	50.1	53.2
16	10 062	29.1	32.1	35.8	38.5	40.7	42.9	45.0	47.2	49.9	53.6	56.7
17	8157	31.3	34.3	38.0	40.6	42.9	45.0	47.1	49.4	52.1	55.7	58.8
Girls												
9	9690	7.2	8.7	10.4	11.6	12.6	13.6	14.6	15.6	16.8	18.5	19.9
10	11 804	8.0	9.6	11.5	12.9	14.1	15.2	16.3	17.5	18.8	20.7	22.3
11	11 582	9.4	11.2	13.4	14.9	16.3	17.5	18.8	20.1	21.7	23.9	25.6
12	13 331	12.0	13.9	16.2	17.9	19.3	20.6	21.9	23.3	25.0	27.3	29.1
13	13 182	16.1	18.0	20.3	21.9	23.3	24.6	25.9	27.3	29.0	31.2	33.1
14	13 168	18.5	20.4	22.7	24.3	25.7	27.1	28.4	29.8	31.4	33.7	35.6
15	10 586	19.1	21.1	23.5	25.2	26.7	28.0	29.4	30.8	32.5	34.9	36.8
16	9672	19.3	21.2	23.6	25.4	26.9	28.2	29.6	31.1	32.8	35.2	37.2
17	7594	19.4	21.4	23.8	25.5	27.0	28.4	29.8	31.3	33.0	35.5	37.4

of children and adolescents with healthy CRF than Southern European countries (average difference in means (range): 7% (0% to 27%) at the sex-age level).

On average, boys performed substantially better than girls at each age group on muscular strength (ES: large), muscular power (ES: large), muscular endurance (ES: moderate to large), speed-agility (ES: moderate) and CRF (ES: large) tests, with the magnitude of the sex-specific differences increasing with age and accelerating from about 12 years (figure 6). Boys also developed at a faster rate than girls on these tests, especially during the teenage years. Conversely, girls performed substantially better at each age group on the flexibility test (ES: moderate), with boys and girls developing with age at similar rates. There were negligible sex-specific differences overall on the balance and upper body speed tests, although boys developed at a faster rate than girls on the upper body speed test.

DISCUSSION

This study systematically analysed 2 779 165 Eurofit performances of children and adolescents aged 9–17 years to generate

Table 6 Sit-ups (n/30 s) centiles by age and sex based on 481 032 performances of children and adolescents aged 9–17 years representing 23 countries

Age (years)	n	P_5	P_{10}	P_{20}	P_{30}	P_{40}	P_{50}	P_{60}	P_{70}	P_{80}	P_{90}	P_{95}
Boys												
9	31 757	9	11	13	15	16	17	18	20	21	23	25
10	33 748	11	13	15	17	18	19	20	22	23	25	27
11	35 559	13	14	16	18	19	20	22	23	24	26	28
12	29 338	14	15	17	19	20	21	22	24	25	27	29
13	30 805	14	16	18	20	21	22	23	24	26	28	29
14	29 024	15	17	19	20	22	23	24	25	27	29	30
15	22 541	17	18	20	22	23	24	25	26	28	30	31
16	18 751	18	19	21	22	24	25	26	27	29	30	32
17	12 059	18	20	22	23	24	25	27	28	29	31	33
Girls												
9	31 091	9	11	13	14	15	17	18	19	21	23	25
10	33 131	10	12	14	16	17	18	19	20	22	24	26
11	34 525	11	13	15	16	17	19	20	21	22	24	26
12	31 415	12	13	15	17	18	19	20	21	23	24	26
13	29 168	12	14	15	17	18	19	20	21	23	24	26
14	27 377	12	14	16	17	18	19	20	21	23	25	26
15	21 072	13	14	16	17	19	20	21	22	23	25	26
16	18 365	13	15	16	18	19	20	21	22	23	25	27
17	11 306	13	15	17	18	19	20	21	22	24	25	27

Table 7 Bent-arm hang (s) centiles by age and sex based on 189 673 test performances of children and adolescents aged 9–17 years representing 23 countries

Age (years)	n	P_5	P_{10}	P_{20}	P_{30}	P_{40}	P_{50}	P_{60}	P_{70}	P_{80}	P_{90}	P_{95}
Boys												
9	8282	1.48	2.13	3.29	4.49	5.85	7.48	9.55	12.38	16.74	25.36	35.62
10	9584	1.56	2.25	3.48	4.76	6.20	7.92	10.10	13.08	17.65	26.62	37.23
11	11 079	1.63	2.35	3.66	5.00	6.51	8.32	10.60	13.71	18.46	27.73	38.62
12	11 899	1.71	2.48	3.87	5.29	6.89	8.79	11.19	14.44	19.39	28.99	40.19
13	12 321	1.90	2.77	4.33	5.92	7.70	9.81	12.44	15.99	21.34	31.57	43.30
14	12 550	2.50	3.67	5.72	7.78	10.05	12.70	15.96	20.26	26.61	38.39	51.45
15	10 576	3.73	5.40	8.26	11.05	14.04	17.43	21.50	26.72	34.18	47.44	61.48
16	9165	5.19	7.39	10.98	14.36	17.87	21.75	26.28	31.94	39.77	53.13	66.71
17	7425	6.48	9.03	13.07	16.74	20.45	24.46	29.04	34.64	42.19	54.66	66.92
Girls												
9	7681	0.98	1.43	2.24	3.08	4.02	5.14	6.55	8.46	11.36	16.94	23.40
10	9287	0.97	1.42	2.24	3.08	4.03	5.15	6.57	8.50	11.42	17.06	23.60
11	10 942	0.96	1.42	2.23	3.08	4.03	5.16	6.59	8.53	11.48	17.18	23.79
12	13 198	0.96	1.41	2.23	3.08	4.03	5.17	6.60	8.54	11.50	17.22	23.86
13	13 613	0.96	1.41	2.23	3.08	4.03	5.18	6.62	8.58	11.56	17.33	24.04
14	13 322	0.94	1.40	2.22	3.09	4.06	5.23	6.72	8.73	11.82	17.83	24.86
15	11 324	0.92	1.38	2.23	3.11	4.13	5.35	6.91	9.05	12.34	18.80	26.41
16	9639	0.91	1.38	2.27	3.21	4.30	5.63	7.33	9.68	13.33	20.57	29.19
17	7786	0.93	1.43	2.40	3.45	4.67	6.16	8.11	10.82	15.07	23.61	33.92

the largest and most geographically representative sex-specific and age-specific European normative values for physical fitness. These norms add to existing norms across a range of other cardiometabolic risk factors, including adiposity (eg, body mass index[43 44] and waist circumference,[45–49] blood pressure,[50 51] cholesterol,[51] triglycerides[51] and glucose).[51] More importantly, they expand the normative data bank for health-related fitness, building on existing norms studies such as the recently published international CRF norms[31] and other European health-related fitness norms.[52 53]

Despite these norms not being linked to a health outcome, they nonetheless have utility for health and fitness screening, profiling, monitoring and surveillance by identifying the centile rank of children and adolescents in comparison with their peers. For instance, several authors[31 52 54] have suggested using a normative quintile-based framework to classify the fitness levels of children and adolescents, where those below the 20th centile are classified as 'very low/poor'; 20–40th centiles as 'low/poor'; 40–60th centiles as 'moderate'; 60–80th centiles as 'high/good' and those above the 80th centile as 'very high/

Table 8 10×5 m agility shuttle run (s) centiles by age and sex based on 258 618 test performances of children and adolescents aged 9–17 years representing 19 countries

Age (years)	n	P_5	P_{10}	P_{20}	P_{30}	P_{40}	P_{50}	P_{60}	P_{70}	P_{80}	P_{90}	P_{95}
Boys												
9	15 409	29.26	27.58	25.79	24.64	23.73	22.94	22.20	21.46	20.66	19.64	18.87
10	16 773	28.00	26.54	24.98	23.96	23.15	22.44	21.78	21.11	20.38	19.44	18.73
11	17 925	26.77	25.53	24.16	23.27	22.55	21.92	21.33	20.73	20.07	19.22	18.57
12	16 152	25.68	24.59	23.39	22.60	21.96	21.40	20.86	20.32	19.72	18.94	18.35
13	18 549	24.77	23.79	22.70	21.98	21.40	20.88	20.39	19.88	19.33	18.61	18.05
14	16 914	24.10	23.18	22.15	21.47	20.92	20.43	19.96	19.48	18.95	18.27	17.73
15	12 649	23.61	22.72	21.73	21.06	20.53	20.05	19.60	19.13	18.62	17.95	17.43
16	11 783	23.22	22.35	21.37	20.72	20.20	19.73	19.28	18.83	18.32	17.67	17.16
17	6423	22.89	22.03	21.07	20.43	19.91	19.45	19.01	18.56	18.06	17.42	16.91
Girls												
9	16 273	30.96	28.96	26.93	25.67	24.70	23.88	23.12	22.37	21.57	20.57	19.83
10	15 703	28.87	27.35	25.76	24.74	23.95	23.27	22.63	21.99	21.30	20.43	19.78
11	15 063	27.11	25.92	24.64	23.81	23.15	22.58	22.04	21.50	20.90	20.14	19.57
12	18 344	26.36	25.29	24.13	23.37	22.77	22.24	21.74	21.24	20.68	19.97	19.43
13	16 678	26.06	25.03	23.90	23.16	22.58	22.06	21.58	21.08	20.54	19.85	19.32
14	15 589	25.98	24.95	23.83	23.09	22.51	22.00	21.51	21.03	20.49	19.79	19.27
15	11 479	25.97	24.94	23.82	23.09	22.51	22.00	21.51	21.02	20.48	19.79	19.26
16	11 018	25.95	24.92	23.81	23.07	22.49	21.98	21.50	21.01	20.47	19.78	19.25
17	5895	25.93	24.90	23.79	23.06	22.48	21.96	21.48	20.99	20.46	19.77	19.24

Table 9 20 m shuttle run (min/stages) centiles by age and sex based on 445 092 test performances of children and adolescents aged 9–17 years representing 24 countries

Age (years)	n	P_5	P_{10}	P_{20}	P_{30}	P_{40}	P_{50}	P_{60}	P_{70}	P_{80}	P_{90}	P_{95}
Boys												
9	36 079	1.27	1.96	2.80	3.41	3.93	4.43	4.92	5.45	6.08	6.95	7.68
10	36 935	1.53	2.25	3.13	3.77	4.31	4.83	5.34	5.90	6.55	7.46	8.22
11	30 786	1.79	2.53	3.45	4.11	4.68	5.22	5.75	6.33	7.01	7.96	8.75
12	26 552	2.04	2.82	3.77	4.46	5.06	5.61	6.18	6.78	7.49	8.47	9.30
13	29 467	2.31	3.12	4.11	4.82	5.44	6.02	6.60	7.23	7.97	8.99	9.85
14	28 262	2.71	3.55	4.57	5.31	5.95	6.55	7.15	7.80	8.56	9.62	10.51
15	23 754	3.08	3.92	4.95	5.70	6.34	6.95	7.56	8.21	8.98	10.05	10.94
16	13 417	3.35	4.19	5.22	5.96	6.61	7.21	7.81	8.47	9.23	10.30	11.19
17	11 326	3.80	4.64	5.67	6.42	7.06	7.66	8.26	8.91	9.67	10.74	11.63
Girls												
9	35 027	0.87	1.41	2.08	2.56	2.98	3.38	3.77	4.20	4.70	5.40	5.98
10	36 270	1.03	1.60	2.29	2.79	3.22	3.63	4.04	4.48	5.00	5.72	6.33
11	30 751	1.31	1.91	2.64	3.18	3.64	4.07	4.51	4.98	5.53	6.30	6.94
12	26 119	1.27	1.89	2.66	3.21	3.69	4.14	4.60	5.08	5.66	6.46	7.13
13	20 066	1.25	1.87	2.64	3.20	3.68	4.13	4.58	5.07	5.65	6.46	7.13
14	19 557	1.24	1.87	2.64	3.20	3.68	4.13	4.58	5.07	5.65	6.46	7.13
15	15 682	1.24	1.87	2.63	3.19	3.67	4.13	4.58	5.07	5.65	6.46	7.13
16	13 317	1.21	1.84	2.61	3.17	3.66	4.11	4.57	5.06	5.64	6.45	7.13
17	11 725	1.20	1.83	2.60	3.17	3.65	4.11	4.56	5.06	5.64	6.45	7.13

Note: 20 m shuttle run centiles are available for other metrics in online supplement 4.

good'. Single test measures can be qualitatively interpreted using these quintile-based thresholds and longitudinal changes tracked against centile bands to identify expected, better than expected or worse than expected developmental changes. In addition, long-term intervention studies are required to determine whether changes in fitness in response to exercise training are over and above expected developmental changes illustrated by our age-related reference values. While individual fitness test scores can be benchmarked and tracked, a composite or overall fitness score could also be generated as an aggregate score summarising centiles across all fitness components or across multiple components or subdomains of interest (eg, a composite score for health-related fitness should aggregate centiles for CRF, MSF and flexibility). This scoring structure, similar to that used in the Canadian Assessment of Physical Literacy,[55 56] could help identify the fitness components/subdomains in need of attention in order to provide appropriate feedback and advice to children about how to best improve their overall physical fitness. In this context, the lowest quintile has extensively been used as a threshold for defining low fitness or unfit youth.[57] In prospective cohort studies, this group has been shown to have a disproportionately higher risk for future diseases.[58] Even more stringent cut-points (eg, 10th centile) have been proposed for individuals who should be checked for the existence of other risk factors or developmental problems. In a cohort study conducted in more than 1 million Swedish male adolescents, it was observed that those in the lowest decile of muscular strength had significantly higher risk of all-cause mortality, cardiovascular disease mortality and suicide mortality, supporting the notion that this should be considered a group at risk.[12]

To date, research examining criterion-referenced standards in children and adolescents has focused on CRF,[22 23 59] with new international standards recently published for healthy CRF recently published.[23] While not the first study to estimate the percentage of European children and adolescents with apparently healthy CRF,[52] this study provides the most current and best available estimate using the new international criterion-referenced standards. This study is consistent with previous studies showing a latitudinal gradient, where children and adolescents from Northern-Central Europe typically have better CRF than their peers from Southern Europe.[16 41 42] This study also identified considerable variability in healthy CRF levels among different European countries. Variability in CRF was previously identified as a strong unfavourable correlate of country-specific income inequality (operationalised as the Gini index); meaning, countries with a large population spread of income tend to have poor CRF levels.[42] The observed age gradient in healthy CRF levels may reflect that children are generally healthier than adolescents or it may be an artefact of the new international standards being age-independent. Unfortunately, criterion-referenced standards for fitness components other than CRF do not currently exist. In addition, CRF criterion-referenced standards do not exist for outcomes other than cardiometabolic health (ie, poor bone health, mental health, cognitive health and so on), which is a limitation and represents an area for future research.

This study systematically identified and quantified the sex-specific differences in Eurofit performance, showing that boys outperformed girls on CRF, MSF and speed-agility tests and experienced larger age-specific changes, while girls outperformed boys on the flexibility test. While the underlying causes of the sex-specific differences are clear for some fitness components (eg, differences in MSF are largely explained by physical differences such as differences in body size/composition), they are less clear for others (eg, differences in CRF may be explained by physiological differences such as differences in mechanical efficiency and/or the fractional utilisation of oxygen).[21 60 61] It is, nonetheless, beyond the scope of this paper to discuss these mechanistic causes. However, there is a need for longitudinal cohort studies to better understand what mechanisms drive sex-specific and age-specific differences in physical fitness throughout childhood and adolescence.

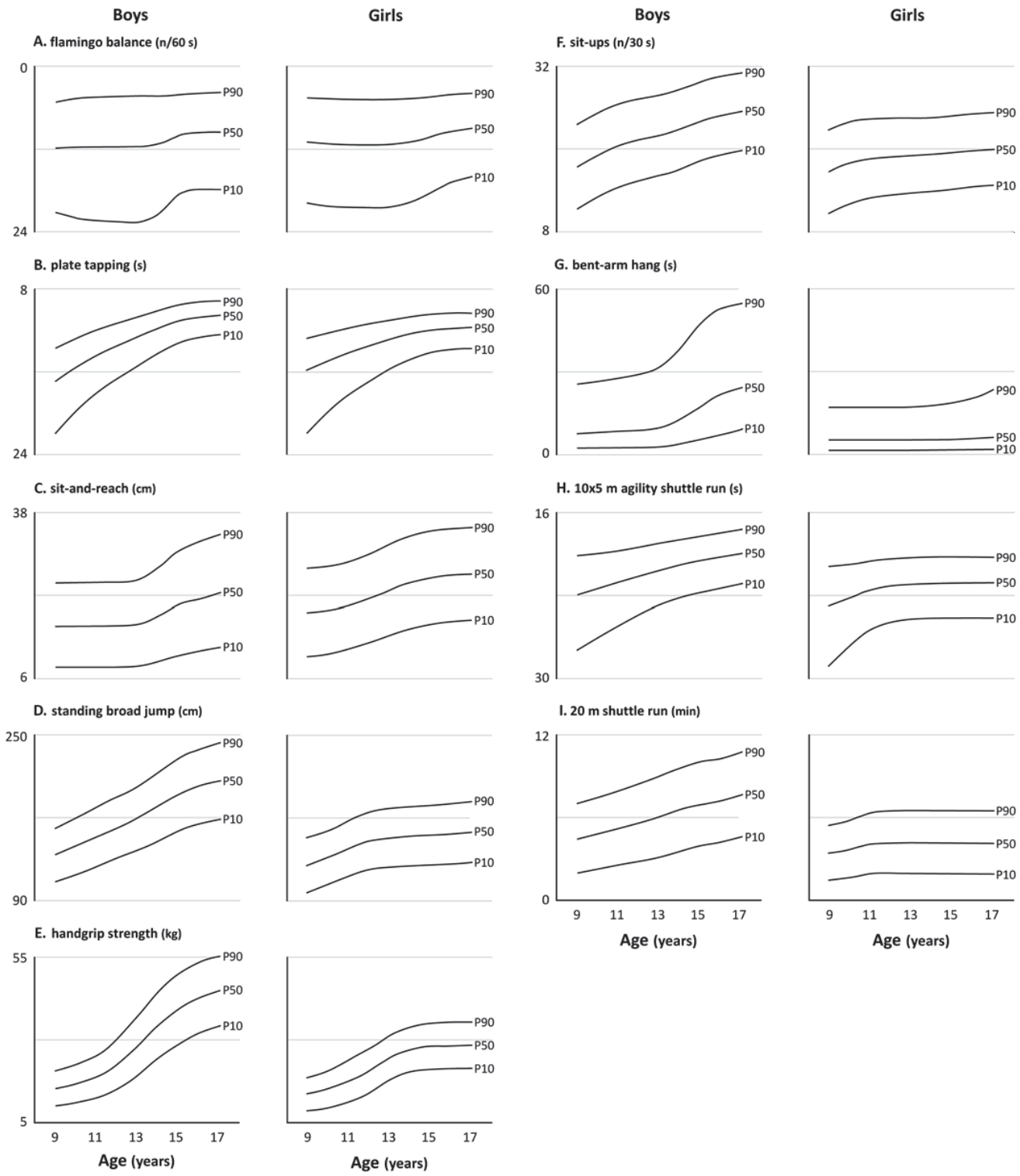

Figure 4 Smoothed centile curves (P_{10}, P_{50} and P_{90}) for (A) flamingo balance (n/60 s), (B) plate tapping (s), (C) sit-and-reach (cm), (D) standing broad jump (cm), (E) handgrip strength (kg), (F) sit-ups (n/30 s), (G) bent-arm hang (s), (H) 10×5 m agility shuttle run (s) and (I) 20 m shuttle run (min).

Strengths and limitations

This study summarised cross-sectional Eurofit data from 98 studies to generate probably Europe's largest physical fitness database for children and adolescents. Although not the first comprehensive review of children's Eurofit performance, it does provide an update to a previous review[16] by: (1) extending the data coverage from 2001 to 2015 through a rigorous systematic review process, (2) producing sex-specific and age-specific European normative values and (3) estimating the percentage of European children and adolescents with healthy CRF.

Despite the strengths of this study, it is not without limitations. First, we pooled data from studies that used different

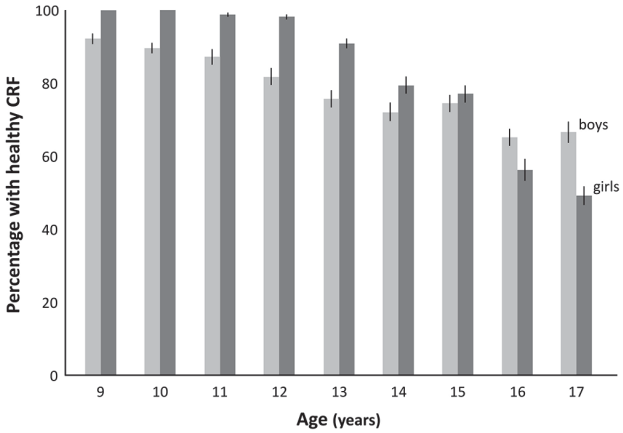

Figure 5 Percentage of European children and adolescents aged 9–17 years meeting the new international criterion-referenced standards of 42 mL/kg/min (boys, light grey bars) and 35 mL/kg/min (girls, dark grey bars) for healthy CRF. The thin black vertical lines show the 95% CIs. CRF, cardiorespiratory fitness.

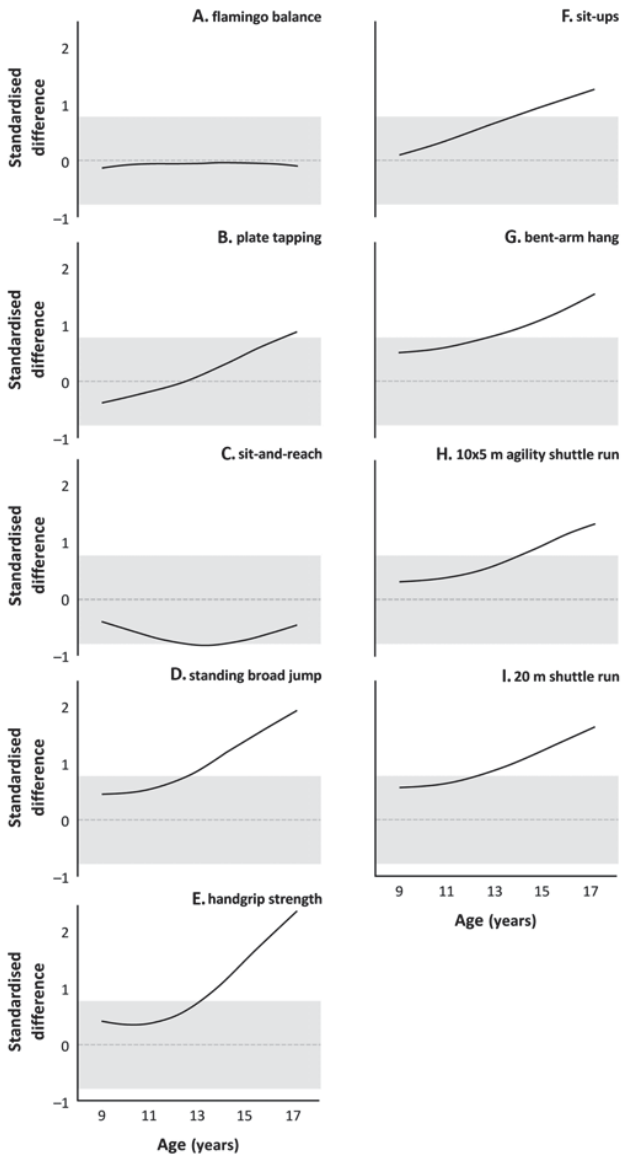

Figure 6 Standardised sex-specific differences in mean Eurofit performance for European children and adolescents aged 9–17 years. The limits of the grey zone represent the threshold for a large standardised difference (ie, 0.8 or −0.8). Positive differences indicated that Eurofit performances for boys were better than those for girls.

sampling methods (probability and non-probability sampling) and sampling frames (national-level, state/provincial-level and community-level), which raises the issue of representativeness. However, we used the best available data and a poststratification population weighted approach to control for oversampling and undersampling across studies and countries. Second, differences in testing conditions (eg, climate, altitude, practice and testing surfaces) and measurement errors (eg, methodological drift and diurnal variation) might have occurred, although the large number of included data points should have minimised these issues. Third, the vigorous nature of the Eurofit may have resulted in difficulties in testing, or exclusion of, individuals with a lower level of physical function. The absence of data from these populations may have inflated our norms within the lower centile range. Fourth, our sex-specific and age-specific norms and differences in Eurofit performance are also limited by the potential for unmeasured confounding. For example, biological maturation, which was rarely reported in the included studies and was therefore not included in our analysis, confounds sex-specific and age-specific differences in physical fitness.[62] Large-scale longitudinal studies focused on the influence of maturation on physical fitness are needed. Finally, Eurofit data were also collected at different times in the period between 1981 and 2015 and given evidence of temporal changes in some (but not all) fitness components in European children,[21 28 63–69] it is possible that our norms represent a different health-related picture than what would actually be observed today. However, without the availability of temporal trends data for all included countries, temporal corrections of our norms are not possible.

Recommendations

Given the widespread use of the Eurofit and other test batteries such as the ALPHA, there is a need for consistent reporting of results across studies to assist future data pooling and the update of normative values. In addition to recommending that the Eurofit be routinely administered (in part or in whole) in schools to improve national and regional surveillance of health and fitness, we also make the following recommendations:

1. An online multilingual operations and procedures manual, including instructional videos, should be made available (eg, the ALPHA project manual, http://profith.ugr.es/alpha-children). Researchers should make de-identified raw data available through an online data repository[42 70] in order to help improve surveillance efforts across the region. For example, scheduled for official release in 2018 is a free website (http://www.activehealthykids.org/kids-fit-guide/) that will compute a report comparing individual 20 m shuttle run performances to national, regional and international normative values and criterion-referenced standards, providing researchers with valuable analytical support.
2. Care should be taken to minimise and report factors that may impact fitness test performance (eg, climate, temperature, humidity, altitude, clothing, ground surfaces/conditions, pretest instructions and test familiarisation). Studies should be conducted to assess the effect of these factors on fitness test performance.

What are the new findings?

- This study presents the largest and most geographically representative sex-specific and age-specific European normative values for physical fitness in children and adolescents.
- This study estimated that 78% (95% CI 72% to 85%) of boys and 83% (95% CI 71% to 96%) of girls met the new international criterion-referenced standards of 42 and 35 mL/kg/min respectively for healthy cardiorespiratory fitness (CRF), with the percentage meeting the standards decreasing with age.
- This study showed that boys performed better than girls on muscular strength, muscular power, muscular endurance, speed-agility and CRF tests, but worse on the flexibility test. Boys' fitness also generally improved at a faster rate than girls' fitness, especially during the teenage years.

How might it impact on clinical practice in the future?

- Sex-specific and age-specific European normative values for physical fitness in children and adolescents are important for health and fitness screening, profiling, monitoring and surveillance.

3. Best practice should include that: (1) test protocols be followed and test results be reported as per the operations and procedures manual; (2) biological age (sexual maturation) be measured (if appropriate) in addition to chronological age; (3) descriptive statistics (sample sizes, means and SDs) be reported in 1 year age and sex groups based on age at last birthday and (4) the year(s) of testing be reported.

CONCLUSION

Physical fitness is an important indicator of good health, and the Eurofit is probably the most popular way to measure physical fitness throughout Europe. This study pooled 2 779 165 Eurofit performances, representing children and adolescents from 30 European countries. This large summary analysed the best available Eurofit data to: (1) provide the largest and most geographically representative sex-specific and age-specific European normative values for physical fitness in children and adolescents and (2) estimate the percentage of children and adolescents with healthy CRF according to the new international criterion-referenced standards. These data have utility for both health and sport promotion given that they help to identify children and adolescents with: (1) very low/poor fitness in order to set appropriate fitness goals, monitor longitudinal changes and promote positive health-related fitness behaviours (eg, physical activity and exercise promotion) and (2) very high/good fitness in the hope of recruiting them into sporting or athletic development programmes.

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Contributors GRT developed the systematic review research question and objectives. GRT, ND and LL created the search strategy and provided guidance on review methodology. KC, FA, LL and ND screened and extracted the data. GRT and KC led the data analysis, data synthesis and writing of the manuscript. All authors contributed to interpretation of the results, edited, reviewed and approved the final manuscript.

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IN THE CIRCUIT COURT OF HARRISON COUNTY, WEST VIRGINIA

RE: CHANGE OF NAME OF [redacted]

Civil Action No. 22-P-104-1
Judge Christopher J. McCarthy

Heather D. Jackson and
Wesley Scott Pepper, as parents

Petitioners.

ORDER GRANTING PETITION FOR CHANGE OF NAME

Pending before the Court is a Petition for Change of Name, filed by Heather Jackson and Wesley Pepper, as parents, legal guardians, and next of friends on behalf of their daughter, originally named [redacted], a minor child. The Petitioner seeks the name change in order for her name to conform with her gender identity.

On May 2, 2022, the Petitioners filed the Petition for name change that is pending. The hearing was scheduled for June 1, 2022. On June 1, 2022, this Court held a hearing on the Petition following proper publication of notice as a Class-I legal advertisement. Present at said hearing were Petitioners Heather D. Jackson, Wesley Scott Pepper, and the Minor Child.

The Court now concludes that the Petition will be **GRANTED**.

FINDINGS OF FACT

1. On May 2, 2022, Heather D. Jackson and Wesley Scott Pepper filed in Harrison County, West Virginia a Petition for Change of Name seeking to change their daughter's name from [redacted] to [redacted].

2. [redacted] has been a bona fide resident of Harrison County for all relevant periods of time.
3. Notice of the hearing on said Petition was published as a Class-I legal advertisement on May 18, 2022, in the Clarksburg Exponent Telegram, a newspaper of general circulation for Harrison County, West Virginia, at least 10 days prior to the June 1, 2022 hearing.
4. The name change is not being sought for any of the illegal purposes articulated in West Virginia Code § 48-25-101(a), and the Petitioners are not barred from seeking a name change based on the provisions of § 48-25-101(a) or § 48-25-103, as represented by the Petitioners in their properly verified Petition.[1]
5. No injury will be done to any person by reason of the name change.
6. Reasonable and proper cause exists for the name change.

[1] West Virginia Code § 48-25-101(a) states:

> (a) A person desiring a change of his or her own name, or that of his or her child, may apply to the circuit court or family court of the county in which he or she resides by a verified petition setting forth and affirming the following:
> (1) That he or she has been a bona fide resident of the county for at least one year prior to the filing of the petition or that he or she is a nonresident of the county who was born in the county, was married in the county and was previously a resident of the county for a period of at least fifteen years;
> (2) The cause for which the change of name is sought;
> (3) The new name desired;
> (4) The name change is not for purposes of avoiding debt or creditors;
> (5) The petitioner seeking the name change is not a registered sex offender pursuant to any state or federal law;
> (6) The name change sought is not for purposes of avoiding any state or federal law regarding identity;
> (7) The name change sought is not for any improper or illegal purpose;
> (8) The petitioner is not a convicted felon in any jurisdiction;
> (9) The name change sought is not for any purpose of evading detection, identification or arrest by any local, state or federal law-enforcement agency; and
> (10) Whether or not the petitioner desires to protect his or her identity for personal safety reasons.

7. The name change is not sought for any fraudulent or evil intent on the part of the Petitioners.

8. Petitioners testified at the hearing that their daughter wished to change her name to reflect her gender identity. The minor child also testified to this fact.

CONCLUSIONS OF LAW

Pursuant to West Virginia Code § 48-25-103(a), a court may grant a name change after making certain findings regarding the facts and circumstances of a Petition:

> Upon the filing of the verified petition, and upon proof of the publication of the notice and of the matters set forth in the petition, and being satisfied that no injury will be done to any person by reason of the change, and upon a finding that all representations the applicant has affirmed pursuant to subsection (a), section one hundred one of this article are true and the applicant is not prohibited from obtaining a name change pursuant to this article, that reasonable and proper cause exists for changing the name of petitioner and that the change is not desired because of any fraudulent or evil intent on the part of the petitioner, the court or judge may order a change of name.

W. Va. Code § 48-25-103(a).

The Court is not permitted to grant a name change if certain other circumstances are present:

> (b) The court may not grant any change of name for any person convicted of any felony during the time that the person is incarcerated.
>
> (c) The court may not grant any change of name for any person required to register with the State Police pursuant to the provisions of article twelve, chapter fifteen of this code during the period that the person is required to register.
>
> (d) The court may not grant a change of name for persons convicted of first degree murder in violation of section one, article two, chapter sixty-

> one of this code for a period of ten years after the person is discharged from imprisonment or is discharged from parole, whichever occurs later.
>
> (e) The court may not grant a change of name of any person convicted of violating any provision of section fourteen-a, article two, chapter sixty-one of this code for a period of ten years after the person is discharged from imprisonment or is discharged from parole, whichever occurs later.

W. Va. Code § 48-25-103(b)–(e).

Further, when a name change involves a minor child, proof that the change is in the best interest of the child is necessary over and above what is required by the name change statute. W. Va. Code § 48-25-101 et seq.; Syl. Pt. 3, *In re Name Change of Jenna A.J.*, 231 W. Va. 159, 744 S.E. 2d 269 (2013) (internal citations omitted). Any name change involving a minor child may be made only upon clear, cogent, and convincing evidence that the change would significantly advance the best interests of the child. *Id.* at 231 W. Va. at 163, 744 S.E.2d at 273 (2013).

The Court finds that it is the best interest of the minor child to change her name for several reasons. First, children who are allowed to have names conforming to their gender identity feel more accepted by the community as a whole. Second, changing the minor child's name to her gender identity ensures a safe and happy mental state by the child in conforming with her gender identity. Finally, this name change is supported by the parents. Both of whom know the mind of their child.

The Court is satisfied that all the requirements of the above-quoted statutes have been met, and that the Petitioner is not barred from having the Petition granted by the same.

ORDER

Therefore, based on its above-stated findings, the Court concludes that the instant Petition will be **GRANTED.**

It is hereby **ORDERED** that the name of [redacted] shall be changed to [redacted] by which name she shall hereafter be called.

It is **FURTHER ORDERED** that Petitioner shall immediately deliver a certified copy of this Order to the Office of the Clerk of the County Commission of Harrison County, West Virginia, the current county of his residence, and upon payment of any fees the clerk shall immediately record the same in a book to be kept for the purpose of name changes, and index the same under both the old and the new names. After this Order is filed in the Office of the Clerk of the County Commission, the new name of [redacted] is to be used in place of the Petitioner's former name.

It is **FURTHER ORDERED** that the Clerk of this Court shall send three (3) certified copies of this Order to the Petitioners, Heather D. Jackson and Wesley Scott Pepper, 12537 Buckhannon Pike, Lost Creek, WV 26385. This is a **FINAL ORDER**. The Clerk of this Court is **ORDERED** to remove this case from the Court's docket.

ENTER: 6/2/2022

The Hon. Christopher J. McCarthy, Chief Judge

STATE OF WEST VIRGINIA

COUNTY OF HARRISON, TO-WIT

I, Albert F. Marano, Clerk of the Fifteenth Judicial Circuit and the 18th Family Court Circuit of Harrison County, West Virginia, hereby certify the foregoing to be a true copy of the ORDER entered in the above styled action on the 2nd day of June, 2022.

IN TESTIMONY WHEREOF, I hereunto set my hand and affix the Seal of the Court this 2nd day of June, 2022.

Albert F. Marano

Fifteenth Judicial Circuit & 18th
Family Court Circuit Clerk
Harrison County, West Virginia

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

LAINEY ARMISTEAD,

Defendant-Intervenor.

Civil Action No. 2:21-cv-00316

Hon. Joseph R. Goodwin

PLAINTIFF'S REPLY IN SUPPORT OF HER MOTION *IN LIMINE* TO EXCLUDE EVIDENCE AND/OR TESTIMONY OF BERNARD DOLAN REGARDING CERTAIN HEARSAY STATEMENTS AND SUPPORTING MEMORANDUM OF LAW

B.P.J. has moved this Court to exclude two statements made by Mr. Dolan at his deposition: (1) a statement by Mr. Dolan that an unknown and unidentified male student allegedly told him that he would "be a girl" to play on the volleyball team and (2) a statement by an unidentified school staff member who allegedly told Mr. Dolan that the school "had one student who one day identified as a girl, next day a boy, and back and forth." (Dkt. No. 406 (Pl. MIL) at 2.) In their oppositions, the State (Dkt. No. 422 (State Opp.)) and Intervenor (Dkt. No. 427 (Intervenor Opp.)) have walked themselves into a corner. To avoid the bar against hearsay, the State now concedes

that the only probative value of the statements would be to justify the enactment of H.B. 3293. But these statements are irrelevant for that purpose and thus inadmissible.

ARGUMENT

As a preliminary matter, even if Mr. Dolan testifies at trial, both of the statements at issue are inadmissible hearsay.[1] Defendants now argue that the statements will not be introduced for the truth of the matter, but instead to show the state of mind of those enacting H.B. 3293. But Mr. Dolan is not a legislator and did not have any input on whether or if H.B. 3293 was enacted. As a result, it is wholly irrelevant whether Mr. Dolan was on notice of these alleged statements or what his state of mind was having heard these alleged statements. The same goes for the declarants—they had no part in the enactment of H.B. 3293 and thus their state of mind or intentions are entirely irrelevant. Instead, the only way that these statements touch on any issue before this Court is if the State and Intervenor introduce them for the truth of the matter asserted therein: a misplaced effort to bolster the legislature's decision to enact H.B. 3293. Therefore, the statements are inadmissible hearsay that do not fall into any exception. Fed. R. Evid. 802.

Moreover, the statements are irrelevant. According to the State and Intervenor, these hearsay statements are probative because they show that "at the time H.B. 3293 was enacted, the WVSSAC was experiencing activity on this topic [of transgender students participating in secondary school athletics]." (Dkt. No. 422 (State Opp.) at 3; *see* Dkt. No. 427 (Intervenor Opp.) at 1 (stating that these statements are admissible because they are "germane to refute B.P.J.'s argument that legislators had no legitimate reason to enact [H.B. 3293]").) The State also claims

[1] The State claims that Mr. Dolan will be a witness at trial and thus that his deposition testimony will only be used if he is "unavailable" or for impeachment. (Dkt. 422 (State Opp.) at 4.) If a hearing is required and Mr. Dolan appears, the first hearsay bar will be addressed. But if he does not appear, Plaintiff reserves the right to challenge the basis of his "unavailability" and maintains that both statements are inadmissible hearsay. Fed. R. Evid. 801(c).

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,

vs.

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

Defendants,

and

LAINEY ARMISTEAD,

Defendant-Intervenor.

Case No. 2:21-cv-00316

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[upression] 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 identity 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 Rigby 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. Brigard 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

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[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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IN THE UNITED STATES DISTRICT COURT
FOR THE SOUTHERN DISTRICT OF WEST VIRGINIA

CHARLESTON DIVISION

B. P. J., et al.,

Plaintiffs,

v. CIVIL ACTION NO. 2:21-cv-00316

WEST VIRGINIA STATE BOARD OF EDUCATION, et al.,

Defendants.

MEMORANDUM OPINION AND ORDER

West Virginia passed a law that defines "girl" and "woman," for the purpose of secondary school sports, as biologically female. Under the law, all biological males, including those who identify as transgender girls, are ineligible for participation on girls' sports teams. B.P.J., a transgender girl who wants to play girls' sports, challenges the law. The question before the court is whether the legislature's chosen definition of "girl" and "woman" in this context is constitutionally permissible. I find that it is.

I. Relevant Facts

A. B.P.J.

B.P.J. is an eleven-year-old transgender girl. This means that although B.P.J.'s biological sex is male, she now identifies and lives as a girl. According to her First Amended Complaint, B.P.J. began expressing her female gender identity when she

was three years old. [ECF No. 285-2]. By the end of third grade, B.P.J. expressed herself fully—both at home and otherwise—as a girl. In 2019, B.P.J. was diagnosed with gender dysphoria and, at the first signs of puberty, she began taking puberty blocking medications to treat that condition. [ECF No. 289-21]. As a result, B.P.J. has not undergone endogenous male puberty.

In 2021, as she prepared to enter middle school, B.P.J. expressed interest in trying out for the girls' cross-country and track teams. When her mother, Plaintiff Heather Jackson, asked the school to allow B.P.J. to participate on the girls' teams, the school initially informed her that whether B.P.J. would be permitted to play on the girls' teams depended on the outcome of House Bill ("H.B.") 3293, which was then pending in the West Virginia legislature. When the law passed, the school informed Ms. Jackson that B.P.J. would not be permitted to try out for the girls' teams.

B. The "Save Women's Sports Bill"

H.B. 3293, entitled the "Save Women's Sports Bill," was introduced in the West Virginia House of Delegates on March 18, 2021. The bill passed and was codified as West Virginia Code Section 18-2-25d, entitled "Clarifying participation for sports events to be based on biological sex of the athlete at birth." The law, which was clearly carefully crafted with litigation such as this in mind, begins with the following legislative findings:

> (1) There are inherent differences between biological males and females, and that these differences are cause for celebration, as determined by the Supreme Court of the United States in *United States v. Virginia* (1996);

(2) These inherent differences are not a valid justification for sex-based classifications that make overbroad generalizations or perpetuate the legal, social, and economic inferiority of either sex. Rather, these inherent differences are a valid justification for sex-based classifications when they realistically reflect the fact that the sexes are not similarly situated in certain circumstances, as recognized by the Supreme Court of the United States in *Michael M. v. Sonoma County, Superior Court* (1981) and the Supreme Court of Appeals of West Virginia in *Israel v. Secondary Schools Act. Com'n* (1989);

(3) In the context of sports involving competitive skill or contact, biological males and biological females are not in fact similarly situated. Biological males would displace females to a substantial extent if permitted to compete on teams designated for biological females, as recognized in *Clark v. Ariz. Interscholastic Ass'n* (9th Cir. 1982);

(4) Although necessarily related, as concluded by the United States Supreme Court in *Bostock v. Clayton County* (2020), gender identity is separate and distinct from biological sex to the extent that an individual's biological sex is not determinative or indicative of the individual's gender identity. Classifications based on gender identity serve no legitimate relationship to the State of West Virginia's interest in promoting equal athletic opportunities for the female sex; and

(5) Classifications of teams according to biological sex is necessary to promote equal athletic opportunities for the female sex.

W. Va. Code § 18-2-25d(a)(1)–(5).

After making these findings, the law sets forth definitions of "biological sex," "female," and male" as follows:

(1) "Biological sex" means an individual's physical form as a male or female based solely on the individual's reproductive biology and genetics at birth.

> (2) "Female" means an individual whose biological sex determined at birth is female. As used in this section, "women" or "girls" refers to biological females.
>
> (3) "Male" means an individual whose biological sex determined at birth is male. As used in this section, "men" or "boys" refers to biological males.

Id. § 18-2-25d(b)(1)–(3).

Finally, the law requires that each athletic team that is "sponsored by any public secondary school or a state institution of higher education" "be expressly designated as" either male, female, or coed, "based on biological sex." *Id.* § 18-2-25d(c). Teams that are designated "female" "shall not be open to students of the male sex where selection for such teams is based upon competitive skill or the activity involved is a contact sport." *Id.* § 18-2-25d(c)(2).

C. Procedural History

On May 26, 2021, B.P.J., through her mother, filed this lawsuit against the West Virginia State Board of Education and its then-Superintendent W. Clayton Burch, the Harrison County Board of Education and its Superintendent Dora Stutler, and the West Virginia Secondary Schools Activities Commission ("WVSSAC"). The State of West Virginia moved to intervene, and that motion was granted. Plaintiff then amended her complaint, [ECF No. 64], naming the State of West Virginia and Attorney General Patrick Morrisey as defendants. Mr. Morrisey has since been dismissed as a party from this lawsuit.

In her amended complaint, B.P.J. alleges that Defendants Burch, Stutler, and the WVSSAC deprived her of the equal protection guaranteed to her by the

Fourteenth Amendment and that the State, the State Board of Education, the Harrison County Board of Education, and the WVSSAC have violated Title IX. B.P.J. seeks a declaratory judgment that Section 18-2-25d of the West Virginia Code violates Title IX and the Equal Protection Clause; an injunction preventing Defendants from enforcing the law against her; a waiver of the requirement of a surety bond for preliminary injunctive relief; nominal damages; and reasonable attorneys' fees.

B.P.J. initially requested a preliminary injunction to allow her to compete on the girls' track and cross-country teams during the pendency of this case. Finding that B.P.J. had a likelihood of success on the merits of her as-applied challenge to the law, I granted the preliminary injunction. All defendants moved to dismiss, and those motions were denied. Lainey Armistead, a cisgender[1] female college athlete then moved to intervene as a defendant and that motion was granted. All parties have now moved for summary judgment.

II. Legal Standard

Summary judgment is appropriate where the "depositions, documents, electronically stored information, affidavits or declarations, stipulations . . . , admissions, interrogatory answers, or other materials" show that "there is no genuine dispute as to any material fact and the movant is entitled to judgment as a matter of law." Fed R. Civ. P. 56(a), (c)(1)(A).

[1] "Cisgender" means a person whose gender identity aligns with her biological sex. *See Grimm v. Gloucester Cnty. Sch. Bd.*, 972 F.3d 586, 594 (4th Cir. 2020), *as amended* (Aug. 28, 2020), *cert. denied*, 141 S. Ct. 2878 (2021).

III. Analysis

B.P.J. alleges that H.B. 3293 violates the Constitution's Equal Protection Clause and Title IX. I will address each argument in turn. Before turning to the merits of those arguments, however, I find it important to address some preliminary matters.

A. The WVSSAC's Motion

The WVSSAC does not argue the merits of Plaintiff's Equal Protection or Title IX claims. Rather, the WVSSAC only argues that it is not a state actor and is therefore not subject to scrutiny under either the Equal Protection Clause or Title IX. I disagree. Defendant WVSSAC's motion [ECF No. 276] is **DENIED**.

A court may only apply equal protection scrutiny to state action. U.S. Const. amend. XIV, § 1, cl. 4.; *Lugar v. Edmondson Oil Co., Inc.*, 457 U.S. 922, 923–24 (1982). Likewise, only a party acting under the color of state law is subject to suit pursuant to 42 U.S.C. § 1983. Despite differing terms, the color-of-law requirement in a § 1983 claim and the state action requirement under the Fourteenth Amendment are synonymous and are analyzed the same way. *See Lugar*, 457 U.S. at 923–24; *United States v. Price*, 383 U.S. 787, 794 (1966).

"[T]he character of a legal entity is determined neither by its expressly private characterization in statutory law, nor by the failure of the law to acknowledge the entity's inseparability from recognized government officials or agencies." *Brentwood Acad. v. Tenn. Secondary Sch. Athletic Ass'n*, 531 U.S. 288, 931 (2001) (citing *Lebron v. Nat'l R.R. Passenger Corp.*, 513 U.S. 374 (1995)). For example, an ostensibly

private actor can become a state actor when it is "controlled by an 'agency of the State,'" or "entwined with governmental policies[,]" or the government is "entwined in [its] management or control." *Pennsylvania v. Bd. of Dir. of City Trs. of Phila.*, 353 U.S. 230, 231 (1957); *Evans v. Newton*, 382 U.S. 296, 299 (1966). There is, however, no rigid test to determine when a challenged action becomes a state action. *Brentwood Acad.*, 531 U.S. at 295. No single fact nor set of conditions will definitively confer state action because there may be a better "countervailing reason against attributing activity to the government." *Id.* at 295–96. "Only by sifting facts and weighing circumstances can the nonobvious involvement of the State in private conduct be attributed its true significance." *Lugar*, 457 U.S. at 939 (citing *Burton v. Wilmington Parking Auth.*, 365 U.S. 715, 860 (1961); *Peltier v. Charter Day Sch., Inc.*, 37 F.4th 104, 116 (4th Cir. 2022) ("[T]he inquiry is highly fact-specific in nature.").

After considering its composition, rulemaking process, obligations under state law, and other rules for student eligibility, I find the WVSSAC is a state actor. Like in *Brentwood Acad.*, the WVSSAC's nominally private character "is overborne by the pervasive entwinement of public institutions and public officials in its composition and workings, and there is no substantial reason to claim unfairness in applying constitutional standards to it." 531 U.S. at 298. I find that the WVSSAC is a state actor for several reasons. Though county boards of education have the statutory authority to supervise and control interscholastic athletic events, they have delegated that authority to the WVSSAC. [ECF No. 285-1]. Every public secondary school in

West Virginia is a member of the WVSSAC, and the school principals sit on the WVSSAC's Board of Control to propose and vote on sports rules and regulations. *Id.* Any rule the WVSSAC passes is then subject to approval by the State Board of Education, and the State Board of Education requires that any coach who is not also a teacher be trained by the WVSSAC and certified by the State Board of Education. *Id.* And the WVSSAC Board of Directors—the entity that enforces the rules—includes representatives of the State Superintendent and the State Board of Education, among other governmental entities. *Id.*; 127 C.S.R. § 127-1-8.2. Here, it appears that the WVSSAC cannot exist without the state, and the state cannot manage statewide secondary school activities without the WVSSAC. The WVSSAC is pervasively entwined with the state.

The WVSSAC's motion for summary judgment [ECF No. 276] is therefore **DENIED**.

B. Animus

In her Amended Complaint, B.P.J. alleges that H.B. 3293 was introduced in the legislature "as part of a concerted, nationwide effort to target transgender youth for unequal treatment." [ECF No. 64, ¶ 45]. B.P.J. alleges that the law was "targeted at, and intended only to affect, girls who are transgender." *Id.* ¶ 46. In support of these contentions, B.P.J. points to the actions of bill co-sponsor Delegate Jordan Bridges. According to the Amended Complaint, Delegate Bridges made a Facebook post announcing the introduction of the bill and then "'liked' comments on his post that advocated for physical violence against girls who are transgender, compared

girls who are transgender to pigs, and called girls who are transgender by a pejorative term." *Id.* ¶ 47. In her summary judgment motion, B.P.J. again points the court to the actions of Delegate Bridges and points to several instances where legislators made clear that the purpose of the bill was to address transgender participation in sports.

Notwithstanding these statements, B.P.J. does not argue that the law is unconstitutional under the Supreme Court's animus doctrine, and the record lacks sufficient legislative history to make such a finding. The record makes abundantly clear, however, that West Virginia had no "problem" with transgender students playing school sports and creating unfair competition or unsafe conditions. In fact, at the time it passed the law, West Virginia had no known instance of any transgender person playing school sports. While the legislature did take note of transgender students playing sports in other states, it is obvious to me that the statute is at best a solution to a potential, but not yet realized, "problem."

Even so, the law is only unconstitutional under the animus doctrine if the reason for its passage was the "bare desire" to harm transgender people. *U.S. Dep't of Agric. v. Moreno*, 413 U.S. 528, 535 (1973). While the record before me does reveal that at least one legislator held or implicitly supported private bias against, or moral disapproval of, transgender individuals, it does not contain evidence of that type of animus more broadly throughout the state legislature. Therefore, I cannot find unconstitutional animus on the record before me.

C. Other Matters

Next, before proceeding to the merits of the case, I find it important to briefly discuss what this case is *not*.

First, despite the politically charged nature of transgender acceptance in our culture today, this case is *not* one where the court needs to accept or approve B.P.J.'s existence as a transgender girl. B.P.J., like all transgender people, deserves respect and the ability to live free from judgment and hatred for simply being who she is. But for the state legislature, creating a "solution" in search of a problem, the courts would have no reason to consider eligibility rules for youth athletics. Nevertheless, I must do so now.

This is also *not* a case where B.P.J. challenges the entire structure of school sports. B.P.J. does not challenge, on a broad basis, sex-separation in sports. B.P.J. wants to play on a girls' team. And she admits that there are benefits associated with school athletics, "including when such athletics are provided in a sex-separated manner." [ECF No. 286-1, at 1445]. Ultimately, B.P.J.'s issue here is not with the state's offering of girls' sports and boys' sports. It is with the state's definitions of "girl" and "boy." The state has determined that for purposes of school sports, the definition of "girl" should be "biologically female," based on physical differences between the sexes. And the state argues that its definition is appropriate here because it is substantially related to an important government interest. B.P.J., for her part, seeks a legal declaration that a transgender girl is "female."

I will not get into the business of defining what it means to be a "girl" or "woman." The courts have no business creating such definitions, and I would be hard-pressed to find many other contexts where one's sex and gender are relevant legislative considerations. But I am forced to consider whether the state's chosen definition passes constitutional muster in this one discrete context.

D. Equal Protection

Having addressed those matters, I now turn to the merits of B.P.J.'s claim that H.B. 3293 violates the Constitution's Equal Protection Clause.

1. Legal Standard

The Equal Protection Clause of the Fourteenth Amendment provides that no state may deny any person within its jurisdiction "equal protection of the laws." U.S. Const. amend. XIV, § 1, cl. 4. In other words, "all persons similarly situated should be treated alike." *City of Cleburne, Tex. v. Cleburne Living Ctr.*, 473 U.S. 432, 439 (1985). Realistically, though, every law impacts people differently, and the Fourteenth Amendment does not prohibit that outcome. *Reed v. Reed*, 404 U.S. 71, 75 (1971). But the Equal Protection Clause does forbid a statute from placing people into different classes and treating them unequally for reasons "wholly unrelated to the objective of that statute." *Id.* at 75–76. Ultimately, if a law seeks to treat different groups of people differently, it must do so "upon some ground of difference having a fair and substantial relation to the object of the legislation, so that all persons similarly circumstanced shall be treated alike." *Id.* at 76 (quoting *Royster Guano Co. v. Virginia*, 253 U.S. 412, 415 (1920)).

In general, courts presume that a law is constitutional. Based on that presumption, courts may only overturn a law if the challenger can show that the law's classification is not rationally related to *any* government interest. *Moreno*, 413 U.S. at 533. This general review is known as rational basis review. However, the court's inquiry becomes more searching if the law disadvantages a group of people who have historically been discriminated against and whose identity has nothing to do with their ability to participate in society. Race-based laws, for example, are "immediately suspect" because "they threaten to stigmatize individuals by reason of their membership in a racial group." *Shaw v. Reno*, 509 U.S. 630, 643 (1993). Laws based on race, or other suspect classifications such as alienage and national origin, are subject to strict scrutiny and will only be upheld "upon an extraordinary justification." *Id.* at 643–44 (quoting *Pers. Adm'r of Mass. v. Feeney*, 442 U.S. 256, 272 (1979)). Under strict scrutiny, the law must be "narrowly tailored to serve a compelling governmental interest." *Cleburne*, 473 U.S. at 440.

In the middle of rational basis review and strict scrutiny lies intermediate scrutiny. Intermediate scrutiny applies to laws that discriminate on the basis of a quasi-suspect classification, like sex, *United States v. Virginia*, 518 U.S. 515, 533 (1996), and transgender status, *Grimm v. Gloucester Cnty. Sch. Bd.*, 972 F.3d 586, 611 (4th Cir. 2020), *as amended* (Aug. 28, 2020), *cert. denied*, 141 S. Ct. 2878 (2021) ("Engaging with the suspect class test, it is apparent that transgender persons constitute a quasi-suspect class."). Sex discrimination receives intermediate scrutiny because while states have historically used sex as a basis for invidious discrimination,

we recognize that there are some "real differences" between males and females that could legitimately form the basis for different treatment. *Virginia*, 518 U.S. at 533.

The Supreme Court has long "viewed with suspicion laws that rely on 'overbroad generalizations about the different talents, capacities, or preferences of males and females.'" *Sessions v. Morales-Santana*, 137 S. Ct. 1678, 1692 (2017) (quoting *Virginia*, 518 U.S. at 533). Therefore, laws that discriminate based on sex must be backed by an "exceedingly persuasive justification." *Virginia*, 518 U.S. at 513. That is to say, the law's proponents must show that it "serves important governmental objectives and that the discriminatory means employed are substantially related to the achievement of those objectives." *Miss. Univ. for Women v. Hogan*, 458 U.S. 718, 724 (1982). Even if the law's objective is to protect the members of one sex, that "objective itself is illegitimate" if it relies on "fixed notions concerning [that sex's] roles and abilities." *Morales-Santana*, 137 S. Ct. at 1692.

The party defending the statute must "present[] sufficient probative evidence in support of its stated rationale for enacting a [sex] preference, i.e., . . . the evidence [must be] sufficient to show that the preference rests on evidence-informed analysis rather than on stereotypical generalizations." *H.B. Rowe Co. v. Tippett*, 615 F.3d 233, 242 (4th Cir. 2010) (quoting *Eng'g Contractors Ass'n of S. Fla. v. Metro. Dade Cnty.*, 122 F.3d 895, 910 (11th Cir. 1997)); *Concrete Works of Colo., Inc. v. City & Cnty. of Denver*, 321 F.3d 950, 959 (10th Cir. 2003) ("[T]he gender-based measures . . . [must be] based on 'reasoned analysis rather than [on] the mechanical application of

traditional, often inaccurate, assumptions.'" (quoting *Miss. Univ. for Women*, 458 U.S. at 726)).

2. Discussion

There is no debate that intermediate scrutiny applies to the law at issue here—H.B. 3293 plainly separates student athletes based on sex. And even B.P.J. agrees that the state has an important interest in providing equal athletic opportunities for female students. [ECF No. 291, at 24]. As discussed earlier, B.P.J. does not challenge sex-separation in sports on a broad basis; she does not argue that teams should be separated based on some other factor or not separated at all. Rather, B.P.J. recognizes the benefits of sex-separated athletics and takes issue only with the state's definitions of "girl" and "woman" as based on biological sex.

B.P.J. argues that "H.B. 3293 excludes students from sports teams based on 'biological sex' and defines 'biological sex' solely in terms of 'reproductive biology and genetics at birth.'" *Id.* at 19. According to B.P.J., H.B. 3293 uses this "'ends-driven definition[] of "biological sex"' to 'guarantee a particular outcome': Barring girls who are transgender from qualifying as girls for purposes of school sports and thereby categorically excluding them from girls' teams and therefore from school sports altogether." *Id.* (quoting *Grimm*, 972 F.3d at 626 (Wynn, J., concurring)). B.P.J. argues that this definition of "biological sex," and the related definitions of "girl" and "woman," are not substantially related to the government interest in providing equal athletic opportunities for females.

The State of West Virginia, the State Board defendants, the Harrison County defendants, and Intervenor Lainey Armistead all argue that the state's classification based on "biological sex" is substantially related to its important interest in providing equal athletic opportunities for females. The state points to a longstanding recognition in the courts that "'[p]hysical differences between men and women . . . are enduring' and render 'the two sexes . . . not fungible.'" [ECF No. 305, at 13–14 (quoting *Virginia*, 518 U.S. at 533)]. And the state argues that in order to preserve athletic opportunities for females, it is necessary to exclude biological males from female teams because males as a group have significant athletic advantage over females and thus the two groups are not similarly situated. [ECF No. 287, at 6–8].

The record does make clear that, in passing this law, the legislature intended to prevent transgender girls from playing on girls' sports teams. In making that decision, the legislature considered an instance in Connecticut where two transgender girls ran on the girls' track team and won at least one event. Cisgender girls there sued, claiming the state's policy allowing the transgender girls to play on girls' teams violated Title IX. *Id.* at 5. But acting to prevent transgender girls, along with all other biological males, from playing on girls' teams is not unconstitutional if the classification is substantially related to an important government interest. The state's interest in providing equal athletic opportunity to females is not at issue here, and B.P.J. does not argue that sex-separate sports in general are not substantially related to that interest. Rather, B.P.J. argues that she and other transgender girls

should be able to play on girls' teams despite their male sex, because their gender identity is "girl."

While sex and gender are related, they are not the same. *See e.g., PFLAG, PFLAG National Glossary of Terms* (June 2022), http://pflag.org/glossary (defining "biological sex" as the "anatomical, physiological, genetic, or physical attributes that determine if a person is male, female, or intersex . . . includ[ing] both primary and secondary sex characteristics, including genitalia, gonads, hormone levels, hormone receptors, chromosomes, and genes" and explaining that "[b]iological sex is often conflated or interchanged with gender, which is more societal than biological, and involves personal identity factors"). It is beyond dispute that, barring rare genetic mutations not at issue here, a person either has male sex chromosomes or female sex chromosomes. Gender, on the other hand, refers to "a set of socially constructed roles, behaviors, activities, and attributes that a given society considers appropriate." *Id.* Gender identity, then, is "[a] person's deeply held core sense of self in relation to gender." *Id.* For most people, gender identity is in line with biological sex. *See Grimm*, 972 F.3d at 594. That is, most females identify as girls or women, and most males identify as boys or men. But gender is fluid. There are females who may prefer to dress in a style that is more typical of males (or vice versa), and there are males who may not enjoy what are considered typical male activities. These individuals may, however, still identify as the gender that aligns with their sex. Others may not. When one's gender identity is incongruent with their sex, that person is transgender. To be transgender, one must have a deeply held "consistent[], persistent[], and insistent[]"

conviction that their gender is, "on a binary, . . . opposite to their" biological sex. *Id.* I recognize that being transgender is natural and is not a choice. But one's sex is also natural, and it dictates physical characteristics that are relevant to athletics.

Whether a person has male or female sex chromosomes determines many of the physical characteristics relevant to athletic performance. Those with male chromosomes, regardless of their gender identity, naturally undergo male puberty, resulting in an increase in testosterone in the body. B.P.J. herself recognizes that "[t]here is a medical consensus that the largest known biological cause of average differences in athletic performance between [males and females] is circulating testosterone beginning with puberty." [ECF No. 291, at 28]. While some females may be able to outperform some males, it is generally accepted that, on average, males outperform females athletically because of inherent physical differences between the sexes. This is not an overbroad generalization, but rather a general principle that realistically reflects the average physical differences between the sexes. Given B.P.J.'s concession that circulating testosterone in males creates a biological difference in athletic performance, I do not see how I could find that the state's classification based on biological sex is not substantially related to its interest in providing equal athletic opportunities for females.

In parts of her briefing, B.P.J. asks me to find that specifically excluding transgender girls from the definition of "girl" in this context is unconstitutional because transgender girls can take puberty blockers or other hormone therapies to mitigate any athletic advantage over cisgender females. B.P.J., for example, is

biologically male, but she identifies as a girl. To express her gender identity, she goes by a traditionally feminine name, wears her hair long, uses female pronouns, and in all other respects lives as a girl. Before the first signs of puberty, B.P.J. made no other changes as a result of her transgender identity. But, once she started showing signs of male puberty, B.P.J. began taking puberty blocking medications, pausing the male puberty process. In that respect, B.P.J. argues that she has not gained the physical characteristics typical of males during and after puberty.

While this may be true for B.P.J., other transgender girls may not take those medications. They may not even come to realize or accept that they are transgender until after they have completed male puberty. Even if a transgender girl wanted to receive hormone therapy, she may have difficulty accessing those treatment options depending on her age and the state where she lives. And, as evidenced by the thousands of pages filed by the parties in this case, there is much debate over whether and to what extent hormone therapies after puberty can reduce a transgender girl's athletic advantage over cisgender girls. Additionally, of course, there is no requirement that a transgender person take any specific medications or undergo hormone therapy before or after puberty. A transgender person may choose to only transition socially, rather than medically. In other words, the social, medical, and physical transition of each transgender person is unique.

The fact is, however, that a transgender girl is biologically male and, barring medical intervention, would undergo male puberty like other biological males. And biological males generally outperform females athletically. The state is permitted to

legislate sports rules on this basis because sex, and the physical characteristics that flow from it, are substantially related to athletic performance and fairness in sports.

Could the state be more inclusive and adopt a different policy, as B.P.J. suggests, which would allow transgender individuals to play on the team with which they, as an individual, are most similarly situated at a given time? Of course. But it is not for the court to impose such a requirement here. Sex-based classifications fall under intermediate scrutiny and therefore do not have a "narrowly-tailored" requirement. As intervenor, Lainey Armistead, points out, "[s]ome boys run slower than the average girl . . . [and] [s]ome boys have circulating testosterone levels similar to the average girl because of medical conditions or medical interventions," but B.P.J. denies that the latter "would be similarly situated [to cisgender girls] for purposes of Title IX and the Equal Protection Clause," and does not argue that they should be allowed to play on girls' teams. [ECF No. 288, at 17 (citing ECF No. 286-1, at 1473)]. This is inconsistent with her argument that the availability of hormone therapies makes transgender girls similarly situated to cisgender girls. In fact, after reviewing all of the evidence in the record, including B.P.J.'s telling responses to requests for admission, it appears that B.P.J. really argues that transgender girls are similarly situated to cisgender girls for purposes of athletics at the moment they verbalize their transgender status, regardless of their hormone levels.

The legislature's definition of "girl" as being based on "biological sex" is substantially related to the important government interest of providing equal athletic

opportunities for females. B.P.J.'s motion for summary judgment on this basis is **DENIED**.

E. Title IX

Finally, I address B.P.J.'s claim that H.B. 3293 violates Title IX. B.P.J. brings this claim against the State of West Virginia, the State Board of Education, the County Board of Education, and the WVSSAC.

1. Legal Standard

Title IX provides that "no person . . . shall, on the basis of sex, be excluded from participation in, be denied the benefits of, or be subjected to discrimination under any education program or activity receiving Federal financial assistance." 20 U.S.C. § 1681(a). To succeed on a Title IX claim, a plaintiff must prove that she was (1) excluded from an educational program on the basis of sex; (2) that the educational institution was receiving federal financial assistance at the time; and (3) that "improper discrimination caused [her] harm." *Grimm*, 972 F.3d at 616 (citing *Preston v. Va. ex rel. New River Cmty. Coll.*, 31 F.3d 203, 206 (4th Cir. 1994)). "In the Title IX context, discrimination 'mean[s] treating [an] individual worse than others who are similarly situated.'" *Id.* at 618 (quoting *Bostock v. Clayton Cnty.*, 140 S. Ct. 1731, 1741 (2020)). Title IX permits sex-separate athletic teams "where selection for such teams is based upon competitive skill or the activity involved is a contact sport." 34 C.F.R. § 106.41(b).

2. Discussion

B.P.J. argues that H.B. 3293 violates Title IX because it excludes transgender girls from participation on girls' sports teams. B.P.J. argues that this amounts to complete exclusion from school sports altogether, and that it is discrimination because she and other transgender girls are similarly situated to cisgender girls. [ECF No. 291, at 17]. The state responds that the law does not violate Title IX because it does not exclude B.P.J. from school athletics. "To the contrary, it simply designates on which team [she] shall play." [ECF No. 287, at 22]. And, the County Defendants argue that Title IX authorizes sex separation in sports in the same scenarios outlined in H.B. 3293—"where selection for such teams is based upon competitive skill or the activity involved is a contact sport." W. Va. Code § 18-2-25d(c)(2). All Defendants[2] argue that while it did not define the term, Title IX used "sex" in the biological sense because its purpose was to promote sex equality. Therefore, they argue that H.B. 3293 furthers, not violates, Title IX. I agree.

Title IX authorizes sex separate sports in the same manner as H.B. 3293, so long as overall athletic opportunities for each sex are equal. 34 C.F.R. § 106.41(b)–(c). As other courts that have considered Title IX have recognized, although the regulation "applies equally to boys as well as girls, it would require blinders to ignore that the motivation for the promulgation of the regulation" was to increase opportunities for women and girls in athletics. *Williams v. Sch. Dist. of Bethlehem, Pa.*, 998 F.2d 168, 175 (3d Cir. 1993). There is no serious debate that Title IX's

[2] Excluding the WVSSAC.

endorsement of sex separation in sports refers to biological sex. Nevertheless, B.P.J. argues that transgender girls are similarly situated to cisgender girls, and therefore their exclusion from girls' teams is unlawful discrimination. But as I have already discussed, transgender girls are biologically male. Short of any medical intervention that will differ for each individual person, biological males are not similarly situated to biological females for purposes of athletics. And, despite her repeated argument to the contrary, transgender girls are not excluded from school sports entirely. They are permitted to try out for boys' teams, regardless of how they express their gender.

I do not find that H.B. 3293, which largely mirrors Title IX, violates Title IX. B.P.J.'s motion for summary judgment on this basis is **DENIED.**

IV. Conclusion

I have no doubt that H.B. 3293 aimed to politicize participation in school athletics for transgender students. Nevertheless, there is not a sufficient record of legislative animus. Considering the law under the intermediate scrutiny standard, I find that it is substantially related to an important government interest. B.P.J.'s motion for summary judgment is **DENIED**. Defendant WVSSAC's motion for summary judgment [ECF No. 276] is **DENIED**. The motions for summary judgment filed by the State of West Virginia [ECF No. 285], the Harrison County defendants [ECF No. 278], the State Board defendants [ECF No. 283], and Intervenor Lainey Armistead [ECF No. 286] are **GRANTED** to the extent they argue that H.B. 3293 is constitutional and complies with Title IX. The preliminary injunction is **DISSOLVED**. All other pending motions are **DENIED as moot.**

The court **DIRECTS** the Clerk to send a copy of this Order to counsel of record and any unrepresented party. The court further **DIRECTS** the Clerk to post a copy of this published opinion on the court's website, www.wvsd.uscourts.gov.

ENTER: January 5, 2023

JOSEPH R. GOODWIN
UNITED STATES DISTRICT JUDGE

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

CHARLESTON DIVISION

B. P. J., et al.,

Plaintiffs,

v. CIVIL ACTION NO. 2:21-cv-00316

WEST VIRGINIA STATE BOARD OF EDUCATION, et al.,

Defendants.

JUDGMENT ORDER

The court **ORDERS** that judgment be entered in accordance with accompanying Memorandum Opinion and Order, and that this case be dismissed and stricken from the docket.

The court **DIRECTS** the Clerk to send a certified copy of this Judgment Order to counsel of record and to any unrepresented party.

ENTER: January 5, 2023

JOSEPH R. GOODWIN
UNITED STATES DISTRICT JUDGE

A TRUE COPY CERTIFIED ON
January 5, 2023
[Date]
RORY L. PERRY II, CLERK
U.S. District Court
Southern District of West Virginia
By s/Brittany McGuire Deputy

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

LAINEY ARMISTEAD,

Defendant-Intervenor.

Civil Action No. 2:21-cv-00316

Hon. Joseph R. Goodwin

DECLARATION OF B.P.J.

I, B.P.J., pursuant to 28 U.S.C. § 1746, declare as follows:

1. I make this declaration of my own personal knowledge, and, if called as a witness, I could and would testify competently to the matters stated herein.

2. On April 19, 2022, I signed a declaration for my attorneys to submit to the court. When I signed the declaration, I was an 11-year-old girl in sixth grade at Bridgeport Middle School.

3. I am now a 12-year-old girl, and I am currently in the seventh grade at Bridgeport Middle School.

4. I knew from when I was very little that I am a girl. I began receiving puberty-delaying medication in 2020 as part of my treatment for gender dysphoria, which I am still receiving. The doctors gave me a Vantas implant, and I felt so happy that my body would reflect the girl that I am. In June of 2022, after years of visits, my doctor told me that I was ready to begin an estrogen hormone therapy called Estradiol, and I have been taking that medication in addition to the puberty-delaying medication for the last seven months.

5. Competing on a team with my friends on the girls' cross-country and track-and-field teams is a central part of my life and identity. After my Fall cross-country season in 2021, I was very excited to try out for the girls' track-and-field team in the Spring of 2022. My coach, Ms. Schoonmaker, encouraged me to try out some of the field events based on my running times from my cross-country season so that I could still join the track-and-field team and compete with my friends. I ended up loving shotput and discus, and I made the team for those two events. It was so much fun to cheer on my teammates who ran at the meets, and they would cheer me on when I competed in shotput and discus. I then ran on the girls' cross-country team again in Fall 2022. I am excited to try out for the girls' track-and-field team this spring and have been preparing to do so. Tryouts begin on February 27, 2023.

6. The past two years on Bridgeport Middle School's girls' cross-country and track-and-field teams have been the best of my life. I love being on a team with my friends. We have the best time during practices and at cross-country and track-and-field meets. If I had not been able to join the cross-country or track-and-field teams these last few years, I would have missed out on challenging myself with all the amazing friends I made and the time we got to spend together. My teammates support me even when I am not the fastest or best on the team.

7. Every practice and meet is different. I learn something new at each event, and I am happiest when I am trying my best and motivating my teammates to do their best. When it rains and our trails become muddy, we have so much fun together being knee-deep in the mud and finishing our runs. When I compete in meets, I always feel the support from my coach, my teammates, and my family to have fun and keep a positive attitude. You get to push yourself, and the only way to lose is by not trying your hardest. I love breathing in the fresh air and feeling proud when I work hard. I feel so free and fully myself when I am out on the field.

8. When my mom told me that the court had ruled against me and I would no longer be able to participate on the girls' team with my friends, I felt so angry and upset. I ran upstairs to my room and cried in my bed the whole night.

9. I was scared to go to school the next day and tell my friends and my teammates the bad news, but they were so supportive. Even the kids I am not as close to at school told me they think it is unfair that this law prevents me from participating on the girls' team. Running on the boys' team is not an option for me, but would be deeply upsetting, humiliating, and confusing because I am a girl. I feel sad and frustrated that West Virginia does not see me for the girl that I am and won't let me play on a team with my friends and be happy.

10. I don't want to stop doing the thing that I love and that is part of who I am. Sports are everything to me and my cross-country and track-and-field teams have become my second family over the last two years. Nothing makes me happier than being on a team with my friends and competing on behalf of my school. I have many more years of cross-country and track-and-field left, and I just want the opportunity to participate in school sports like any other girl.

* * *

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed on January 20, 2023

B.P.J.

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

LAINEY ARMISTEAD,

Defendant-Intervenor.

Civil Action No. 2:21-cv-00316

Hon. Joseph R. Goodwin

DECLARATION OF HEATHER JACKSON

I, Heather Jackson, pursuant to 28 U.S.C. § 1746, declare as follows:

1. I make this declaration of my own personal knowledge, and, if called as a witness, I could and would testify competently to the matters stated herein.

2. On April 19, 2022, I signed a declaration for my attorneys to submit to the court.

3. I am 54 years old. I am the mother of two sons, ages 21 and 14, and a 12-year-old daughter. I live in Lost Creek, West Virginia.

4. My daughter's name is B.P.J. B.P.J. has been on puberty delaying treatment since 2020, under the care of a multidisciplinary team of medical providers with expertise in treating transgender adolescents.

5. In June of 2022, under the care of Dr. Kacie Kidd and her team at the West Virginia University Department of Pediatrics, B.P.J. and I were told that B.P.J. was eligible to start hormone therapy. B.P.J. had pure joy and radiance in her eyes when she realized her body could develop in a way that matches what her brain is telling her. After we spoke as a family, and after we spoke in-depth with her medical and mental health providers, B.P.J. was prescribed estradiol, an estrogen-based hormone therapy, which she has been taking for the last seven months. B.P.J. is very comfortable with her treatment plan and is so excited for her body to go through puberty in a way that matches who she is.

6. For the past year and a half—thanks to the court's injunction order—participating on Bridgeport Middle School's girls' cross-country and track teams has meant everything to my daughter. Having the opportunity to play on the girls' teams is important to B.P.J. because she feels her happiest when she is out on the field making friends and competing in one of her favorite sports. She is a gracious teammate and an incredible motivator, and she always tries to have as much fun as possible!

7. After running with her cross-country team in the Fall of 2021, B.P.J. was so excited for Spring track-and-field in 2022. Although B.P.J. was not fast enough to make the track-and-field team in running events, her coach, Ms. Schoonmaker, encouraged her to try out for the field events, and B.P.J. focused on shotput and discus. B.P.J. loved taking on a new challenge, was able to make the team, and participated in meets for those two field events. At the Connect Bridgeport Middle School Invitational, B.P.J. placed 36 out of 45 participants in shotput, and 29 out of 29 participants in discus; at the Ritchie Middle School Pizza Box Invitational, B.P.J. placed 15 out of 25 participants in discus; and at the Harry Green Middle School Invitational, B.P.J. placed 57 out

of 61 participants in shotput, and 35 out of 53 participants in discus. B.P.J.'s 2022 track-and-field meet records are attached hereto as Exhibit A.

8. After participating on the cross-country and track-and-field teams for both seasons in the 2021-2022 school year, it was no surprise to me that B.P.J. carried this interest into her seventh-grade year, and tried out for, and made, the girls' cross-country team again in the Fall of 2022. During this second cross-country season of hers, B.P.J. participated in several meets with her teammates. At the Charles Point Invitation, B.P.J. placed 54 out of 55 participants; at the Mountain Holler Middle School Invitational, B.P.J. placed 43 out of 53 participants; at the Taylor County Middle School Invitational, B.P.J. placed 38 out of 46 participants; at the Elkins Middle School Invitational, B.P.J. placed 78 out of 80 participants; and at the Mid-Mountain 10 Conference Middle School Championships, B.P.J.'s final race of the season, B.P.J. finished 64 out of 65 participants. B.P.J. did not participate in any additional meets after her final race due to a toe injury that she has since recovered from. B.P.J.'s 2022 cross-country meet records are attached hereto as Exhibit B.

9. B.P.J. has been excited about trying out for track again this spring and has been planning to do so. Tryouts will take place on February 27, 2023.

10. My daughter's love for participating in school sports is a precious thing. B.P.J. loves all the friends she has made on the girls' cross-country and track teams, trying her best at every practice and meet, and being a team player. In her two years of sports with Bridgeport Middle School, B.P.J. has not encountered any problems with any of her teammates or children from any other schools, and her coaches and teachers have been extremely supportive of her participation. I have never seen my daughter happier than when I pick her up from practices and take her to meets. Photos from B.P.J.'s 2022 cross-country season are attached as Exhibit C.

11. This new year of 2023 has been incredibly difficult for B.P.J. I watched my daughter run upstairs to her room in tears after I told her about the recent ruling against her and removing the injunction that allowed her to participate as the girl she is. She was devastated and cried for the entire night and told me that she was terrified about not being able to continue doing the thing that she loves with her friends. The next morning, B.P.J. told me that although she is very sad, she will never stop fighting for her right to play with her teammates and to be treated equally.

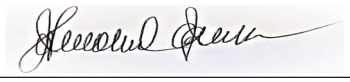
12. Forcing B.P.J. to compete on the boys' cross-country or track-and-field teams would profoundly harm her, erase who she actually is, and make participating in the school sports that bring her so much joy impossible for her. She cannot be the person she is and compete on the boys' team.

13. My daughter is a twelve-year old girl who just wants the same opportunities as the other girls in her school. By refusing to treat her as a girl and singling her out for different treatment than all the other girls, West Virginia sends a clear message that it refuses to see her, accept her, and respect her equally to others. My daughter will be forever harmed if she is not able to compete alongside her teammates and friends as she has done so happily for the past year and a half.

* * *

I declare under penalty of perjury under the laws of the United States of America that the foregoing is true and correct.

Executed on January 20, 2023



Heather Jackson

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

LAINEY ARMISTEAD,

Defendant-Intervenor.

Civil Action No. 2:21-cv-00316

Hon. Joseph R. Goodwin

NOTICE OF APPEAL

Notice is hereby given that B.P.J., by her next friend and mother, Heather Jackson, appeals to the United States Court of Appeals for the Fourth Circuit from the judgment order entered in this action on January 5, 2023.

Dated: January 23, 2023

Respectfully Submitted,
/s/ Nick Ward

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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. **Civil Action No. 2:21-cv-00316**
Honorable Joseph R. Goodwin, Judge

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

Defendants,

And

LAINEY ARMISTEAD,

Defendant-Intervenor.

NOTICE OF APPEAL

Defendant West Virginia Secondary School Activities Commission appeals to the United States Court of Appeals for the Fourth Circuit from the 'state actor' and other related determinations related to its summary judgment motion as set forth in Memorandum Opinion and Order entered on January 5, 2023 [ECF No. 512] and the Judgment Order to the extent it finalizes the same determination, entered on January 5, 2023 [ECF No. 513].

WEST VIRGINIA SECONDARY SCHOOL ACTIVITIES COMMISSION,
By Counsel.

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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.

Civil Action No. 2:21-cv-00316
Honorable Joseph R. Goodwin, Judge

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

And

LAINEY ARMISTEAD,
Defendant-Intervenor.

CERTIFICATE OF SERVICE

I hereby certify that I, Roberta F. Green, have this, the 2nd day of February, 2023, served a true and exact copy of the foregoing **"Notice of Appeal"** with the Clerk of Court using the CM/ECF System, which will send notification of such filing to the following counsel of record:

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

CHARLESTON DIVISION

B. P. J., et al.,

Plaintiffs,

v. CIVIL ACTION NO. 2:21-cv-00316

WEST VIRGINIA STATE BOARD OF EDUCATION, et al.,

Defendants.

MEMORANDUM OPINION AND ORDER

Pending before the court is Plaintiff's Motion for a Stay Pending Appeal. [ECF No. 515]. For the reasons stated herein, B.P.J.'s motion is **DENIED**.

I. Background

This case concerned the lawfulness of West Virginia's Save Women's Sports Act (the "Act"), a law passed by the West Virginia Legislature in April 2021. The Act classifies school athletic teams according to biological sex and prohibits biological males from participating on athletic teams designated for females. W. Va. Code § 18-2-25d(a)(5), (b), (c)(2). B.P.J., a transgender minor seeking to join her middle school's girls' cross country and track teams, filed a Complaint with this court, alleging that the Act violates the Equal Protection Clause of the Fourteenth Amendment and Title IX. [ECF No. 1]. On July 21, 2021, I granted B.P.J. a preliminary injunction enjoining enforcement of the Act against her. [ECF No. 67]. Thus, B.P.J. was able to compete on the girls' cross country and track teams during the pendency of this case.

The parties filed motions for summary judgment on April 21, 2022. [ECF Nos. 276, 278, 283, 285, 286, 289]. On January 5, 2023, I denied B.P.J.'s motion for summary judgment and granted summary judgment in favor of the State of West Virginia, the Harrison County defendants, the State Board defendants, and Intervenor Lainey Armistead (collectively, the "Defendants"). [ECF No. 512]. I also dissolved the preliminary injunction. *Id.*

On January 20, 2023, B.P.J. filed the instant motion requesting that the court stay its January 5, 2023 Order, dissolving the preliminary injunction, until her appeal is resolved. [ECF No. 515]. B.P.J. seeks this relief so that she can "continue participating on those [athletic] teams consistent with her gender identity." *Id.* at 5. Defendants jointly responded on January 27, 2023. [ECF No. 520]. B.P.J. replied on January 30, 2023. [ECF No. 521].

II. Legal Standard

Rule 62(d) of the Federal Rules of Civil Procedure permits the court to "restore" an injunction "[w]hile an appeal is pending from . . . final judgment that . . . dissolves . . . [the] injunction." When ruling on a motion to stay an order, the court considers the following four factors: "(1) whether the stay applicant has made a strong showing that [s]he is likely to succeed on the merits; (2) whether the applicant will be irreparably injured absent a stay; (3) whether issuance of the stay will substantially injure the other parties interested in the proceeding; and (4) where the public interest lies." *Nken v. Holder*, 556 U.S. 418, 426 (2009) (quoting *Hilton v. Braunskill*, 481 U.S.

770, 776 (1987)). "The first two factors . . . are the most critical," and a party seeking a stay must demonstrate more than a mere possibility of success on the merits. *Id.* at 434.

III. Discussion

As the Defendants have acknowledged, this was a novel and difficult case. *See* [ECF No. 520, at 13]. With respect to the instant motion, the second, third, and fourth factors weigh heavily in favor of granting B.P.J.'s motion for a stay. B.P.J. is a twelve-year-old transgender girl in middle school, often considered a memorable and pivotal time in a child's life. For many children, the middle school experience is shaped considerably by their participation on their school's athletic teams. B.P.J.'s experience has been no different. [ECF No. 515-1, ¶¶ 5–6]. Moreover, as I expressed in my previous Orders, not one child has been or is likely to be harmed by B.P.J.'s continued participation on her middle school's cross country and track teams. [ECF No. 67, at 11; ECF No. 512, at 9]. Both cross country and track are non-contact sports, and B.P.J. often finishes near the end of the pack, [ECF Nos. 515-3, 515-4]. I am unpersuaded, as Defendants have argued, that B.P.J. finishing ahead of a few other children, who would have placed one spot higher without her participation, constitutes a substantial injury. In the end, the only person truly injured by the enforcement of the Act against her is B.P.J., who must now watch her teams compete from the sidelines. It is in the public interest that all children who seek to participate in athletics have a genuine opportunity to do so. Moreover, there is a public interest

in celebrating not only the unique differences of those who fit into society's binary world but also those who fall outside that box.

That said, a law is not deemed unconstitutional simply because it causes harm. When analyzing equal protection claims, courts apply different levels of scrutiny to different types of classifications. In this case, the court applied intermediate scrutiny to the Act because the Act "separates student athletes based on sex." [ECF No. 512, at 14]. This level of scrutiny applied to both B.P.J.'s facial and as-applied challenges. *See Oswald v. Ireland-Imhof*, 599 F. Supp. 3d 211, 218 (D.N.J. 2022) (applying the same level of scrutiny to the plaintiff's facial and as-applied challenges). To pass intermediate scrutiny, a law must be substantially related to an important governmental objective. *Miss. Univ. for Women v. Hogan*, 458 U.S. 718, 724 (1982).

As I explained in my Order granting summary judgment to the Defendants, B.P.J. never challenged the well-accepted practice of separating sports by sex; rather, she only challenged the state's definitions of "male" and "female," which determine the athletic team an individual may participate on. [ECF No. 512, at 10]. To achieve sex-separated sports, however, the state needed to adopt some definition to determine eligibility for participation on either team. In this case, the state, claiming an interest in promoting equal athletic opportunities for females, drew the line at biological sex determined at birth. It is common knowledge that "sex, and the physical characteristics that flow from it," are linked "to athletic performance and fairness in sports." *Id.* at 19. Thus, separating athletic teams based on biology is substantially

related to the state's important interest in providing equal athletic opportunities to females, who would otherwise be displaced if required to compete with males. The Act, therefore, is not violative of the Equal Protection Clause.

As for Title IX, which authorizes sex-separate sports, "[t]here is no serious debate that [its] endorsement . . . refers to biological sex." *Id.* at 21–22. Like the alleged interest put forth by the state in this case, the goal of Title IX "was to increase opportunities for women and girls in athletics." *Id.* at 21 (citing *Williams v. Sch. Dist. of Bethlehem, Pa.*, 998 F.2d 168, 175 (3d Cir. 1993)). Thus, I could not, and still cannot, find that the Act, "which largely mirrors Title IX, violates Title IX." *Id.* at 22. As such, I am unpersuaded that B.P.J. is likely to succeed on her facial challenge of the Act on appeal.

Under the above analysis, the state is permitted to use biology as the sole criterion in separating school athletic teams. The legislature, of course, could have used less rigid definitions which would allow transgender individuals to play on the athletic team consistent with their gender identity. Indeed, more inclusive definitions might have even furthered the legislature's stated objective. "But it [was] not for the court to impose such a requirement here." *Id.* at 19. The question before the court was whether the Act survives intermediate scrutiny, and intermediate scrutiny does not require the tightest fit between means and ends for a law to withstand constitutional muster.

B.P.J.'s as-applied challenge asked the court to consider her gender in lieu of sex and to include her in the state's definition of "female." To do so, the court would have needed to assess B.P.J.'s individual characteristics, which is not appropriate under intermediate scrutiny. The court was required, instead, to consider whether excluding B.P.J. from teams designated as female—because she is biologically male and males consistently outperform females in athletics—is substantially related to the important government interest of providing equal athletic opportunities for females. The court answered that question in the affirmative: intermediate scrutiny permits the line drawing between "males" and "females" adopted here by the state in the context of sports, without individual consideration of occasional outliers. *Id.* The analysis must end there. Had the court looked any further and taken B.P.J.'s gender and sex characteristics into account, it would have been applying strict scrutiny's narrow tailoring requirement. *See id.* That analysis also would have been inconsistent with my decision to uphold the legislature's chosen definitions of "male" and "female" for the purpose of athletics. Accordingly, I cannot find that B.P.J. is likely to succeed on her as-applied challenge of the Act on appeal.

Because B.P.J. cannot satisfy the first prong of the test to obtain a stay, her motion is **DENIED**.

IV. Conclusion

For the foregoing reasons, B.P.J.'s Motion for a Stay Pending Appeal [ECF No. 515] is **DENIED**. The court **DIRECTS** the Clerk to send a copy of this Order to counsel of record and any unrepresented party.

ENTER: February 7, 2023

JOSEPH R. GOODWIN
UNITED STATES DISTRICT JUDGE