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## Letter to the Editor

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# Comment on: “A unique pseudo-eligibility analysis of longitudinal laboratory performance data from a transgender female competitive cyclist”

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Dear Editor,

We are writing to express concerns regarding the recent paper “A unique pseudo-eligibility analysis of longitudinal laboratory performance data from a transgender female competitive cyclist” by Hamilton et al. [1]. The authors assert that a sub-elite trans woman athlete can compete equitably in elite women’s cycling events after one year of gender-affirming hormone therapy (GAHT). However, this conclusion is not supported by the data presented. Furthermore, the authors’ presentation of data from a single athlete as a basis for inferring the effects of testosterone suppression is fundamentally flawed. The extension of these inferences to suggest case-by-case assessments as a solution for trans women inclusion in women’s sports is equally problematic. In addition, the paper raises several concerns regarding the study design, outcome measures, data interpretation, and the use of correct and consistent terminology when describing transgender individuals. In this letter, we aim to

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**Article note:** This article addresses an important issue within the modern Olympic movement: gender equality, diversity, and inclusion in sports participation. The objective of TEB is to foster research that links theory with practice, and we are delighted to have received a Letter to the Editor from readers on this highly debated issue. We have invited the authors to respond to the Letter and have decided to publish both contributions for the benefit of our audience. Healthy and respectful scientific debates will enhance our understanding and practical solutions to this pressing issue.

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clarify these issues to help your readers better understand what constitutes fair competition in women’s sport.

## Questionable comparisons of groups

A first point of criticism concerns the trans women and female athletes that the authors used as comparison groups for the case study on the sub-elite trans woman cyclist. As criticized in two separate rapid responses to the original study [2], these trans women and female athletes are very dissimilar. The trans women had the highest BMI ( $26.2 \text{ kg m}^{-2}$ ), fat mass (31.5 %) and lowest  $\text{VO}_2\text{max}$  ( $45.1 \text{ mL kg}^{-1} \text{ min}^{-1}$ ) of any group in the study – values which are not representative of an athlete cohort. In contrast, the female athletes had body composition and  $\text{VO}_2\text{max}$  values that suggest very fit and athletic females [3]. Thus, with this fundamental error in scientific design, the authors were comparing ‘apples to oranges’ and then trying to form unfounded conclusions about the similarity of the two different groups.

## Data from the transgender cyclist

Our next concerns relate to the comparison of the sub-elite trans woman in cycling with other trans women and female athletes. The authors provide few details about the athletic activities that these groups engage in, without elaborating on the types or intensity of sports or exercise. This lack of specificity undermines the validity of the comparison as it risks equating fundamentally different sporting profiles without sufficient justification.

Furthermore, the choice of tests used to assess the performance of the trans woman cyclist does not comply with the principle of specificity, which is essential for accurate and relevant results. The use of handgrip strength, counter-movement jump, and a treadmill test of  $\text{VO}_2\text{max}$  may not adequately reflect the demands of cycling. Crucially, absolute

VO<sub>2</sub>max and absolute power are key determinants of performance in cycling [4], with the presented data suggesting that these advantages were retained by the trans woman. The authors' conclusion that "the transgender athlete could compete equitably in elite cycling events within the female category after one year of GAHT" is therefore not supported. Rather, their results provide further support to the UCI decision to exclude those with male advantage from the female category. Fairness in female competition is not about a "plus/minus" balance of various physiological or other factors, but about whether the inherent male advantage is completely removed. The tests used and the conclusions drawn fail to address this critical point.

The variability of the cyclist's weekly training volume further complicates the interpretation of the changes in performance. Significant fluctuations are evident, with a 38 % reduction in training after three months, followed by a 13 % increase after 12 months compared to baseline. These changes are likely to have influenced performance outcomes, making it difficult to distinguish the effects of GAHT from those due to inconsistent training. In addition, the lack of information about the cyclist's diet, which is an essential part of training adaptations, makes it difficult to interpret the data, especially when dealing with a single athlete and not an entire cohort of participants.

Finally, the body composition data also show inconsistencies that raise questions about the reported results. The increase of 9.9 kg in combined fat and lean mass does not appear to match the overall change in body mass from 86.0 to 89.4 kg. These discrepancies emphasize the need for greater methodological rigor and accuracy in future studies before drawing conclusions about the effects of GAHT on athletic performance.

## Case by case assessment

The suggestion that the eligibility of trans women in female sports could be determined on a case-by-case basis is a fundamental misconception and fraught with significant practical and ethical problems [5]. A major issue is the difficulty of establishing consistent and objective criteria for these assessments. To determine whether a trans woman has sufficiently attenuated male athletic advantages, various performance metrics must be selected and interpreted. Deciding which methods to use and when to update/change them in a valid and reliable manner would be fraught with numerous obstacles, both practical and theoretical. There are also concerns about whether the determining criteria for including a trans woman in female sports is a reduction in performance by a certain amount, or simply that the

performance must be comparable to female athletes. This opens the possibility for sub elite or regional standard male athletes with no reduction in performance being eligible for higher standard female competitions. This is evident in the Hamilton et al. paper itself, where the results demonstrate that the sub elite trans woman in question can be compared favourably to elite female athletes in several variables, whilst outperforming them in several others. Furthermore, determination of the performance characteristics of female athletes for a specific sport would likely be problematic as results will change with time. If the tests are not strictly objective, there would be an incentive for athletes to underperform, which, together with the risk of the athlete becoming "too good" and exceeding the testing threshold, with subsequent exclusion, would run counter to a fundamental tenet of sport: that athletes should strive to achieve their best.

Furthermore, case-by-case assessments risk reinforcing arbitrary and subjective standards of female performance and potentially excluding trans women who do not meet these criteria. This stigmatization is in direct contradiction to the principles of the IOC framework, which the authors frequently cite. The authors also appear to advocate for hormonal treatment as a means for some trans women to participate in female sport. This raises ethical concerns regarding the primacy of health and bodily autonomy. The IOC Framework states' athletes should never be pressurised by an international federation or any other party to undergo medically unnecessary treatment to meet eligibility criteria. Examples of arbitrary decision making are frequently evident in the paper by Hamilton et al. Firstly, the authors conclude "performance advantage is likely not to exist" following broad comparisons of individual data points to averages from other groups and other studies. There is no attempt to outline what criteria the authors were using to decide whether a performance advantage "likely" did or did not exist. Secondly, the authors remarkably argue that as the trans woman cyclist in question retained advantages in either 54 % or 33 % of the reported variables that they could be allowed to compete against females. Threshold criteria of how many variables an athlete is allowed to have an advantage in is not provided, leaving this to be an arbitrary decision on the part of the authors. Nor is there a hierarchy of variables, as not all variables will have the same impact on performance. This is particularly salient in a sport such as sprint track cycling, where an advantage in just one variable can determine success [6]. Finally, the authors themselves highlight the inadequacy of several of the tests used when attempting to determine sports performance. Considering these problems, the approach taken by the authors provides further evidence that the use of case-by-case testing to determine eligibility for female sport is unfeasible.

## Terminology

We also have concerns about the title and terminology used throughout the article. Biological sex is binary, with female being the biological term for a person whose body is structured around the production of large gametes, and male being the biological term for a person whose body is structured around the production of small gametes [7]. Therefore, the title is incorrect because the subject of this case study was a male who identifies as a woman (i.e., a transgender woman, trans woman, or a trans-identifying male). This title confuses the reader and may lead to incorrect assumptions about the athlete's sex. The inconsistent use of terms throughout the paper to describe the subject of the case study, e.g., "transgender female", "transgender woman", "transgender sub-elite cyclist", and "transgender athlete," makes it confusing to the reader as to whether the authors are discussing the trans woman sub-elite cyclist or the group of trans women athletes in the comparison groups.

## The necessity for a protected female category

It is an undeniable fact that in sports which rely on muscle strength, speed, power, or endurance, males have inherent biologically based advantages when compared to similarly aged, trained, and talented females [8]. The female sports category exists to allow females to compete against one another on a level playing field absent from male advantages just like age categories exclude those with age and maturity-related advantages [9]. As Hamilton already stated [10], "Transwomen have the right to compete in sports. However, cisgender women [meaning females] have the right to compete in a protected category". This certainly implies a category that is completely free from male advantages.

Both the present paper by Hamilton et al. and several previous research papers demonstrate that testosterone suppression does not erase male advantages in body height, body mass, muscle mass, body fat, heart and lung dimensions,  $VO_2$ max, bone length, and so forth [11–13]. While factors such as muscle strength, muscle mass, and  $VO_2$ max may be slightly reduced by testosterone suppression, the male advantages are not eliminated. In fact, transgender adolescents who had masculinizing puberty blocked with a gonadotropin-releasing hormone agonist and subsequent estradiol treatment grow to their expected adult stature, with reductions in expected height possibly occurring with some formulations of estradiol [14], supporting the notion that being male in and of itself confers inherent physical advantages.

Hamilton et al. uses a model that was previously proposed by the author to scale male advantages relative to female performance as a tool to determine the presence or absence of male advantages in trans women athletes. This arbitrary model has not been adopted by any professional societies or sports governing bodies and relies heavily on statistically adjusting measures of performance for inherent differences between males and females, such as body height, body mass, or fat free body mass. While mathematically adjusting performance for anthropometric factors may show an amelioration of male advantages, this is not of practical use in sports, nor does it account for the myriads of anatomical and physiological factors that separate males and females. We consider such a model a statistical deception and one that has no place in the research related to trans women competing in the female category.

## Conclusions

In conclusion, we have several concerns with the recent paper by Hamilton et al. [1]. The authors' conclusion that the sub elite trans woman cyclist could be equitably included in the elite female category cannot judiciously be drawn based upon the presented data. The conclusion is based on cross-sectional comparisons between trans women and female athletes who are not comparable in terms of athletic ability, whose exercise and sport history are largely unknown and for whom no baseline data is available. Therefore, they cannot be reasonably compared, let alone serve as a valid comparison group for a sub-elite cyclist. There are also numerous problems with using a case-by-case approach to evaluating trans women for possible inclusion in the female sports category, including the selection of appropriate tests, discerning the effects of GAHT from variations in training and lifestyle, and determining objective metrics that would indicate the trans woman could be fairly and safely included in the female category. Furthermore, using a case-by-case approach raises concerns that trans woman athletes would be subjected to arbitrary standards about female body dimensions or performance leading to individuals being stigmatized. This approach would also allow sub-standard male athletes to qualify for higher standard female competition simply by virtue of their male physiology and/or morphology. We are also concerned that the authors' imprecise terminology can lead to misunderstandings about what was measured and on whom, leading to a misuse of the information by decision and policy makers. Finally, but perhaps most importantly, the authors do not follow their own previous statement on the necessity of maintaining a protected category for female athletes and instead seem

indifferent about allowing male advantage into the female sports category without due concern for fairness and safety.

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