

# Understanding the Sex Binary

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When biologists claim that “sex is binary” it is because an individual’s sex is defined by the type of gamete (sperm or ova) their primary reproductive organs (i.e., gonads) are organized, through development, to produce. Males have primary reproductive organs organized around the production of sperm; females, ova. Because there is no third gamete type, there are only two sexes that a person can be. The “sex binary” does not entail that every human is unambiguously either male or female, even though the vast majority are. Crafting effective policy requires not conflating intersex with transgender, but instead treating them as the distinct concepts that they are.

Current debates over the fundamental nature of biological sex are not merely esoteric academic musings. They have direct implications for policy related to sex-based legal protections and medicine. It truly matters whether sex categories in humans are empirically real, immutable, and binary, or are instead outdated and oppressive “social constructs” that should be abandoned.<sup>1</sup>

The claim that biological sex is *not* binary is often used to justify the inclusion of biological males in female sports, prisons, and other spaces that have historically been segregated by sex for reasons of fairness and safety. For instance, ACLU lawyer Chase Strangio frequently claims that the binary concept of biological sex is a recent invention being used “exclusively for the purposes of excluding trans people from legal protections.”<sup>ii</sup> Last December, Scottish politician Maggie Chapman stated that false notions about the “binary and immutable” nature of sex were her primary motivation for pursuing “comprehensive gender recognition for non-binary people in Scotland.”<sup>iii</sup>

Those opposed to the abolition of sex categories often argue for the binary and immutable nature of sex, as well as for the importance of recognizing fundamental sex differences to protect women and girls. But while proponents of this binary and immutable notion of sex are

more in line with biological reality, considerable confusion still exists about the true meaning of the “sex binary.”

Because those on both sides of this issue claim that biological facts justify their policy proposals, accurate descriptions of biology—unmarred by politics—matter now more than ever. So let’s clarify the meaning of the “sex binary” and why it’s important; explain why we should distinguish between intersex conditions (or differences/disorders of sex development) and transgenderism to avoid the “intersex trap”; and outline effective approaches to drafting legislation and policy relating to the biology of sex to preserve the integrity of female-only spaces.

When biologists claim that “sex is binary,” they mean something straightforward: *there are only two sexes*. This statement is true because an individual’s sex is defined by the type of gamete (sperm or ova) their primary reproductive organs (i.e., gonads) are organized, through development, to produce. Males have primary reproductive organs organized around the production of sperm; females, ova. Because there is no third gamete type, there are only two sexes that a person can be. Sex is therefore binary.

It is important to note here that the binary nature of sex is compatible with sex ambiguity because ambiguity with respect to sex is not itself a third sex. However, many gender activists falsely assert that the “sex binary” must

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mean something like “every human who has ever existed and will ever exist can be unambiguously categorized as either male or female.” Given this, they contend that providing examples of people with ambiguous sexual anatomy (i.e., “intersex” conditions) not only disproves the sex binary but also demonstrates that biological sex is a meaningless and even oppressive categorization scheme. (We will leave aside for now the fact that many of these same activists *do* recognize an alternative version of “biological sex” in the form of gender-identity bio-essentialism, or the theory that a person’s subjective self-conception of male or female is rooted in the brain itself.)

The chain of reasoning goes something like this. Sex is not binary because intersex people exist. Their existence demonstrates that biological sex is a spectrum. Since sex is a spectrum, that means no line can be perfectly drawn separating males from females. If no single line can be drawn, then anywhere someone chooses to draw one is totally arbitrary and subjective. If it’s totally arbitrary and subjective, then that means the categories male and female are also arbitrary and subjective “social constructs” with no firm root in biological reality. If that’s the case, why are we categorizing people in law according to these arbitrary labels instead of letting people simply label themselves? To do otherwise is to oppress people based on a biological falsehood.

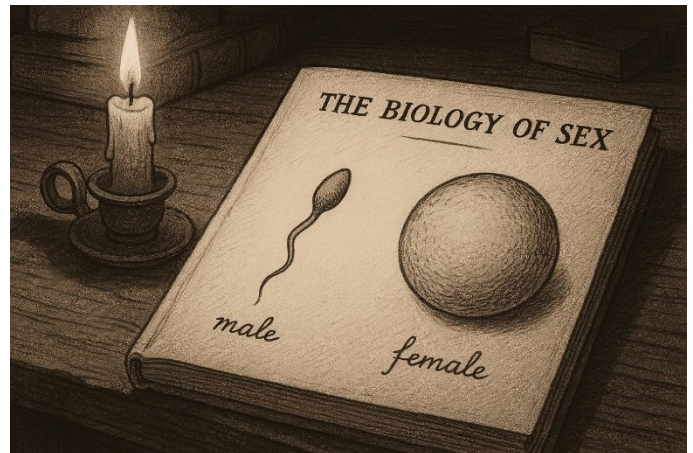
This is just how the argument is made, and it is made with stunning success. Children in K-12 are regularly taught these days that sex and gender exist on a spectrum. Parts of the scientific establishment and the medical profession have also embraced this idea.

Perhaps nobody is more well-known for relying on the existence of intersex conditions to supposedly disprove the sex binary than the historian of science Alice Dreger. In her book, *Hermaphrodites and the Medical Invention of Sex*, Dreger refers to intersex individuals as “hermaphrodites,” and says:

“Hermaphroditism causes a great deal of confusion, more than one might at first appreciate, because—as we will see again and again—the discovery of a ‘hermaphroditic’ body raises doubts not just about the particular body in question, but about all bodies. The questioned body forces us to ask what exactly it is—if anything—that makes the rest of us unquestionable.”<sup>iv</sup>

Those without a firm background in biological science may read such passages and feel something akin to having an epiphany, but Dreger is peddling pseudoscience. This desire to extrapolate a small blur at a boundary to the entire picture is rooted in the postmodern impulse to “queer,” and thereby eliminate, natural categories. In the queer-theory worldview, categories are themselves oppressive, and human liberation requires the “troubling” of categories (to borrow Judith Butler’s term), including those of sex. Yet Dreger’s account does not accurately describe biological reality. The existence of “questionable” cases with respect to sex classification does not automatically cast a degree of doubt onto everyone’s sex. For most people, their sex is obvious.

Besides, our society is not currently experiencing a sudden dramatic surge in people stricken with ambiguous genitalia; we are experiencing a surge in people who are unambiguously one sex claiming to “identify” as the opposite sex, or neither sex.



Credit: Wright (2025a)

Another false depiction of the sex binary is that it refers to sex chromosomes, with males always being XY and females always XX. Activists purport to debunk this misrepresentation of the sex binary by pointing to sex-chromosome aneuploidies—instances where an individual may have missing or extra X or Y chromosomes, such as in those with Klinefelter (XXY) and Turner (X0) syndrome, among others. How could sex be binary and based on sex chromosomes, they argue, if there are more combinations beyond XX and XY? They may also

highlight examples of XX males and females with Y chromosomes as proof that chromosomes do not determine an individual's sex.

There are several major issues with this line of reasoning. The first is that the vast majority of people with sex-chromosome aneuploidies are not intersex; their primary sex organs and anatomy are unquestionably either male or female. Other compositions than the typical XX and XY arrangement do not represent additional sexes *beyond* male and female, but instead represent chromosomal variation within each of the two sexes. A person with Klinefelter syndrome (XXY), for example, isn't a new sex in the same way that a person with Down syndrome (who has three instead of two copies of chromosome 21) isn't a new species.

Second, the notion that XX males and females with a Y chromosome debunk the claim that sex is determined by chromosomes erroneously conflates how sex is *determined* with how sex is *defined* for an individual. "Sex determination" is a technical term in developmental biology referring to the process by which certain genes trigger and regulate sex development. Mammals, which include humans, have evolved what's called "chromosomal sex determination," meaning that certain genes residing on chromosomes guide the development of males and females in utero. The Y chromosome is considered "sex determining" because it usually harbors a gene called *SRY* that triggers male development, and in its absence a female typically develops. But in very rare instances an *SRY* gene can find its way onto an X chromosome, resulting in a male with XX chromosomes.

This process stands in contrast to sex-determining mechanisms in other organisms that do *not* rely on chromosomes, such as "temperature-dependent sex determination" that occurs in many reptiles, where the temperature at which an egg is incubated triggers male and female development. In the alligator *A. mississippiensis*, for instance, higher incubation temperatures (>34°C) produce males, while lower temperatures (<30°C) produce females.

In both chromosomal and temperature-dependent sex determination systems, though an individual's sex is mechanistically *determined* in different ways, it is always *defined* the same way—by the type of gamete his or her primary reproductive organs is organized around producing. This should be obvious, as it would have been impossible ever to have discovered these different sex-

determining mechanisms without first knowing what males and females are apart from sex chromosomes and incubation temperatures.

These efforts by activists serve a single purpose—to portray sex as so incomprehensibly complex and multivariable that our traditional practice of classifying people as simply either male or female is grossly outdated and should be completely abandoned in favor of "gender identity." This entails that biological males would not be barred from female sports, prisons, or any other space previously segregated according to our supposedly antiquated notions of "biological sex," so long as they "identify" as female, whatever that means.

But while sex development is a complex process, it does not follow that the outcomes are equally complex. Dreger's claim that the existence of edge cases "raises doubts not just about the particular body in question, but about all bodies" is not true. A person's sex is almost always completely unambiguous and recorded correctly at birth.

While it may be necessary to outline reasonable policies and laws for hard cases, we need not pretend we're all hard cases. Failing to reject Dreger's rhetorical sleight-of-hand prevents us from calling a spade a spade.

The terms *intersex* and *transgender* are entirely distinct and should not be conflated. Intersex people have rare (approximately 0.018% of all births) developmental conditions that result in apparent sex ambiguity. Transgender people, on the other hand, need not be sexually ambiguous at all; indeed, current progressive orthodoxy insists that it is enough for one merely to "identify" as the opposite or neither sex.

You may have noticed, though, that activists frequently steer discussions about whether trans women (i.e., biological males who identify as female) should be allowed to compete in female sports toward a debate about various intersex conditions and prominent athletes with differences of sexual development (DSD) like South African runner Caster Semenya. Why is this?

The answer is simple: so long as they've got you on your heels and in the weeds making judgment calls on a slew of complex intersex conditions, they've succeeded in drawing your attention away from making easy calls on unquestionably biologically male athletes like 2022 NCAA Division I Women's Swimming and Diving champion Lia Thomas. In other words, they shift the focus to intersex to distract from transgender. Lia Thomas is not sexually

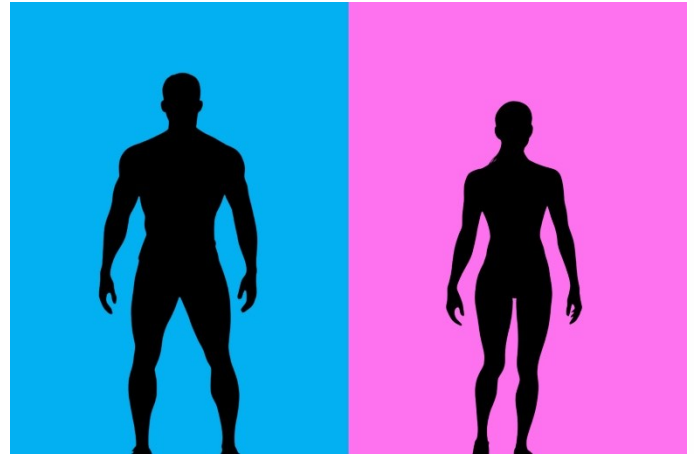
ambiguous; Thomas is biologically male in every respect save for Thomas's subjective self-perception of sex, which does not, scientifically speaking, have any bearing on a person's literal sex.

I occasionally hear from women's organizations and sporting bodies seeking guidance on wording their policies to exclude biological male athletes from female sports, prisons, and other female-only spaces. Many are unaware, however, that they've adopted the activists' strawman of the sex binary as "every human is unambiguously either male or female." While adopting such a framing may appear tempting as a means of unequivocally protecting female-only spaces, it should be avoided because it is incorrect and unnecessary—and a trap set by activists. It is incorrect for all the reasons outlined in the previous section. It is unnecessary because the most important issues currently concern biological males, not intersex people, in female spaces. And it is a trap because it allows activists to turn what should be an easy and winnable conversation about keeping biological males out of female spaces into a much more difficult and irrelevant conversation about complicated intersex conditions.

Admitting the existence of rare hard cases doesn't weaken the position or arguments against allowing biological males in female sports, prisons, and other female-only spaces. In fact, it's a much stronger approach because it separates two distinct issues—intersex versus transgender policies—that the activists would much rather keep fused together. For instance, it's much easier for them to make the case for including biological males with complete androgen insensitivity syndrome (CAIS) in female sports, given their body's overall female appearance and unresponsiveness to testosterone, than it is to make the case for including Lia Thomas, a fully intact biological male in every regard who enjoys the performance-enhancing benefits of having gone through male puberty. Keeping intersex and transgender issues separate and distinct prevents activists from pretending that arguing for inclusion of the former (CAIS male) is simultaneously to argue for inclusion of the latter (Lia Thomas).

Indeed, if gender identity determines who counts as female for purposes of female sports, then *any* restriction on participation by female-identified people is arbitrary and unjust. Thus, for instance, it would be wrong to require some women to suppress their hormones simply because

they happen to be transgender or to have gone through "male" puberty. In other words, if the gender identity doctrine is taken seriously, there should be no restrictions at all on participation by female-identified biological males in female sports. It is telling that gender activists almost never take this position, and in some cases—including in federal lawsuits over "exclusionary" sports policies—they have explicitly rejected it.



*Credit: Wright (2025b)*

As previously mentioned, any effective policy proposal requires addressing intersex and transgender issues separately.

Crafting policy to exclude biological males who identify as women (i.e., trans women) from female sports, prisons, or other female-only spaces is not complicated. This is because trans women are unambiguously biologically male, so the chances that a doctor incorrectly recorded their sex at birth is practically zero. This means that any "transgender policy" designed to protect female spaces need only specify that participants must have been recorded (or "assigned") female at birth. This alone would put an end to biological males competing in female sports.

Of course, this also requires that laws forbid the alteration of birth certificates. This has become a real problem, as currently every state in the United States apart from Tennessee, Oklahoma, and Montana allows citizens to amend the sex marker on their birth certificates. Further, at least 15 states will issue *new* birth certificates, meaning that it will not show any indication that a change has been made. All records linked to the original birth

certificate are placed under seal that can only be accessed via court order.<sup>v</sup>

Activists have also pushed to move sex designations on birth certificates “below the line of demarcation.” Information above the line, such as name, sex, and date of birth, generally appears on certified copies of birth certificates and carries legal significance, whereas information below the line is private and consists of legally and medically irrelevant demographic information for purposes of compiling aggregated population statistics. Indeed, an article published in the prestigious *New England Journal of Medicine* argues that “sex designations on birth certificates offer no clinical utility, and they can be harmful for intersex and transgender people.”<sup>vi</sup> They justify this claim by (you guessed it!) rejecting the sex binary: “male or female on birth certificates suggests that sex is simple and binary when, biologically, it is not.” The authors go on to say that, even if this binary classification system were to be preserved, it should be based “on self-identification at an older age, rather than on a medical evaluation at birth.”<sup>vii</sup>

Achieving sound policy for single-sex spaces and activities requires that these laws be either overturned or amended so that an individual’s sex that was observed and recorded at birth, even if later amended, can always be accessed. For now, circumventing the birth-certificate issue can be done by using sex chromosomes as a reliable proxy for sex when sufficient doubt exists. While this would not be fully reliable in every conceivable instance, we must not let the perfect be the enemy of the near-perfect.

Crafting effective intersex policies is somewhat more complicated, but the problem of intersex individuals or people with DSDs in female sports is less pressing than that of biological males in female sports, and there seem to be no current concerns arising from intersex people using female spaces. It should be up to individual organizations to decide which criteria or cut-offs should be used to keep female spaces safe and, in the context of sports, safe and fair. It is imperative, however, that such policies be rooted in properties of bodies over identity. Identity alone is irrelevant to issues of fairness and safety.

The “sex binary” refers to the biological reality that there are only two sexes—male and female—and that these categories refer to individuals whose primary sex organs are organized around the production of either sperm

(male) or ova (female). The “sex binary” does not entail that *every human is unambiguously either male or female*, even though the vast majority are.

This is an important distinction, because adopting the second framing is inaccurate and plays into the hands of activists who seek to debunk the existence of only two sexes by calling attention to the existence of rare edge cases (i.e., “intersex” conditions). But the first framing (“there are only two sexes”) is both biologically accurate and ensures that two distinct concepts—transgenderism and intersex—remain distinct. It also puts to rest the false notion that the existence of rare edge cases necessarily entails that sex is a “spectrum” and that we are all therefore intersex to *some* degree.

Crafting effective policy therefore requires treating transgenderism and intersex as the distinct concepts that they are. It also requires not falling into activists’ trap of conflating intersex with transgender. An effective policy to prevent biological males in female spaces would be simply to require that “female” refer to one’s biological birth sex; sex chromosomes can be used as a backup when there is doubt. Intersex or DSD policies should prioritize safety and fairness, with specifics left to the individual organizations to decide.

While activists are insistent in presenting the biology of sex as being so complex as to defy all categorization, and categorization itself as a social evil, we should resist the urge to counter them by adopting their overly simplistic misrepresentations of the sex binary. We must not make the biology of sex more (or less) complex than it is 📌

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## Endnotes

- <sup>i</sup> A version of this article was originally published by the Manhattan Institute on March 20, 2023. Adapted here with permission. Link to original: <https://www.city-journal.org/article/understanding-the-sex-binary>.
- <sup>ii</sup> Link to example tweet: [https://x.com/chastrangio/status/1327244826983739392?s=20&t=9k4RZ5g\\_7ksrWVMYyE870-g](https://x.com/chastrangio/status/1327244826983739392?s=20&t=9k4RZ5g_7ksrWVMYyE870-g).
- <sup>iii</sup> See Wright, 2023.
- <sup>iv</sup> Ibid.
- <sup>v</sup> Ibid.
- <sup>vi</sup> Shteyler et al., 2020.
- <sup>vii</sup> Ibid.