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ORIGINAL ARTICLE

The Biological Reality of Sex and Gender

Challenging Social Constructionism

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Abstract
This paper challenges the social constructionist perspective on sex and gender, which argues that gender is solely shaped by cultural norms and that biological sex exists on a spectrum. The research addresses whether biological evidence, including evolutionary psychology, neuroscience, and hormonal studies, contradicts the claims of social constructionism. Furthermore, the study critiques mainstream frameworks, such as the American Psychological Association's guidelines, which emphasize the role of culture while disregarding biological underpinnings. The paper employs a multidisciplinary review of existing literature and research from evolutionary psychology, neuroscience, economics, and cross-cultural studies. Data from developmental biology, hormonal studies, and behavioral research are synthesized to evaluate biological differences between human males and human females. These findings are then compared with the claims of social constructionist theorists. Critical analyses of policies and guidelines, such as the APA's position on masculinity, are included to illustrate the implications of social constructionist views in practice. The analysis demonstrates that biological factors such as hormones, brain structures, and evolutionary processes significantly influence sex and gender. Evidence from neuroscience reveals structural brain differences between human males and human females, while studies in developmental biology underscore the impact of prenatal hormone exposure on behavior. Cross-cultural research shows consistent gendered behaviors, challenging the assertion that gender is merely a social construct. Furthermore, the failure of conversion therapies supports the biological foundation of sexual orientation. The findings refute the core tenets of social constructionism, affirming the biological reality of sex and gender. While acknowledging the role of culture in shaping gender expressions, the study emphasizes the importance of respecting scientific evidence to inform policy and social discourse. A balanced approach that integrates biological and cultural perspectives is advocated, promoting inclusivity without undermining empirical reality.

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Introduction

The goal of this review is to critically evaluate the claim that sex and gender are predominantly social constructs rather than biological realities. While the social constructionist perspective argues that gender differences arise chiefly from cultural norms, language, and power structures, this paper examines whether biological evidence from evolutionary psychology, neuroscience, and endocrinology more convincingly accounts for persistent differences between males and females. By synthesizing empirical research on hormonal influences, brain development, cross-cultural behavioral patterns, and sexual orientation, this review aims to assess the strengths and limitations of social constructionist arguments and to clarify the extent to which biology underpins sex and gender differences. In particular, the paper considers the role of sexual selection (i.e., intrasexual competition for mates and intersexual choice of mating partners; elaborated below) in shaping behavioral and cognitive traits that consistently diverge between the sexes.

It is important to ensure that the terminology used in this article is clearly understood before addressing the issues at hand. 'Sex' refers to the biological distinction between male and female, defined by the type of gamete (sperm or ova) an individual's primary reproductive organs are organized to produce, a criterion rooted in anisogamy and consistent across sexually reproducing species (Wright, 2025). 'Male' denotes an individual with organs designed to produce small, motile gametes (sperm), while 'female' denotes one with organs designed to produce large, immobile gametes (ova). From an evolutionary psychology perspective, 'gender' refers to the behavioral, psychological, and social traits that tend to differ between males and females as a result of evolved adaptations to reproductive and survival challenges faced by our ancestors. These traits are not arbitrary cultural inventions but rather reflect sex-differentiated strategies shaped by natural and sexual selection over evolutionary time. 'Male' and 'female' denote biological sex, with 'male' typically characterized by XY chromosomes and 'female' by XX chromosomes. 'Intersex' describes rare conditions where physical sex characteristics (e.g., chromosomes, gonads) do not align clearly with typical male or female categories, yet these exceptions do not constitute a third sex, as they typically do not produce a novel gamete type. 'Transman' and 'transwoman' refer to adult humans who identify as male or female, respectively. This paper focuses on the binary nature of sex as a biological reality, while acknowledging cultural influences on gender and the complexity of intersex conditions.

The social constructionism hypothesis, often endorsed by many feminists, psychologists, and social scientists, posits that our understanding of reality is shaped through cultural and social processes. Instead of treating reality as an objective truth independent of human perception, social constructionists argue that what we consider "reality" is influenced by cultural norms, language, social practices, and power dynamics within society. While it's undeniable that societal influence affects percep-

tions, such as how printed money gains value through societal consensus, issues arise when social constructionism drifts away from empirical reality.

For instance, Pickering (1984) argues that quarks were socially constructed during the development of the Standard Model of particle physics. Gergen (Gergen, 1988), a staunch social constructionist, takes this a step further by asserting that "the validity of theoretical propositions in the sciences is in no way affected by factual evidence." This anti-scientific stance, championed by constructionists like Gergen, appears more aligned with ideological motivations than with objective scientific inquiry.

Feminist scholarship emphasizing a strong social constructionist perspective on gender argues that the categories of "man" and "woman" are not rooted in biology but are products of social processes, discourses, and institutions (e.g., Defant, 2025b). Butler (1990) famously contends that gender is performative – reiterated behaviors and norms that create the illusion of a stable identity. West and Zimmerman (1987) similarly conceptualize gender as something people *do* in everyday interactions, rather than something they *are*. Fausto-Sterling (2000) critiques the binary model of sex and gender, showing how scientific knowledge itself is culturally shaped. Raymond (1979) and Oakley (1972) further argue that what societies consider "natural" male and female traits are imposed by patriarchal structures and reinforced through socialization. Collectively, these works maintain that gender differences are best understood as historically contingent social constructs rather than biologically determined facts.

Some authors have attempted to integrate biology and social construction. Eagly (1987, 2018), Eagly and Wood (1999), and Hyde (2007) offer perspectives emphasizing the significant role of social and environmental factors in shaping psychological sex differences, while also acknowledging biological influences. Eagly (1987, 2018) argues that many psychological sex differences arise primarily from social roles assigned to men and women, which channel behaviors through expectations, division of labor, and socialization. Eagly and Wood (1999) integrate evolutionary and social role theories, proposing that evolved physical differences between the sexes interact with societal structures and cultural norms to produce observed behavioral patterns. Their biosocial model challenges strict biological determinism while recognizing that biological predispositions can interact with cultural factors to shape gendered behavior. This view highlights how societal structures and expectations can magnify or moderate sex differences, rather than assuming they are exclusively products of biology or entirely socially constructed.

Hyde (2007) advances a gender similarities hypothesis, suggesting that human males and human females are more psychologically similar than different, and that observed differences are often amplified by social and cultural factors. Hyde critiques overemphasized sex differences in research and highlights how social contexts, including stereotypes and power dynamics, shape perceived psychological distinctions. Together, these papers align with social constructivism by illustrating how psychological sex differences are not fixed or solely innate but are heavily influenced by socialization, cultural norms, and societal roles, providing a framework for understanding gender as a socially constructed phenomenon.

The focus of this paper is to challenge the notion that gender, and by extension sex, is socially constructed. I will demonstrate that the biological reality of sex differences

cannot be dismissed in favor of ideologically driven social constructionism. While culture undoubtedly plays a role in shaping individual experiences, the foundational differences between the sexes are influenced by biology through evolution. The arguments put forth by feminists and social constructionists are not only anti-scientific but are often ideologically motivated to uphold specific political agendas.

Socially Constructing Sex and Gender

Social constructionism has been particularly influential in the literature of feminist and queer studies. In the 1960 s, before the feminist appropriation, the term "gender" referred primarily to grammatical distinctions (e.g., feminine and masculine articles like *un* and *une* in French) (Nicholson, 1994). By the 1970 s, feminists began using "gender" to distinguish what they believed were socially constructed masculine and feminine characteristics, distinct from biological sex (Mikkola, 2017). At the same time, an emerging field in biology – evolutionary psychology – postulated that human males and human females are physically, emotionally, and mentally different due to evolutionary pressures over thousands of generations of human evolution (Wilson, 1975; Dawkins, 1976).

Some feminists have long contested this view, often using political discourse rather than the scientific method. If gender is socially constructed, they argue, it is "mutable" and can be reshaped through political and social reforms. Feminists often refer to "biological determinism" in a pejorative sense, as they seek to reform society into a genderless one by eliminating what they perceive to be constructed gender traits.

By the late 1980 s, the feminist discourse around gender construction had expanded to consider other axes of identity, such as race, ethnicity, social class, and nationality. Spelman (Spelman, 1988) argued that predominantly white, middle-class human females were being privileged at the expense of marginalized minority females. Butler (1990; 1999), a prominent philosopher and feminist, further complicated the narrative by arguing that previous feminist assumptions about femininity excluded those with non-normative sexual orientations, such as lesbians. Butler's famous phrase, "Gender ought not be construed as a stable identity," emphasized that gender is a performative construct constituted through repeated acts, rather than a stable category.

Some feminists have even extended social constructionism to sex itself. Fausto-Sterling (1993) argued that sex is not binary but exists on a spectrum. She contends that sex is "constructed" and should be viewed as a continuum, with intermediate categories like hermaphrodites, "merms" (male pseudohermaphrodites), and "ferms" (female pseudohermaphrodites). Fausto-Sterling's goal is to dismantle the notion of biological determinism, asserting that "only our beliefs about gender – not science – can define our sex." One of the reasons many feminists have not spoken out against trans human females and girls in sports may be due to their ultimate objective of creating a sexless/genderless society.

Science Versus the Social Construction of Sex

One of the most critical areas where social constructionism clashes with biological reality is the debate over the binary nature of sex. Fausto-Sterling's argument for a non-binary view of sex relies heavily on the existence of intersex individuals, which she claims make up 1.7% of the population (Fausto-Sterling, 2000). However, Sax (2002) argues that conditions like Klinefelter syndrome, Turner syndrome, and late-onset adrenal hyperplasia are not typically classified as intersex. According to Sax's more precise definition, the actual prevalence of intersex individuals is closer to 0.018%, nearly 100 times lower than Fausto-Sterling's estimate.

Fausto-Sterling's attempt to expand the definition of intersex to undermine the binary view of sex is problematic for several reasons. First, intersex individuals are exceedingly rare, and their existence does not invalidate the biological purpose of sex in the animal kingdom – reproduction. From a biological standpoint, sex in anisogametic, gonochoric species, such as humans, exists to enable sexual reproduction through the interaction of two distinct sexes, male and female, producing different gametes (sperm and ova). Moreover, most intersex individuals are infertile (Fausto-Sterling, 2000), further emphasizing that their condition is an exception to the biological norm. Most intersex individuals, who may have ambiguous genitals or infertility, represent exceptions to typical male or female development but do not challenge the binary nature of sex, as this binary is defined by the production of two gamete types – sperm or ova (Wright, 2025). For sex to be non-binary, a third gamete type would be required, which does not occur in humans, reinforcing that intersex conditions remain within the biological framework of a male-female binary.

Beukeboom and Perrin (2014) provide a comprehensive analysis of the genetic and environmental mechanisms governing sex determination across species, reinforcing the binary framework of sex as a biological norm rooted in evolutionary processes. The authors detail how sex determination systems, whether genetic (e.g., XX/XY or ZW/ZZ) or environmental (e.g., temperature-dependent), consistently produce two primary sexes optimized for sexual reproduction, with rare deviations like intersex conditions arising as exceptions due to genetic or developmental anomalies. This evolutionary perspective supports the view that the binary nature of sex is a fundamental adaptation for reproductive success, countering social constructivist claims by demonstrating that intersex cases, while biologically interesting, do not undermine the predominant binary structure essential for species propagation.

The notion that sex exists on a spectrum also runs counter to the basic principles of evolution and biology. The biological differences between human males and human females are not simply social constructs; they are rooted in evolutionary processes that have shaped human behavior and physiology for at least hundreds of thousands of years. Human males and human females evolved differently to fulfill complementary roles in hunter-gatherer societies. These evolutionary pressures resulted in differences in physical strength, cognitive abilities, and emotional traits that persist today. As evolutionary psychologists have demonstrated, the differences between human males and human females are not limited to external anatomy but include a wide range of cognitive, emotional, and behavioral traits that are linked to biological sex (Buss, 2025; Conroy-Beam et al., 2015).

These differences have been extensively addressed in previous research. Archer (2019) argued that psychological sex differences are real, substantial, and rooted in evolutionary processes, emphasizing natural and sexual selection as key drivers while acknowledging some influence from social factors. Geary (2021) provides a comprehensive evolutionary perspective, detailing how sexual selection, parental investment, and ecological pressures have shaped sex differences in behavior, cognition, and psychology, with a focus on biological underpinnings over social constructs. Similarly, Geary (2025) explores how sexual selection has led to sex-specific brain structures and cognitive abilities, highlighting evolutionary mechanisms like mate choice and competition as primary causes of these differences. Christov-Moore et al. (2014) further support a dichotomy by demonstrating sex differences in empathy, with females showing greater empathic responses linked to evolutionary pressures on nurturing roles, evidenced by distinct neural and behavioral patterns. Together, these works prioritize evolutionary biology over social constructivism, asserting that psychological sex differences are predominantly innate and adaptive responses to evolutionary pressures.

Table 1 highlights some of the well-documented differences between human males and females across various psychological, cognitive, and physical traits. For example, males tend to excel in tasks requiring spatial reasoning and weapon target-

Table 1 Sex differences measured in cohen's d in standard deviations (adopted from Hines, 2010) in "human behavior/psychological characteristics that have been studied in relation to the early hormone environment."

Behavior or psychological characteristic	Cohen's d in standard deviation units
Core gender identity	11.0-13.2
Sexual orientation	6.0-7.0
Childhood play:	
Play with girls' toys	1.8
Play with boys' toys	2.1
Feminine preschool games	1.1
Masculine preschool games	0.7-1.8
Playmate preferences	2.3-5.6
Composite of sex-typed play (PSAI[2])	2.7-3.2
Cognitive and motor abilities (adolescents/adults):	
Targeting	1.1-2.0
Fine motor skill	0.5-0.6
Mental rotations	0.3-0.9
Spatial perception	0.3-0.6
Spatial visualization	0.0-0.6
Personality (Assessed with questionnaires):	
Tendencies to physical aggression	0.4-1.3
Empathy	0.3-1.3
Dominance/assertiveness	0.2-0.8

2. Pres-School Activities Inventory evaluation.

ing[1], which can be traced back to tasks such as hunting and male-male competition using projectile weapons. Females, on the other hand, display greater empathy and fine motor skills on average, traits that would have been advantageous in caregiving and social bonding roles. These differences, far from being socially constructed, are strongly influenced by hormonal and genetic factors tied to sex.

Athletic Performance and Physical Sex Differences

Athletic performance provides one of the most visible examples of biological sex differences. Title IX legislation in 1972 has been used to create equity in sports for human females, resulting in increased participation and data collection. Over the decades, comparisons between male and female athletes have consistently shown that human males outperform human females in physical sports (Fig. 1 – all data are available upon request). Even though human females have achieved remarkable progress in sports, the physical differences between the sexes remain evident, as shown by national records in track and field.

Whipp and Ward (1992) in a *Nature* article extrapolated human females' track times and suggested that based on the trend, human females would eventually perform equal to human males in certain events. However, this hypothesis never materialized. For example, the 100-meter dash times have shown little change between human males and human females since the early 1980 s, with human males consistently outperforming human females. Similarly, in events such as the high jump and pole vault, male athletes continue to achieve higher records than their female counterparts, even after decades of equal access to training and resources. To most researchers, these results are obvious because we accept that there are physical differences between the sexes. In fact, these differences led to the separation of human female and human male sports to begin with.

These persistent differences in performance provide strong evidence for biological factors at play. Testosterone, muscle mass, bone density, and oxygen-carrying capacity all contribute to human males' superior performance in sports. These physical differences are not socially constructed but are instead rooted in the biological realities of male and female physiology (i.e., they are genetic/hormonal).

While the divergence in athletic performance between human males and human females becomes most pronounced during puberty due to testosterone's effects, significant sex differences exist prior to puberty. Studies indicate that pre-pubertal boys outperform girls by approximately 2.9%–6.7% in track running events (100 m to 1500 m) and exhibit greater distances in long jump, javelin throw, and shot put, with males aged 8–10 showing a 5.7% advantage in long jump (Brown et al., 2025). These differences, though smaller than the 10%–30% post-pubertal gap, are rooted in biological factors such as slight variations in muscle mass, bone density, and neuromuscular coordination (Joyner et al., 2025). These pre-pubertal differences, amplified by pubertal hormonal changes, underscore that athletic performance disparities are not

[1] For example, the male world record in archery is better than the female world record, and men tend to have better overall performances in the sport than women.

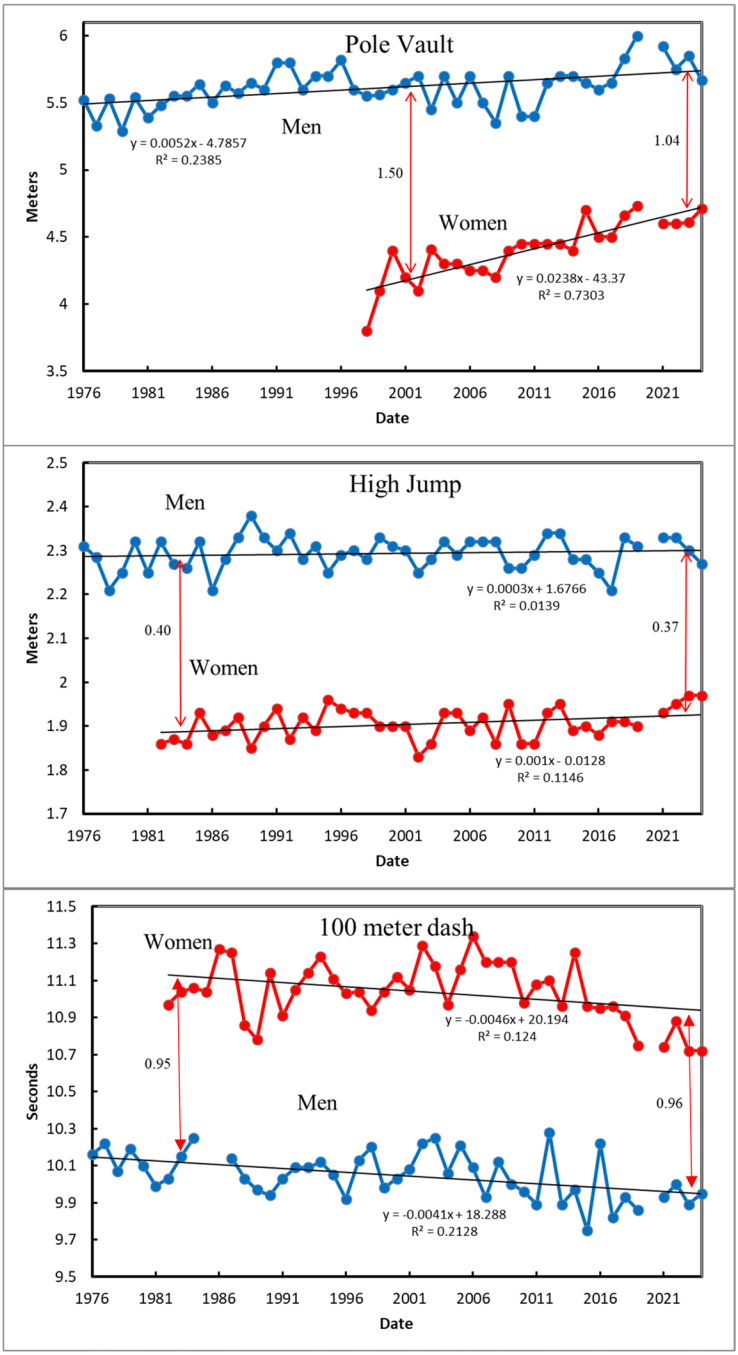

Fig. 1 Graph of dates and times/heights of NCAA human males and human females' Division I outdoor track and field championships for the 100-meter dash, the high jump, and the pole vault. Data from the NCAA[4]

[4] Unfortunately for women, they did not start competing in the NCAA pole vault until 1998

exclusively the result of puberty but reflect inherent biological distinctions between sexes (Handelsman, 2024).

Why do human males and females exhibit distinct physical differences? Charles Darwin's concept of sexual selection explains the development of physical traits that distinguish males and females, driven by reproductive advantages rather than survival needs. He observed that certain male characteristics, like the peacock's vibrant tail or the male cardinal's bright red feathers, may attract mates but could also increase vulnerability to predators. These observations led Darwin to distinguish sexual selection from natural selection, noting that it produces morphological differences between sexes, often resulting in exaggerated male features that signal reproductive fitness.

Sexual selection operates through two primary mechanisms that enhance offspring survival. The first, intrasexual competition, involves males vying for access to females, as seen in species like gorillas, where males, significantly larger (1.5 to 2 times the size of females), engage in physical confrontations to secure mating opportunities (Pinker, 2003; Buss, 2025; Wright, 1994; Geary, 2021). In humans, the sexual dimorphism in size is 1.15 but it is not a good indicator because women have more body fat than men. The sexual dimorphism in upper-body strength, however, is similar to the size dimorphism in gorillas, suggesting intense physical male-male competition (Lassek & Gaulin, 2009). Even so, male-male competition also involves other traits, such as skill at forming coalitions for group-level competition (Geary, 2021). This suggests human evolution favored other traits over extreme physical contests.

The second mechanism, intersexual selection, involves mate choice, where one sex selects partners based on specific traits. For instance, male weaverbirds construct intricate nests to impress females, who evaluate the structures carefully (Collias & Collias, 1970). If a female finds a nest lacking, she rejects the male, prompting him to rebuild in hopes of meeting her standards. Through such selective choices, females increase the chances that their offspring inherit traits conducive to survival, reinforcing physical and behavioral differences between sexes shaped by evolutionary pressures. In humans, this process suggests females favored males with physical attributes like strength and stature, which likely enhanced abilities in protection, hunting, and resource provisioning, thereby improving offspring survival (Pinker, 2003; Buss, 2025; Geary, 2021).

Testosterone and its Role in Sex Differences

Testosterone is a critical hormone driving the divergence of human male and female physical and behavioral traits, with its impact most evident during key developmental periods. Prior to puberty, testosterone levels in boys and girls are typically below 2 nmol/L, but puberty triggers a dramatic increase in males to 7.7–29.4 nmol/L, while female levels remain low at 0–2.5 nmol/L (Handelsman et al., 2018; Handelsman, 2024). This hormonal surge in males leads to pronounced secondary sexual characteristics, such as greater muscle mass, bone density, and facial hair, which underpin physical dimorphism (Szadvári et al., 2023). Figure 2 (all data are available upon request) illustrates this hormonal divergence. Early developmental windows, such

as the postnatal "mini-puberty" in male infants (1–6 months) and the prenatal testosterone surge at 8–24 weeks of gestation, further shape neural circuits that influence male-typical behaviors, such as aggression and spatial skills (Hines et al., 2016).

Testosterone's influence extends to psychological and behavioral sex differences, rooted in both biology and, to some extent, social factors. Higher testosterone levels in human males are linked to traits like aggression, dominance, and risk-taking, which are more pronounced in human males and tied to evolutionary pressures such as male-male competition (Conroy-Beam et al., 2015; Hooven, 2021). Prenatal testosterone exposure, as seen in congenital adrenal hyperplasia (CAH), increases male-typical play behaviors in females, such as preference for rough-and-tumble activities, demonstrating its role in early behavioral differentiation (Kung et al., 2024). Testosterone also enhances spatial reasoning, where human males often excel, due to its effects on brain organization (Hines, 2020; Szadvári et al., 2023). Furthermore, testosterone modulates sexual desire, with human males showing a 35% increase in testosterone following sexual arousal, contributing to higher male libido compared to human females (Goldey & van Anders, 2012). While social norms, such as gendered competitive behaviors, can elevate testosterone in human males, reinforcing these traits, the biological foundation remains primary (van Anders et al., 2015).

As shown in Fig. 2, the stark post-pubertal testosterone divergence between human males and females drives the development of distinct physical and psychological traits that align with evolutionary roles, such as male protection, hunting, and physical male-male competition. These biologically rooted differences, amplified by prenatal and postnatal testosterone surges, challenge claims of sex as a spectrum by highlighting a bimodal hormonal distribution (Handelsman et al., 2018; Hines et al.,

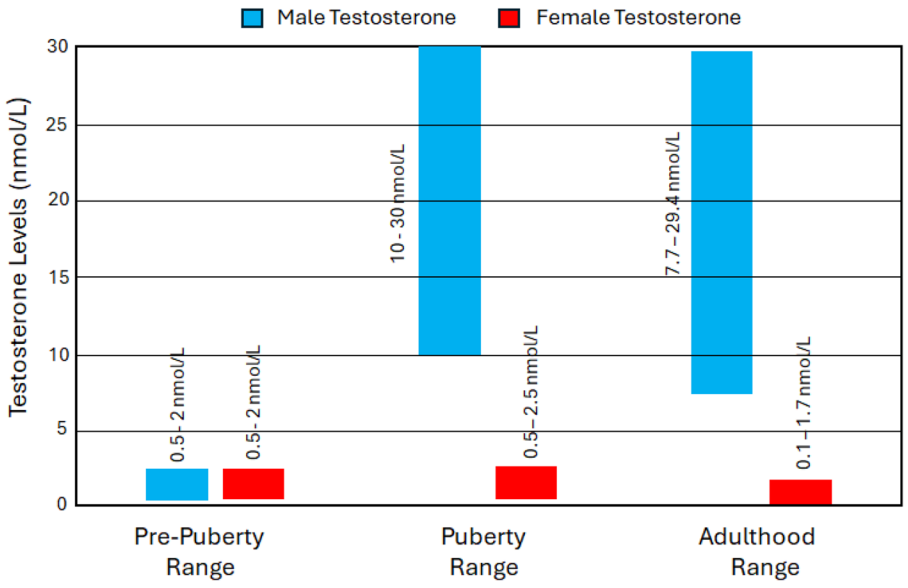

Fig. 2 The graph illustrates the testosterone ranges (in nmol/L) for males and females across three life stages: pre-puberty, puberty, and adulthood (Handelsman et al., 2018; Handelsman, 2024)

2016). In athletic performance, testosterone's role in male muscle mass and strength creates significant advantages, supporting sex-specific categories (Handelsman et al., 2018). Prenatal androgens further shape sex-typical behaviors, as evidenced by CAH studies, while adult testosterone levels sustain traits like aggression and sexual motivation, modulated but not determined by culture (Kung et al., 2024; Hooven, 2021). These findings affirm that sex differences are predominantly biological, driven by testosterone's evolutionary role in reproductive success, rather than social constructs. The differences lead to the development of a distinct suite of physical and psychological traits that we commonly associate with gender roles (i.e., masculine and feminine).

In contrast to male secondary sexual characteristics driven by testosterone, female secondary sexual characteristics are primarily influenced by estrogen and progesterone, which surge during puberty in individuals with female biology (XX chromosomes, producing ova). These hormones promote the development of traits such as breast growth, wider hips, and increased subcutaneous fat distribution, particularly in the hips and thighs, which enhance reproductive capacity and signal fertility in anisogametic, gonochoric species like humans (Ellison, 2001; Jasienska et al., 2017). *These physical changes*, alongside a higher voice pitch and smoother skin texture, reflect evolutionary adaptations for mate attraction and offspring nurturing, complementing male traits like strength and aligning with sex-specific roles in reproduction (Puts et al., 2016). Such hormonally driven differences, observable across cultures, underscore the biological basis of sex dimorphism, independent of social constructs.

While secondary sexual characteristics, such as muscle mass or breast development, may exhibit a bimodal distribution with some overlap between human males and females, this does not imply a unimodal spectrum where all traits are equally likely across sexes. The binary nature of sex, defined by the production of sperm or ova in anisogametic, gonochoric species like humans, remains fundamental, as these characteristics cluster distinctly around male and female norms (Wright, 2025).

Cross-Cultural Consistency in Gender Roles

One of the strongest arguments against the social construction of gender is the cross-cultural consistency of gender roles and behaviors which suggest these roles are rooted in biology rather than being socially constructed (Buss, 2025). Boys, for example, tend to prefer toys that promote action and exploration, such as cars and building blocks, while girls gravitate towards nurturing toys, such as dolls and playsets that mimic domestic life (Marlowe, 2007; Hines, 2010; Buss & Schmitt, 2011; Conroy-Beam et al., 2015).

This pattern holds true even in societies with contrasting social systems and values, reinforcing the evolutionary origins of gender roles. Best and Williams (1983), through their cross-cultural study of gender stereotypes in 25 countries, found that traits like male dominance and female nurturing are nearly universal, though their intensity varies by cultural context, suggesting a blend of biological predispositions and societal modulation. Such consistency implies that gender roles evolved to align with ancestral roles, where human males typically hunted and protected, and human

females focused on nurturing offspring (Buss, 2025)[2]. While cultural practices can shape how these tendencies are expressed, their widespread presence across human societies underscores a biological basis.

The persistence of gendered behaviors across diverse cultures, even in those actively promoting gender equality, underscores their deep biological roots, challenging social constructionist claims that socialization primarily shapes gender roles. In societies with high gender equality, such as Scandinavian countries, sex differences in preferences and occupations are often more pronounced, a phenomenon known as the gender equality paradox (Stoet & Geary, 2018). For instance, Stoet and Geary (2018) found that in nations with greater gender equality, women are less likely to pursue STEM fields (e.g., engineering, computer science), with male-to-female ratios in STEM degrees reaching 4:1 in countries like Norway, compared to lower ratios in less egalitarian nations. This suggests that when societal constraints are relaxed, biological predispositions – such as male interest in systemizing tasks and female preference for people-oriented roles – manifest more strongly, contrary to social constructionist predictions that equal opportunities would lead to similar life choices across sexes (Walker et al., 2020). Historical examples, like the Israeli kibbutzim, further illustrate this, where efforts to eliminate traditional gender roles failed to erase sex-typical behaviors, reinforcing the evolutionary basis of these differences (Spiro, 1996; Buss, 2025).

Further evidence supporting this interpretation comes from recent large-scale research demonstrating that improvements in living conditions tend to amplify, rather than diminish, many psychological sex differences (Herlitz et al., 2025). Specifically, a new study found that sex differences in traits such as personality, verbal abilities, episodic memory, and negative emotions were significantly larger in countries with higher levels of economic development, education, and gender equality. In contrast, only a few differences, such as those in sexual behavior, partner preferences, and mathematical ability, became smaller under these conditions. Notably, economic indicators like gross domestic product were among the strongest predictors of the magnitude of sex differences. The authors concluded that as living standards improve, most psychological sex differences remain stable or grow more pronounced. This pattern further challenges the social constructionist view by indicating that reducing societal constraints does not eliminate biologically influenced differences but often allows them to emerge more clearly.

Social Construction Versus Sexual Orientation

Research into the biological basis of sexual orientation suggests that it is influenced by genetic, hormonal, and prenatal factors. A pivotal study by LeVay (1991, 2017) found structural differences in the brains of heterosexual and homosexual human males, specifically in the size of the third interstitial nucleus of the anterior hypothalamus (INAH3). The INAH3 was significantly larger in the postmortem brains of

[2] Evolutionary forces that exist in society today, have had too short of a duration to impact natural selection.

heterosexual human males, suggesting a biological basis for sexual orientation. Additional studies have shown that prenatal exposure to varying levels of sex hormones, particularly testosterone, plays a significant role in shaping sexual orientation later in life. This suggests a biological foundation for homosexuality, as these hormones help 'organize' the developing brain in ways that influence patterns of sexual attraction[3] (Rahman & Wilson, 2003). Bailey et al. (2016) further synthesize evidence showing that biological factors, including genetics and prenatal androgens, strongly influence sexual orientation, particularly in human males, where orientation tends to be more fixed, while noting greater fluidity in human females, which may reflect both biological and cultural influences. These findings collectively point to a robust biological foundation for sexual orientation, rooted in early developmental processes.

During the mid-20th century, various conversion therapies were employed in an attempt to change individuals' sexual orientation. These included psychotherapy, aversion therapy, and other methods aimed at turning gay human males and human females into heterosexuals. However, these interventions had little success, and in many cases, caused significant psychological harm (Glassgold et al., 2009).

The failure of conversion therapies underscores the biological foundations of sexual orientation. If sexual orientation were purely a product of culture or environment, such interventions would likely have shown more success. The resilience of sexual orientation, even under intense psychological and social pressure, aligns with findings from Bailey et al. (2016), who argue that biological determinants, particularly in human males, create stable patterns of attraction that resist external modification. This evidence counters social constructivist claims by demonstrating that sexual orientation is predominantly shaped by innate factors, such as prenatal hormonal exposure and brain structure, rather than cultural or societal influences alone. No account has yet demonstrated how social factors could control hormone production during fetal development or puberty. By contrast, evolutionary psychology provides a clear and compelling framework for understanding how hormones develop and shape behavior over the lifespan.

Challenging Social Constructionist Arguments

Social constructionists argue that societal norms and expectations shape gender roles and that sex itself is not binary but exists on a spectrum. This argument is rooted in the notion that power structures, language, and social practices construct our reality, and thus gender and sex are also social constructs.

A recent essay on social constructionism by Phillips (2023), demonstrates the extent some Marxist social constructionists have distanced themselves from reality. He argues that constructionists are attempting to "problematize" objective reality, particularly in the realm of sex and gender, in favor of a relativistic approach. Phillips states:

Categories and dichotomies, such as male and female, individual and society, mental and physical, and urban and rural, are used in our society, where social con-

[3] It should be noted that the origin of sexual orientation is still controversial.

structionism proposes this move away from objective categories and descriptions of society and the world, and move towards these ideas as human constructions that grow and develop depending on the context and culture of the times… With the assumption that current ways of thinking and being are better than the past based on truth and accuracy, social constructionism argues that we avoid falling into this *'trap'* as this has resulted in the imposing of ways of being onto other contexts and cultures (e.g., the imperialist, colonising view of psychology and replacement of Indigenous perspectives of life and being).

Is ideology trumping science? As we have seen, this perspective overlooks the robust body of scientific evidence showing that biological sex differences are real, significant, and foundational to human development. Many studies have now demonstrated differences in brain patterns and structures between human males and human females. For example, one study showed that male and female brains exhibit different patterns of connectivity that correlate with cognitive and behavioral differences (Ingalhalikara et al., 2014): The prevalence of testosterone and other sex hormones, differences in brain structure, and cross-cultural consistencies in gender roles all point to the reality that sex and gender are deeply influenced by biology. These studies are not isolated to any one culture or society, but consistently show sex-based differences across the globe, further disproving the claim that gender is merely a social construct.

Can ideology override scientific evidence? A robust body of research demonstrates that biological sex differences are real, significant, and integral to human development, particularly in brain structure and function. Studies consistently reveal distinct neural patterns between human males and human females, such as differences in connectivity that underpin cognitive and behavioral variations (Ingalhalikar et al., 2014). For instance, Geary (2025) synthesizes evidence showing that sexual selection has shaped sex-specific brain structures, with males exhibiting greater connectivity in regions linked to spatial processing, while females show stronger inter-hemispheric connections associated with verbal and emotional processing. Ryali et al. (2024) used deep learning models to identify replicable sex differences in functional brain organization, with male brains showing enhanced connectivity in sensorimotor networks and female brains in networks tied to social cognition, correlating with behavioral differences like male spatial advantages and female verbal fluency. These findings, alongside the influence of testosterone and other sex hormones, underscore that sex differences are biologically rooted, not socially constructed, and are consistent across diverse cultures (Buss, 2025).

Further evidence from brain morphology and function reinforces the biological basis of these differences. Meta-analyses reveal that human males have larger total brain volumes (approximately 10% larger) and higher gray and white matter volumes, particularly in regions like the amygdala, while human females have relatively larger cortical areas linked to language and emotion (Ruigrok et al., 2014; Ritchie et al., 2018). Functional studies show that human males exhibit more lateralized brain activation during spatial tasks, influenced by testosterone, whereas human females display more bilateral activation during verbal tasks, reflecting hormonal and evolutionary pressures (Cahill, 2006; Geary, 2025). These structural and functional differences contribute to cognitive sex differences, such as male advantages in spatial reasoning and female strengths in verbal and emotional processing, which persist

across societies regardless of cultural norms (Walker et al., 2020). The global consistency of these neural and behavioral patterns refutes claims that gender is merely a product of socialization, affirming that biological sex shapes both brain and behavior in fundamental ways.

The APA's Perspective on Masculinity and Social Constructionism

The American Psychological Association (APA), the largest professional body of psychologists in the United States, has issued guidelines that reflect a social constructionist view of masculinity. These guidelines suggest that many male behaviors and traits are products of cultural socialization rather than driven by biological factors. The APA's position is clear from the outset, stating that "boys and men, as a group, tend to hold privilege and power based on gender" (American Psychological Association, 2018). This framing adopts a political lens, suggesting that masculine traits are linked to systemic privilege rather than natural variation between the sexes. Despite claims of systemic privilege, it remains unclear what specific data supports these assertions. Evolutionary and biological factors contribute to pronounced sex differences in societal outcomes, with human males exhibiting lower college enrollment and graduation rates, higher suicide rates, greater representation in the prison population, a larger share of homelessness, and a disproportionate burden of combat-related deaths. Similarly, Stoet and Geary (2018) provide a cross-cultural analysis using the Basic Index of Gender Inequality, showing that human males fare worse than human females in 91 of 134 countries across metrics like educational attainment, life expectancy, and homelessness, with human males comprising 70–90% of homeless populations in developed nations, undermining the APA's narrative of universal male privilege.

In their guidelines, the APA warns of the perceived dangers associated with what they term "traditional masculinity ideology." They identify a constellation of traits they associate with traditional masculinity, including anti-femininity, competitiveness, suppression of emotional vulnerability, and risk-taking behaviors. These traits, according to the APA, are problematic and contribute to a rigid and restrictive gender role for human males.

While the guidelines ostensibly aim to support the mental health of boys and human males, they often cast many traditionally masculine behaviors in a pejorative light. The APA encourages therapists to address conflicts human males may experience in areas such as success, power, competition, restrictive emotionality, and balancing family and work life – areas it suggests are the result of social pressures to conform to outdated, patriarchal gender roles.

This perspective reflects a broader social constructionist ideology, wherein traditionally masculine traits are seen as products of societal conditioning rather than driven by biological factors. The APA's position is that by reshaping these masculine behaviors, human males can be allies in dismantling structures like patriarchy, male hegemony, and toxic masculinity (see Defant, 2025a for an argument against these subjects). As psychologist John Paul Wright noted, "the APA committee advises therapists that human males need to become allies to feminism. 'Change men,' an author of the report stated, 'and we can change the world' (Quillette, 2019).

Cross-cultural studies consistently show that, despite varying societal norms, males universally exhibit traits like risk-taking, competitiveness, and emotional restraint, which are evolutionarily ingrained for survival and reproductive success. The APA's dismissal of these biological and cross-cultural realities in favor of a purely social constructionist viewpoint neglects the scientific evidence that masculinity is rooted in biology. The APA is attempting to steer male behavior to more closely resemble female behavior. *More importantly*, *their suggestions to therapists could do serious harm to young and emotionally vulnerable males.*

The Evolutionary Basis of Sex and Gender Differences

Evolutionary psychology offers a comprehensive lens for understanding the profound differences between human males and human females, shaped by diverse selective pressures over millennia. In ancestral environments, human males and females developed distinct physical and behavioral traits to address survival and reproductive challenges. Human males evolved greater physical strength and size, driven by male-male competition for dominance and resources, not solely mating access (Archer, 2019; Geary, 2021). These traits supported navigation, hunting, use of projectile weapons, weapon construction and territorial defense, critical for group survival. Human females, conversely, developed enhanced nurturing and social skills, advantageous for child-rearing and maintaining group cohesion, reflecting their higher parental investment (Geary, 2021). These differences, rooted in ecological and social demands, highlight the biological foundations of sex-specific roles.

Beyond physical traits, cognitive and behavioral differences further illustrate evolutionary influences. Human males' superior spatial reasoning, linked to larger brain regions like the parietal cortex, likely evolved to support navigation and hunting, while human females' verbal and emotional processing strengths, tied to greater interhemispheric connectivity, facilitated social bonding and offspring care (Geary, 2025). Archer (2019) notes that these cognitive differences emerge early in development, persisting across cultures, suggesting a biological basis rather than cultural imposition. For instance, boys consistently show preferences for spatial tasks, while girls gravitate toward social and nurturing activities, patterns observed globally regardless of societal norms (Hines, 2010; Geary, 2021). These findings underscore that sex differences extend beyond reproduction, encompassing adaptations for diverse survival challenges.

Mating strategies, a key component of sexual selection, also contribute significantly to sex and gender (i.e., masculinity and femininity) differences. Buss and Schmitt (2011) argue that human males evolved a preference for short-term mating to maximize reproductive opportunities, leading to traits like risk-taking and competitiveness. Human females, requiring greater investment in offspring, prioritize long-term partners who provide resources and protection, fostering traits like empathy and communication (Buss & Schmitt, 2011). These strategies explain behavioral differences, such as male aggression and female social sensitivity, which align with evolutionary roles but are not the sole drivers of sex differences, as broader survival pressures also play a critical role (Geary, 2021).

The notion that gender – encompassing masculinity and femininity – is a social construct, or that sex and gender exist on a spectrum, lacks scientific support. Hormonal influences like testosterone, which shapes male-typical brain organization and physical traits, and cross-cultural consistencies in sex differences, affirm their biological roots (Archer, 2019; Geary, 2025). Efforts to erase these differences through ideological frameworks ignore the complementary strengths human males and human females bring to society, such as human males' physical prowess and human females' caregiving capacities. Recognizing these biological factors stem from biology does not preclude equality but enhances our understanding of human diversity.

Denying biological reality in favor of social constructivism undermines scientific progress and risks harming individuals by dismissing their inherent traits. Acknowledging the evolutionary basis of sex and gender differences fosters respect for individual expression while grounding societal policies in evidence. By celebrating these differences, rather than attempting to homogenize them, we can promote equality of opportunity and dignity for all, ensuring that fields like psychology and biology advance with clarity and integrity.

Conclusion

In summary, this paper has brought together evidence from evolutionary psychology, neuroscience, hormonal studies, cross-cultural surveys, and analyses of sexual orientation to demonstrate that biological factors play a foundational role in shaping sex and gender. We have seen that prenatal and postnatal hormone exposures sculpt brain structure and behavior in predictable, sex-specific ways; that cognitive and physical differences – such as human males' spatial reasoning advantages and human females' verbal and empathic strengths – emerge consistently across disparate societies. Moreover, critiques of social constructionism – whether in feminist, philosophical, or institutional contexts like the APA's guidelines – reveal an unsettling willingness to subordinate empirical reality to ideological commitments.

Taken together, these findings refute the core tenets of radical social constructionism: while culture and socialization undoubtedly influence how gender is expressed or policed, they do not overwrite the deep biological underpinnings of sex and gender. Recognizing this dual reality – honoring both our shared humanity and our biological diversity – allows us to craft policies, educational programs, and clinical practices that respect individual dignity without disregarding scientific truth.

Moving forward, it is imperative that we shift our focus away from ideological battles over whether gender is "real" or "constructed," and instead ground our decisions in rigorous, merit-based inquiry. Whether we are developing medical guidelines, shaping educational curricula, or debating fairness in sports, our criteria should be evidence and outcome, not political allegiance. By recommitting to a science-first ethos, we safeguard both intellectual integrity and social progress – ensuring that debates about sex and gender are informed by data rather than dogma, and that our collective pursuit of fairness is built on a foundation of fact rather than faction.

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