

12 „...results suggest that women will not run, jump, swim or ride as fast as men“ – concepts of gender/sex in contemporary sport-related research

Corinna Schmechel

Abstract

In this paper, a critical perspective on biomedical knowledge of gender/sex is introduced, based on the work of the biologist Anne Fausto-Sterling and the epidemiologist Nancy Krieger. This critique will be applied to contemporary knowledge of gender/sex in sports science. The discussion will center on two subjects: the gender/sex performance gap in sport, and the relevance of menstruation to athletic performance and the health of female athletes. The discussion will also include how these two phenomena are represented in the medialization of popular knowledge, i.e., the moment in which scientific knowledge becomes everyday knowledge and potentially influences people's self-understanding and everyday practices, e.g., of sporting activity. This paper offers a concise perspective on the subject, highlighting the necessity for further research to comprehensively capture the given diversity of bodies without reproducing gender stereotypes in the future of sport related research and its popular reception.

Keywords: sex, gender, health, menstruation, research, sport, cycle-based training, female athletes

12.1 Introduction

The idea of a fundamental physical vulnerability and inferiority of the so called 'weaker sex' has long been used to legitimize the exclusion or restriction of women and girls in sports (Pfister, 2010; Günter, 2018). Participation in exhausting and demanding practices of sports or competition was said to cause serious damage to the physical, especially reproductive, health of females and would rather not suit their gendered character. Today, the assumption of the physical inferiority of the female sex is still used to exclude some women from sports competition, namely women who

show a strong athletic performance and whose appearance does not meet modern white standards of femininity, as could be observed in recent years in the controversies around the runner Caster Semenya or the boxer Imane Khelif. They should be (or were or are) excluded from competing against other women to protect these from their superiority, which is constructed as unnormal, unfair and - in the case of martial arts – even dangerous for other – normal – women (Krämer, 2020; Wiederkehr, 2012).

These arguments are usually based on scientific knowledge about physical gender resp. sex and its impact on athletic performance. But contrary to everyday assumptions natural sciences don't just neutrally explore biologically given facts. They are structurally and epistemically embedded in society, and so-called "scientific 'findings' can be seen as the results of complex production processes" (Knorr-Cetina, 1988, p. 375). Therefore, they are also constructed by the hegemonic social gender structure (Fausto-Sterling, 1993; Schiebinger, 2013) and biased by dominant gender concepts and hegemonic androcentrism (Schmitz & Schmieder, 2006).

Moreover, a significant contemporary social development is the changing role of scientific knowledge for everyday life practices of subjectivation (Maasen & Duttweiler, 2012). Through the process of (digitalized) medialization scientific knowledge has become fundamentally embedded in everyday life and merged with everyday life knowledge.

Referring to the field of sport, we observe that nowadays thousands of leisure time athletes plan and execute their training routines and diets based on exercise science paradigms about muscle growth, recovery times and protein metabolism. They track and analyze their training practices like professional athletes. This is made possible by a huge culture of (digitalized) popular science. Professional and self-proclaimed experts of exercise and nutrition science write books and post Instagram reels with advice and instructions for better results in athletic performance and physical appearance and popular media produce features, interviews and reports on these topics. Due to the centrality of the body and the historical as well as contemporary strong gendering of the field of sport, gender/sex is a central category in sports, not only in terms of competition classes. So, part of (popular) sport sciences is always a certain gender/sex knowledge which overlaps scientific and everyday form of gender knowledge (Wetterer, 2008).

From the perspective of the sociology of gender and sports this leads to certain questions, amongst others: How is gender/sex conceptualized in current training science, sports medicine and in related popular science

media? How are physical and social dimensions of gender/sex and their interaction understood? Is the intersectionality of gender/sex with diverse other categories of social distinction taken into account? How are other diversity categories, such as race or ability, taken into account?

In this paper, a critical perspective on biomedical knowledge of gender/sex is introduced, based on the work of the biologist Anne Fausto-Sterling and the epidemiologist Nancy Krieger. This critique will be applied to contemporary knowledge of gender/sex in sports science. The discussion will center on two subjects: the gender/sex performance gap in sport, and the relevance of menstruation to athletic performance and the health of female athletes. The discussion will also include how these two phenomena are represented in the medialization of popular knowledge, i.e. the moment at which scientific knowledge becomes everyday knowledge and potentially influences people's self-understanding and everyday practices, e.g. of sporting activity.

12.2 *The Science of Gender/Sex*

The distinction between sex – defined as the physical aspects of gender/sex such as genetic, hormonal or anatomic features of one's body – and gender – defined as social aspects such as one's identity, certain norms and roles within social structures and stereotypical associations of certain characteristics – is widely accepted within scientific and popular discourse. Moreover, there has been a recent rise in awareness regarding the necessity of incorporating sex and gender considerations into medical and epidemiological research. However, a more detailed perspective reveals the emergence of conceptual challenges (Hammarström & Annendale, 2012).

First, from a deconstructivist social science perspective the distinction between a socially constructed gender and a naturally given sex is itself formed by socially constructed, historically shifting, boundaries between what is considered to be nature and what is considered to be culture (see e.g. Butler, 2011; Haraway, 1993, 2000).

Renowned biologist Anne Fausto-Sterling demonstrates in her work, that the separation of distinctly two sexes has to be considered a social rather than a biological one. From a biological standpoint, states Fausto-Sterling, the existence of five sexes is as valid as the existence of two. The dualistic division into only two acknowledged categories, with all bodies which do not fit the referring criteria (so called intersexual people) being categorized

as pathological, is rather a reflection of the social gender categories than a determined biological factum (Fausto-Sterling, 1993).

Also on an empirical level, the distinction between what is natural and what is social is not as easily delineated as it may initially appear. Instead, nature and culture, or nature and nurture as it is more commonly referred to, are inextricably linked. Consequently,

[...] sex and gender are neither dichotomous nor independent of each other. Gendered structures change biological function and structure. At the same time, biological structure and function affect gender, gender identity and gender role at both individual and cultural levels. (Fausto-Sterling, 2019, p. 4)

That's why Fausto-Sterling and other researchers claim for the implementation of the term *gender/sex*¹. (Fausto-Sterling, 2019, p. 4).

Another relevant scholar from the field of critical feminist natural science of the human body is epidemiologist Nancy Krieger, who is known for her Ecosocial Theory and her concept of Embodiment, which explains influences of social positions, such as racist discrimination, on the body and its health (Krieger, 2012). Krieger employs the terminology of “gendered expressions of biology” in distinction to “biologic expressions of gender” (Krieger, 2003). To make her approach clear, I cite an extended passage of her work:

Gender refers to a social construct regarding culture-bound conventions, roles, and behaviors for, as well as relations between and among, women and men and boys and girls. Gender roles vary across a continuum and both gender relations and **biologic expressions of gender** vary within and across societies, typically in relation to social divisions premised on power and authority (e.g., class, race/ethnicity, nationality, religion). [...] **sex** is a biological construct premised upon biological characteristics enabling sexual reproduction. Among people, biological sex is variously assigned in relation to secondary sex-characteristics, gonads, or sex chromosomes; sexual categories include: male, female, intersexual (persons born with both male and female sexual characteristics), and transsexual (persons who undergo surgical and/or hormonal interventions to reassigned their sex). Sex-linked biological characteristics (e.g., presence or absence of ovaries, testes, vagina, penis; various hormone levels;

1 Comparable to the German term *Geschlecht*, which also does not divide the layers of physical or social aspects of *gender/sex*.

pregnancy, etc.) can, in some cases, contribute to gender differentials in health but can also be construed as **gendered expressions of biology** and erroneously invoked to explain **biologic expressions of gender**. (Krieger, 2003, p. 653, highlights in original)

Krieger, like Fausto-Sterling, acknowledges sex as not being dualistic. Instead, Krieger identifies four different sexes (male, female, intersexual and transsexual).² Especially relevant for this paper is her concept of physical and social aspects of gender/sex and their interplay. Krieger admits that sex-linked biological characteristics – such as the rate of testosterone or menstruation – can contribute to differentials in health – or in athletic performance as discussed here. But they can also be understood as gendered expressions of biology which are falsely used to explain – and naturalize – biologic expressions of gender. This says, that there are expressions of biology, which are gendered – as an act of social prescription. An example would be the different proportions of muscles to fat in average male resp. female bodies. This can be seen as a biologic factum based on varying levels of testosterone, which are often gendered, with testosterone being designated as the 'male hormone' (Fausto-Sterling, 2000). It is important to note that there is no specific hormone that can be identified as exclusively 'male' or 'female'. Rather men and women and all other genders/sexes produce testosterone (and estrogen) and are experiencing physiological effects. The labeling of a high rate of testosterone as exclusively male and therefore not female is a social process of gendering, a *gendered expression of biology*. But the characteristic of the average (white and western) female body as not very muscular may also be a consequence of gendered nutritional patterns, e.g. calorie and fat reduced due to gendered norms of the slenderness (Bordo, 2003) and gendered daily physical practices (Young, 2005; Crittenden Scott, 2025 [1974]; Nelson, 2024). Biology is reacting to a life style based on gendered norms and roles and this *biological expression of (social) gender* is erroneously seen as a biological foundation of social gender roles: Women become smaller and weaker than men due to epigenetical processes of bodies adapting a gendered lifestyle over several generations and this is interpreted as women being essentially smaller and weaker than men

2 The five sexes in Fausto-Sterling's concept are male, female and three different sexes (herms, merms and ferms), which are in the hegemonic medical discourse all combined under the label intersexual but for Fausto-Sterling are all separate and different. Fausto-Sterling claims to see sex as something continuous between the poles male and female (Fausto-Sterling, 1993, p. 69) with five or even more central 'point on the line'.

and oftentimes used as a reason for gendered social norms in sports and elsewhere.

So not only social, but also natural science show, that the ‘nature’ of two distinctively different sexes is, at many points, the result of a biased interpretation of biological features and of a gendered lifestyle rather than a determined factum. But these perspectives are not hegemonic, not within the scientific community nor in the public understanding of natural science of the human body and also not within the field of sport science.

12.3 Gender/Sex in Sport-related Research

Sport science is a trans- and interdisciplinary field, encompassing a range of natural and social sciences. These include sports medicine, exercise physiology, sports pedagogy, and sports sociology. While the social sciences of sport science have produced a certain body of research on gender/sex in sport, which recognizes gender/sex as multidimensional and non-dualistic (e.g. Schmechel, 2022; Krämer, 2020; Braumüller et al., 2020; Elling-Machartzki, 2015), the natural sciences of sport science employ, by and large, a monodimensional and dualistic understanding of gender/sex (Nelson, 2024). Furthermore, it can be posited that the conclusions of Ilse Hartmann-Tews and Bettina Rulofs on gender bias in sports medicine from 2013 (Hartmann-Tews & Rulofs, 2013) remain valid and applicable to other domains of sports science, including exercise science (see also Nelson, 2024). The fact that studies usually operationalize gender/sex as dualistic and monodimensional only must also be categorized as a form of gender bias (Horstmann et al., 2022). A paucity of critical research exists on sport science and its conceptualization as an object of research itself.³

In the following, I will discuss what has been presented so far in relation to two subjects that are currently being discussed in sport science and the popular science media. The first is the aforementioned gender performance gap. The second phenomenon is that of menstruation-based training, which is gaining popularity among athletes of all levels.

3 For research on racism within sport-related research, see Nobis & El-Kayed, 2023; see also Cowley et al., 2021 on the gender data gap in sport research.

12.3.1 Performance Gap

The gendered performance gap is the term used to describe the evidence of differences in athletic performance between men and women, with men generally demonstrating higher levels of performance. This disparity serves as the foundation for the legitimacy of single-gender and sex-competitions in the majority of athletic disciplines, as well as the policies that govern participation as a woman. A frequently cited paper on the subject states: “Sex is a major factor influencing best performances and world records” (Thibault et al., 2010, p. 214), while referring to the phenomenon as „gender gap”.⁴ The terms sex and gender are not defined and are used interchangeably and associated with factors such as “[...] height, weight, body fat, muscle mass, aerobic capacity or anaerobic threshold as a result of genetic and hormonal differences” (Thibault et al., 2010, p. 214).

There is no discussion of any social factors except for doping policies in times of the Cold War. The authors compare the improvement of male and female world records and ten best performances over the modern Olympic era in various fields including swimming, athletics, track cycling, weightlifting and speed skating in order to measure the evolution of gender/sex gaps. They conclude: “It appears that gender gaps in sport performance have been stable for a long time: women may never catch up with men” (Thibault et al., 2010, p. 221) and suggest “that women will not run, jump, swim or ride as fast as men” (Thibault et al., 2010, p. 214).

Millard-Stafford et al. (2018) follow a more nuanced approach, also considering political circumstances such as discriminating rewards structures and opportunities for participating in sports. However, they also conclude: “The ~40-y plateau in the performance gap suggests a persistent dominance of biological influences (eg, longer limb levers, greater muscle mass, greater aerobic capacity, and lower fat mass) on performance” (Millard-Stafford et al., 2018, p. 530).

The prevailing evidence of men outperforming women in the past is often interpreted as indicative of a persistent future trend. Without considering the social impacts on the body and the athletic performance of people, the longevity of men's dominance in high-rated athletic performance is taken as proof for the impact of biological characteristics. These characte-

4 This aligns with Hammarströms and Annandales (2012) conclusion of a “conceptual muddle” risking essentialist and reductivist thinking within the field of gender-specific medicine which seems to be transferable to the field of sport medicine.

ristics are taken as essential and not as a potential result of socio-economic circumstances within an historical and ongoing process, as an eco-social approach would suggest (Krieger, 2003). This research can be considered biased in certain aspects. Firstly, the terms 'gender' and 'sex' are not clearly defined, and the studies do also not address the implicit assumption of gender/sex as dualistic, essentialistic, and monolithic. Furthermore, the aspects that are compared and measured exhibit an implicit androcentrism, as certain characteristics that are culturally associated with maleness, such as strength and speed, are measured while disregarding other disciplines or performance aspects, such team play, strategy, and elegance.

Few voices within the field of sport sciences offer a critical perspective on these interpretations. Hallam and Amorim (2022) conclude for the performance gap in the field of running-disciplines:

Explanations for the sex difference in absolute performance and competition depth include physical (physiological, anatomical, neuromuscular, biomechanical), sociocultural, psychological, and sport-specific factors. [...]. There is scope to narrow the sex performance gap by addressing inequalities between the sexes in opportunities, provisions, incentives, attitudes/perceptions, research, and media representation. (Hallam & Amorim, 2022, p. 1)

Also, Nelson (2024) argues for an enhanced interdisciplinary discourse and claims for bridging the gap between the natural exercise science and the social and cultural sciences of sport. Focusing on the so called 'strength gap' between men and women, Nelson advocates a biocultural understanding (similar to Nancy Krieger ecosocial approach in health sciences) of strength in order to "think differently about sex, gender, and bodies, potentially enabling us to imagine new methods of categorizing athletes and organizing social structures beyond binary understandings of physical strength" (Nelson, 2024, p. 10) But these are rather minorized positions within the scientific community.

The dualistic and essentialist conception of gender/sex and its relevance for athletic performance can also be seen in the popular discussions on female athletes who do not fit hegemonic standards of femininity, such as Caster Semenya or Imane Khelif, and whose femaleness is put to question. The oftentimes indiscrete and disrespectful public debates about their bodies are legitimized by the assumption that certain levels of athletic performance and physicality are not attainable for females and the notion of protecting women from being betrayed (or in the case of boxer Khelif put in danger

of severe injury) by referring to a simplistic conception of gender/sex. This reduces gender/sex and its relevance for athletic performance to the rate of testosterone (Heckemeyer, 2020; Krämer, 2020).

12.3.2 Menstruation-based Training

Another topic that has been the subject of discussion in the field of gender/sex in sports lately is the role of menstruation. There has been a remarkable increase in the level of attention it has received, after being a taboo for long. A search of the scientific database PubMed reveals a substantial increase in research on the intersection of menstruation, training, and sport over the past decade.⁵ Additionally, the market for popular science media has witnessed a proliferation of media products on menstruation-based training, including how-to books, TV shows, or Instagram posts by popular science influencers. A review of these materials reveals a consistent recommendation which entails the reduction of training intensity during the menstrual and luteal phases, while planning high-intensity workouts and strength training during the follicular and ovulatory phases. This is said to optimize athletic performance and wellbeing. Frequently, it is accompanied by recommendations for a diet that is synchronized with the menstrual cycle.

But not only is the orientation on one's menstruation cycle regarded necessary for optimizing athletic result, but training without considering one's menstruation cycle is also declared as harmful in some publications. A German television report, produced in 2022, on menstruation-based training, broadcasted by public television, states the following in its introduction:

Women usually train in the same way as men. That's obvious at first. But the female body works differently to the male body. Women live in a monthly cycle. And only very few take this into account when training. Incorrect training, however, can have consequences, even serious ones: Missed periods, infertility. Training that works for men can harm women. [...] This is because at certain times the female body is capable of peak performance and responds to intensive training stimuli, while in

5 Request conducted at PubMed with the terms “menstrua*” and “training” as well as “menstrua*” and “sport” in November 2024 and again in March 2025.

other phases female athletes should slow down because not only does their performance decline, but the risk of injury is also greater.⁶ (ARD Mediathek, 2025, min. 0.00-0.26).

The structure of this contribution does not permit a more profound analysis of the content of this media product, but summarizing this and other publications on the subject, we find the following general aspects, which are particularly evident in this example:

The male and female bodies are considered to be fundamentally different. Menstruation is conceptualized as a cyclical process with distinct phases. These phases are known to have distinct effects on an individual's athletic performance and overall well-being. During two of these phases (menstruation and the luteal phase), performance and wellbeing are described in terms such as 'low/lower' and 'light' indicating that exercise is less aligned with the 'biological calendar'. Depending on the specific concept of the menstrual cycle, this can result in the definition of the athletic performance of the affected person as somehow deficient between 15 and 17 days of the generalized 28-day cycle. In some cases, menstruating individuals may be warned against high-intensity training or lifting heavy weights during the 'wrong' phases because of the increased risk of injury. Moreover, training schedules that are not adapted to a person's menstrual cycle (and therefore consist of 'lower' performance and activity for about half of the month) are considered dangerous for one's reproductive health.

Women (or menstruating persons, who are considered equivalent to women) are construed as the 'weaker sex', who should train at a lower capacity for about half of the month, while men seem to be able to train intensely for the whole month. Additionally, women are often portrayed as the 'endangered sex'⁷ emphasizing the potential risks of severe injury and detrimental consequences for reproductive health during intense training in the 'wrong' phase of the menstrual cycle.

This perspective can be seen as a modernized version of historical discourses that excluded women from (intensive) sports due to a proclaimed natural physical incapacity and vulnerability. While it is now widely recognized that there is no scientific basis for the idea that a woman's uterus could fall out during certain sports activities, the notion that a woman's menstrual cycle could pose a health risk to her if she trains 'against' it

6 Translated with DeepL (Free version)

7 Gerhardt (1987) shows that this is a long tradition of gender bias in health-related research.

(when she is only able to engage in intense training during half of her cycle) bears relevant parallels.

Interestingly, when looking at the scientific discourse on the impact of menstruation on athletic performance, one does not find evidence for such clear advice. Though there are studies showing impact of different hormone levels on the athletic capability during the menstrual cycle, a systematic review in 2020 concludes:

The results from this systematic review and meta-analysis indicate that exercise performance might be trivially reduced during the early follicular phase of the MC, compared to all other phases. Due to the trivial effect size, the large between-study variation and the number of poor-quality studies included in this review, general guidelines on exercise performance across the MC cannot be formed; rather, it is recommended that a personalised approach should be taken based on each individual's response to exercise performance across the MC. (McNulty et al., 2020, 1813).

So, in regard to the subject of menstruation and its impact on athletic performance, a significant discrepancy emerges between the extant scientific evidence and the popular discourse. Though both, scientific research as well as popular discourse, refer to a dualistic concept of gender/sex and do not consider social aspects or intersectionality of any relevance.

12.4 Discussion

A comparison of the two subjects under discussion reveals that the predominant concept of gender/sex in sport science is dualistic and often refers only to an undercomplex concept of sex. Physical differences that occur on average between the two considered sex categories are often taken as naturally determined. Conversely, critical approaches that assume more interaction between nature and nurture and perceive the physical body as a product of biosocial processes of influence and interpretation (e.g., represented in the work of Krieger and Fausto-Sterling) are rare in the field of sport studies (Nelson, 2024).

However, a distinction should be noted between these two subjects and the broader public discourse surrounding them. While the discussion about the performance gap between male and female athletes seems rather conservative, the growing scientific interest in menstruation and its rele-

vance for athletic performance and well-being can be seen as a positive development in recognizing the diversity of athletic bodies and overcoming established androcentrism.

Though, a closer examination, particularly within the public discourse surrounding the topic, reveals the reemergence of entrenched stereotypes about female athletes as the 'weaker sex'. These stereotypes are often rooted in the perception that female athletes are biologically inferior and more prone to physical harm due to their reproductive organs. Menstruation and its impacts are conceptualized as something purely 'natural' and independent from any social factors. A lack of comparable research on the role of reproductive organs in sports or hormone-based training for men also reveals a certain gender bias at the epistemological level.

Additionally, the intersectionality of gender/sex with other factors, such as class, race, or ability, appears to be absent, although the relevance of race to the perception of women's appearance and performance as suspect has been raised, particularly in debates about legitimate testosterone levels for female competitors (Krämer, 2020; Wiederkehr, 2012). When it comes to the discussion of menstruation in training, age and contraceptive practices are taken into account.

12.5 Conclusion

In contemporary modern societies, subjectivation is significantly influenced by public scientific knowledge (Massen & Duttweiler, 2012). In a society characterized a certain 'sportification' (Crum, 1991) the knowledge of sports sciences becomes pertinent to the subjectivation practices of many individuals, extending beyond the realms of professional and competitive sports.

This underscores the significance of sport science and its implicit and explicit gender knowledge. It is imperative for the field of sport science to be cognizant of the social construction processes of difference in sport-related research (Nobis & El-Kayed, 2023) and its embeddedness within hegemonic culture. Furthermore, the integration of a more bio-social understanding of the body and gender/sex (Krieger, 2003) into sport-related research would be beneficial, as would a more intensive dialogue between the natural and social sciences within the inherently interdisciplinary field of sport studies.

This paper offers a concise perspective on the subject, highlighting the necessity for further research to comprehensively capture the given diversity of bodies without reproducing gender stereotypes in the future of sport related research and its popular reception.

Literature

- ARD-Mediathek. (2025, March 27). *Warum Frauen anders Sport treiben sollen als Männer* [Video] <https://www.ardmediathek.de/video/gut-zu-wissen/warum-frauen-anders-sport-treiben-sollen-als-maenner/br/Y3JpZDovL2JyLmRRL2Jyb2FkY2FzdC9GMjAyMldPMDA0NzMyQTA>
- Bordo, S. (2003). Reading the Slender Body. In S. Bordo (Ed.), *Unbearable Weight. Feminism Western Culture and the Body* (pp. 185-212). University of California Press.
- Braumüller, B., Menzel, T., & Hartmann-Tews, I. (2020). Gender Identities in Organized Sports-Athletes' Experiences and Organizational Strategies of Inclusion. *Frontiers in Sociology*, 5, 578213. <https://doi.org/10.3389/fsoc.2020.578213>
- Butler, J. (2011). *Bodies That Matter: On the Discursive Limits of "Sex"*. Routledge.
- Cowley, E. S., Olenick, A. A., McNulty, K. L., & Ross, E. Z. (2021). "Invisible Sportswomen": The Sex Data Gap in Sport and Exercise Science Research. *Women in Sport and Physical Activity Journal*, 29(2), 146-151. doi: 10.1123/wspaj.2021-0028
- Crittenden Scott, A. (2025[1974]). Schließen wir den Muskel-Gap (Orig.: Closing the Muscle-Gap). In Sturm, P. & Spitaler, G. (Eds.), *Sport und Feminismus. Gesellschaftspolitische Geschlechterdebatten vom Fin de Siècle bis heute* (pp. 173-178). Campus.
- Crum, B.J. (1991). 'Sportification' of Society and Internal Sports Differentiation. *Spel en Sport*, 1, 2-7.
- Elling-Machartzki, A. (2015). Extraordinary body-self narratives: Sport and physical activity in the lives of transgender people. *Leisure Studies*, 36(2), 256-268.
- Fausto-Sterling, A. (1993). The Five Sexes. Why Male and Female Are Not Enough. *The Sciences*, 33(2), 20-24. <https://doi.org/10.1002/j.2326-1951.1993.tb03081.x>
- Fausto-Sterling, A. (2000). Sexing the body. Gender Politics and the Construction of Sexuality. Basic Books.
- Fausto-Sterling, A. (2019). Gender/Sex, Sexual Orientation, and Identity Are in the Body: How Did they get there? In: *Journal of Sex Research* 56(4-5), 529-555. <https://doi.org/10.1080/00224499.2019.1581883>
- Gerhardt, U. (1987). Soziologische Erklärung Gesundheitlicher Ungleichheit. In B. Giesen & H. Haferkamp (Eds.), *Beiträge zur sozialwissenschaftlichen Forschung: Vol. 101. Soziologie der sozialen Ungleichheit* (pp. 393-426). VS Verlag für Sozialwissenschaften.
- Günter, S. (2018). „Männlicher Widerwille gegen weibische Weichlichkeit“ (GutsMuths (1793) 1893, 26): Historische und aktuelle Perspektiven auf hegemoniale Männlichkeitskonstruktionen im Feld des Sports. In M. K. Schweer (Ed.), *Sexismus und Homophobie im Sport* (pp. 21-37). Springer VS.

- Hallam, L. C., & Amorim, F. T. (2021). Expanding the Gap: An Updated Look Into Sex Differences in Running Performance. *Frontiers in Physiology*, 12, 804149.
- Hammarström, A. & Annandale, E. (2012). A Conceptual Muddle: an Empirical Analysis of the Use of 'Sex' and 'Gender' in 'Gender-Specific Medicine' Journals. *PLOS One*, 7(4), e34193. <https://doi.org/10.1371/journal.pone.0034193>
- Hartmann-Tews, I., & Rulofs, B. (2013). Gender Bias in der Forschung - ein blinder Fleck der Sportmedizin? In E. Kleinau, D. Schulz, & S. Völker (Eds.), *Gender in Bewegung* (pp. 241-255). Transcript.
- Heckemeyer, Karolin (2020). Inter und trans Athletinnen* im Wettkampfsport. *GenderStudies – Zeitschrift des Interdisziplinären Zentrums für Geschlechterforschung (IZFG)*, 36, 8-10.
- Horstmann, S., Schmechel, C., Palm, K., Oertelt-Prigione, S., & Bolte, G. (2022). The Operationalisation of Sex and Gender in Quantitative Health-Related Research: A Scoping Review. *International Journal of Environmental Research and Public Health*, 19(12). <https://doi.org/10.3390/ijerph19127493>
- Knorr-Cetina, K. (1988). The internal environment of knowledge claims: One aspect of the knowledge-society connection. *Argumentation*, 2, 369–389 (1988). <https://doi.org/10.1007/BF00176973>
- Krämer, D. (2020). Intersexualität im Sport: Mediale und medizinische Körperpolitiken. Transcript.
- Krieger, N. (2003): Genders, Sexes, and Health: What are the Connections--and why does it matter? *International journal of epidemiology*, 32(4), 652-657. <https://doi.org/10.1093/ije/dyg156>
- Krieger, N. (2012): Methods for the Scientific Study of Discrimination and Health: an Ecosocial Approach. *American journal of public health*, 102(5), 936-944. <https://doi.org/10.2105/AJPH.2011.300544>
- Maasen, S., Duttweiler, S. (2012). Neue Subjekte, neue Sozialitäten, neue Gesellschaften. In Maasen, S., Kaiser, M., Reinhart, M. & Sutter, B. (Eds): *Handbuch Wissenschaftssoziologie* (pp. 417–428). Springer VS.
- McNulty, K. L., Elliott-Sale, K. J., Dolan, E., Swinton, P. A., Ansdell, P., Goodall, S., et al. (2020). The Effects of Menstrual Cycle Phase on Exercise Performance in Eumenorrheic Women: A Systematic Review and Meta-Analysis. *Sports medicine (Auckland, N.Z.)*, 50(10), 1813-1827. <https://doi.org/10.1007/s40279-020-01319-3>
- Millard-Stafford, M., Swanson, A. E., & Wittbrodt, M. T. (2018). Nature Versus Nurture: Have Performance Gaps Between Men and Women Reached an Asymptote? *International journal of sports physiology and performance*, 13(4), 530-535.
- Nelson, M. (2024). Stronger together: towards constructive conversations about strength differences, gender, and sex. *Sport, Education and Society*, 1–13. <https://doi.org/10.1080/13573322.2024.2338401>
- Nobis, T., & El-Kayed, N. (2023). Othering in sport-related research: How research produces and reproduces images of 'the immigrant Other'. *European Journal for Sport and Society*, 20(4), 332-350.
- Pfister, G. (2010). Women in Sport - Gender Relations and Future Perspectives. *Sport in Society*, 13(2), 234-248.

- Schiebinger, L. (2013). *Nature's Body: Gender in the Making of Modern Science*. Rutgers University Press.
- Schmitz, S., & Schmieder, C. (2006). Popularisierungen. Zwischen Naturwissenschaften, Medien und Gesellschaft. In S. Ebeling (Ed.), *Geschlechterforschung und Naturwissenschaften. Einführung in ein komplexes Wechselspiel* (pp. 363-378). Springer VS.
- Thibault, V., Guillaume, M., Berthelot, G., Helou, N. E., Schaal, K., Quinquis, L., Nassif, H., Tafflet, M., Escolano, S., Hermine, O., Toussaint, J.-F. (2010). Women and Men in Sport Performance: The Gender Gap has not Evolved since 1983. *Journal of Sports Science & Medicine*, 9(2), 214-223.
- Wetterer, A. (2008). Grundzüge einer Typologie des Geschlechterwissens. In A. Wetterer (Ed.), *Geschlechterwissen und soziale Praxis. Theoretische Zugänge - empirische Erträge* (pp. 39-63). Helmer.
- Wiederkehr, S. (2012). Jenseits der Geschlechtergrenzen. Intersexuelle und transsexuelle Menschen im Spitzensport. *Feministische Studien*, 30(1), 31-43.
- Young, I. M. (2005). Throwing Like a Girl. In I. M. Young (Ed.), *Studies in Feminist Philosophy. On Female Body Experience. "Throwing like a Girl" and other Essays* (pp. 27-45). Oxford Univ. Press.

Autor*innenangaben

Dr. Corinna Schmechel
Georg-August-Universität Göttingen
Sozialwissenschaftliche Fakultät
Platz der Göttinger Sieben 7
37073 Göttingen
E-Mail: corinna.schmechel@uni-goettingen.de