

SYSTEMATIC REVIEW ON THE PARTICIPATION OF TRANSGENDER ATHLETES IN HIGH-PERFORMANCE SPORTS

REVISÃO SISTEMÁTICA SOBRE A PARTICIPAÇÃO DE ATLETAS TRANSGÊNERO EM ESPORTES DE ALTA QUALIFICAÇÃO 

REVISIÓN SISTEMÁTICA SOBRE LA PARTICIPACIÓN DE ATLETAS TRANSGÉNEROS EN DEPORTES DE ALTA CALIFICACIÓN 

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Abstract: This study delves into the participation of transgender athletes in high-performance sports, with a specific focus on transgender studies. Researchers employed the PRISMA systematic review methodology, analyzing 37 articles from databases such as Scopus, PubMed, and SPORTDiscus. These articles spanned from the 2003 Stockholm Consensus, which marked the International Olympic Committee's initial regulations regarding transgender individuals in sports. Notably, the Scopus database contained a higher number of relevant articles. The study identified four key themes: 1) Public Policies, 2) The Role of Coaches, 3) Physiological Differences, and 4) Suggestions for Inclusion. In summary, the research emphasizes the importance of a holistic approach that considers social and human factors alongside physiological aspects when including transgender athletes. By addressing these dimensions, sports organizations can create more informed and inclusive policies, fostering an environment that welcomes transgender athletes.

Keywords: Transgender persons. Athletes. Sports. Systematic Review.

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1 INTRODUCTION

The approach to the issue of transgender bodies in sports is a delicate and complex subject around the world, especially considering the negligence of human rights and the marginalization of minority social groups (Thoreson, 2022). This theme is of interest because the unfavorable positions faced by transgender athletes, such as high rates of suicide, prejudice, restricted access to spaces, and limitations in sports competitions, are often driven by prejudices and stereotyped beliefs that lack a deeper analysis of the sociocultural context. It is essential to address this issue comprehensively and sensitively, seeking inclusion and protection of the rights of all individuals, regardless of their gender identity.

Regarding matters of division, inclusion, eligibility, and categorization in sports, Parry and Martínková (2021) explain that within the context of sports, there has been a long-standing practice of classifying and grouping individuals based on specific traits, such as age, gender, weight, and disability status. These determinations and distinctions are fundamental in establishing the criteria for eligibility.

It is known that eligibility criteria in sports are often based on factors such as anti-doping regulations, age and weight. However, what stands out the most in this discussion is the criterion of biological sex. Human sex is not strictly binary, however, sports typically recognize only two categories based on sex. As highlighted by Grespan and Goellner (2014), sports serve as an educational instrument, a performance platform, and a promoter of gendered models of what is considered masculine and feminine. This characteristic can influence perceptions and gender expectations within the sports context, affecting the participation and treatment of transgender athletes.

One of the first cases of a transgender athlete in sports was that of Renée Richards, who was barred from participating in women's tournaments and was compelled to file a lawsuit in the New York Supreme Court in 1977 to be allowed to compete. However, it was not until 2003 that the International Olympic Committee (IOC) invited seven experts to reflect on and update the sex/gender guidelines for the following years. This led to the creation of the "Consensus Meeting on Sex Reassignment and Hyperandrogenism." The definition established in this document allowed transgender athletes to participate in sports competitions as long as they underwent gender reassignment surgery, obtained recognition from their country of origin, and waited for a minimum of two years after the surgery.

In 2015, the IOC recognized the right to gender identity, making decisions that reflected previous studies and research. These decisions included not mandating gender reassignment surgery for transgender athletes to participate in categories aligned with their gender identity, as long as they were on hormone treatment for at least two years. The IOC (2015) began using only the level of testosterone in the blood as a criterion to limit the participation of transgender women in competitions, establishing the limit of 10 nmol/L stable over the last twelve months. This change meant that transgender men athletes were allowed to compete without restrictions, while transgender women athletes had their participation regulated based on

testosterone levels. These measures were based on studies, including the work of Harper (2015), which contributed to substantiate and reinforce the decisions taken by the IOC regarding the inclusion of transgender athletes in high-performance sports.

We understand high-performance sports as a distinct category, partly due to the large number of studies focused on collegiate and amateur sports. Drawing on the study by Swann, Moran, and Piggott (2015), which presents criteria for defining high-performance athletes, notable factors include participation in international and/or national competitions, experience and professionalism, training load (with an average of 6.5 hours per day and 15 sessions per week), inclusion in elite talent development programs, the achievement of specific sports goals (such as earning a black belt in martial arts), and the athlete's accumulated success, measured, for instance, by the number of victories.

Based on the presented contextualization,¹ it is plausible to believe that the participation of transgender athletes in sports competitions has been significant, leading to an increase in scientific production on this subject. Given this perspective, the objective of this study was to analyze the existing scientific production regarding the participation of transgender athletes in high-performance sports. To guide this analysis, the guiding question established was: "How is the issue of transgenderism being treated in high-performance sports?"

Through the investigation of this topic, we aim to understand the approaches, research, and scientific discussions surrounding the inclusion of transgender athletes in high-performance sports. This type of study is essential to inform policies, practices, and decision-making that can promote greater equality and acceptance in sports, ensuring that transgender athletes are respected and have fair opportunities to compete, thus contributing to greater diversity and inclusion within the sports community.

2 METHOD

This study constitutes a Systematic Review (SR) using the PRISMA technique. As mentioned by Moher *et al.* (2014), clarity and transparency in a systematic review are crucial for clinical efficacy, policy formulation, and intervention safety in the health area. For this reason, the use of the PRISMA method is essential to conduct a systematic review and a meta-analysis that allows for adequate synthesis of the found evidence. The methodological approach of PRISMA helps to ensure the quality and integrity of the review, providing a systematic framework for the collection, analysis, and presentation of research results on the participation of transgender athletes in high-performance sports. This makes the study more robust, reliable, and relevant to inform sports practices and policies related to inclusion and gender equality.

¹ Although there is a more recent position from the International Olympic Committee regarding the participation of transgender athletes in sports, dated 2021 (IOC, 2021), we chose not to include discussions about it in this research. This decision was based on the fact that during the data collection period, this new recommendation was still very recent, which did not allow for the production and publication of comprehensive academic studies that could fully reflect its impact and implications.

According to Moher *et al.* (2014), the guiding items of the PRISMA method aim to guide the identification, selection, assessment, and synthesis of studies found in a systematic review. Recently, the PRISMA technique has received new updates (Page *et al.*, 2021), which have expanded and detailed its guidelines. The main additions include new elements to improve data grouping and synthesis, more comprehensive and detailed search strategies, including the registration of websites and additional databases. The update also incorporates the use of automated tools to aid in data collection and cleaning, as well as enhanced methodologies for collecting results and defining outcomes. There is a greater focus on study eligibility, specifying processes to identify which studies are suitable for synthesis. The updates also include methods for data tabulation and visualization, alternative approaches for statistical synthesis when meta-analysis is not feasible, and a more rigorous assessment of certainty and confidence in the evidence for each outcome. These improvements aim to increase the transparency and robustness of systematic reviews and meta-analyses.

In this study, articles found in the databases Scopus, Web of Science, PubMed, and SPORTDiscus were used. The choice of these databases was based on their international coverage, which allowed for locating research conducted in different parts of the world. The data search was conducted using the terms “transgender” and “athletes,” utilizing the Boolean operator “AND/OR.” It is important to clarify that in each database the initial search was conducted using the terms with the Boolean operator. Following this, the terms were searched individually to gather additional information for the systematic review.

Chart 1 - Terms used with the Boolean operator

Database	Terms	Boolean Operator
Scopus	“Transgender”; “Athletes”	And/Or
Web of Science	“Transgender”; “Athletes”	And/Or
PubMed	“Transgender”; “Athletes”	And/Or
SPORTDiscus	“Transgender”; “Athletes”	And/Or

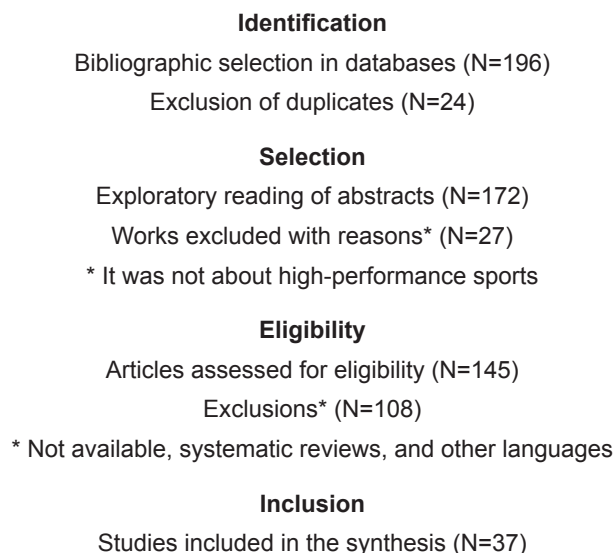
Source: authors (2022)

This systematic search process allowed for the comprehensive collection of relevant studies on the participation of transgender athletes in high-performance sports, ensuring a wide variety of perspectives and information for the analysis and synthesis of the results. The use of the PRISMA method ensures clarity, transparency, and scientific rigor in conducting this systematic review, contributing to the reliability and validity of the findings (Page *et al.*, 2021).

The selected articles for this research were organized chronologically starting from the 2003 Stockholm Consensus (IOC, 2003), which marked the first regulation issued by the IOC regarding transgender athletes or individuals with sex variations. The data collection period was limited to the first quarter of 2022. Inclusion criteria were established for the selection of articles, which consisted of: 1) being published from 2003 onwards; 2) being written in English, Portuguese, or Spanish; 3) including formats such as original articles, essays, dissertations, theses, proceedings, and

editorial notes. Exclusion criteria consisted of: 1) not dealing with sports or not falling into the category of high-performance sports; 2) being systematic review articles; and 3) not being freely available or in full text.

After using the keywords in the databases and applying the criteria, we found 196 studies. Next, we adopted the filters suggested by the PRISMA method, resulting in 37 studies that composed the analytical section of this research. The following diagram illustrates this process:



The following chart summarizes the works found in each database and explains the main methods and data applied and found, respectively.

Chart 2 - Found works according to the methodological criteria

Base	Title	Authors and country	Format and Year	Objective	Study Approach	Type
Scopus	Something's got to give: reconsidering the justification for a gender divide in sport	Bianchi Canada	Article, 2019	To argue that even without conclusive evidence that transgender individuals may still possess the skill, the gender binary in sports may need rethinking	Qualitative	Cross-sectional
Scopus	Experiences of LGBTQ+ individuals in sports in Germany	Hartmann-Tews; Menzel; Braumüller Germany	Article, 2021	To explore other research carried out by the government. It also illustrates public policy documents, projects, and campaign activities being developed nationally and internationally to address homophobia and transphobia in sports and the issues that exist for intersex athletes.	Quantitative	Cross-sectional
Scopus	Dilemas insurgentes no esporte: as práticas esportivas dissonantes	Camargo Brazil	Article, 2016	To ponder on bodies in action through what I call "dissonant sports practices" to discuss the extent to which such practices could have a disruptive potential in relation to an established normativity.	Qualitative	Cross-sectional
Scopus	Lesbian, gay, bisexual, transgender, and queer athletic trainers: collegiate student-athletes' perceptions	Crossway <i>et al.</i> USA	Article, 2019	To examine the perception of National Collegiate Athletic Association (NCAA) student-athletes regarding athletic trainers identified as LGBTQ.	Quantitative	Cross-sectional
Scopus	O armário da sexualidade no mundo esportivo	Camargo Brazil	Article, 2018	To observe how athletes' enunciations about their sexualities question a complex system of control (and self-control) of their own sexualities and those of others, within a framework of references about the secret of the closet.	Qualitative	Cross-sectional
Scopus	Providing transgender patient care: athletic trainers' compassion and lack of preparedness	Eberman <i>et al.</i> USA	Article, 2021	To deepen information regarding the knowledge and experience of trainers regarding the healthcare needs of transgender student-athletes.	Qualitative	Cross-sectional

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Continuation of Chart 1

Scopus	A opinião de atletas e treinadores de voleibol sobre a participação de mulheres trans	Garcia; Pereira Brazil	Article, 2020a	To investigate the opinion of volleyball athletes and coaches about the participation of trans women in women's volleyball based on the case of athlete Tifanny Abreu.	Qualitative	Cross-sectional
Scopus	Transgender athletes: how can they be accommodated?	Genel USA	Invited Commentary, 2017	To discuss how to include transgender individuals in competitive sports.	Qualitative	Cross-sectional
Scopus	¿Citius, altius, fortius?: Derecho internacional de los derechos humanos y protección de deportistas transgénero e intersexuales	González Spain	Article, 2021	To reflect on how two objectives established by international law can be reconciled: the prohibition of discrimination based on gender identity, on one hand, and the integrity of sports competitions, on the other.	Qualitative	Cross-sectional
Scopus	Integrating transwomen athletes into elite competition: the case of elite archery and shooting	Hamilton <i>et al.</i> United Kingdom, Italy and Switzerland	Article, 2021	To propose a decision-making process that International Sports Federations can use to assist the determination process regarding the eligibility of transgender women in their respective sports.	Quantitative	Descriptive
Scopus	The fluidity of gender and implications for the biology of inclusion for transgender and intersex athletes	Harper <i>et al.</i> USA, Italy, United Kingdom, Spain and Switzerland	Article, 2018	To legally, sociologically, and scientifically illustrate the foundations, as well as the history of previous attempts at policies to define how athletes should be separated into male and female.	Quantitative	Cross-sectional
Scopus	Improving competition and mental health for transgender athletes	Kamis; Glick USA	Editorial, 2022	How to integrate transgender athletes into competitions.	Mixed	Cross-sectional
Scopus	Safety, fairness, and inclusion: transgender athletes and the essence of Rugby	Pike United Kingdom	Article, 2021	Philosophical discussion of policies regarding the inclusion and exclusion of transgender individuals for a methodological policy and approach to the relationship between safety, fairness, and the inclusion of transgender women.	Qualitative	Cross-sectional

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Continuation of Chart 1

Scopus	Joint position statement of the International Federation of Sports Medicine (FIMS) and European Federation of Sports Medicine Associations (EFSMA) on the IOC framework on fairness, inclusion and non-discrimination based on gender identity and sex variations	Pigozzi <i>et al.</i> Switzerland, Italy, Germany, Russia, South Africa, United Kingdom, Japan, Austria, China, Belgium, Latvia, Turkey, Mexico, Romania, Brazil, Monaco and France	Article, 2022	Present a critique based on evidence aligned with a broader view of human rights and promote discussion about the new consensus (2021), especially among those responsible for athletes' care.	Qualitative	Cross-sectional
Scopus	Beyond fairness: the biology of inclusion for transgender and intersex athletes	Pitsiladis <i>et al.</i> United Kingdom, USA, Spain, Italy and Switzerland	Note, 2016	To question if transgender women have a sports advantage.	Quantitative	Cross-sectional
Scopus	Transgender athletes in sports competitions: how policy measures can be more inclusive and fairer to all	Reynolds; Jahromi USA	Article, 2021	Review of current policies and suggestions for possible updates.	Quantitative	Longitudinal
Scopus	Factors influencing acceptance of transgender athletes	Tanimoto; Miwa Japan	Article, 2021	To examine influencing factors on the acceptance of transgender athletes in sports events.	Quantitative	Cross-sectional
Scopus	Athletic trainers' competence, education, and perceptions regarding transgender student-athlete patient care	Walen <i>et al.</i> USA	Article, 2020	To measure trainers' ability in: (1) Defining transgender; (2) Comfort and competence working with transgender student-athletes; (3) Sources of education; (4) Perception of legal concerns; (5) Perception of competitive advantage.	Mixed	Cross-sectional
Scopus	Muscle strength, size, and composition following 12 months of gender-affirming treatment in transgender individuals	Wiik <i>et al.</i> Sweden	Article, 2019	This study explored the effects of gender-affirming treatment on muscle composition during 12 months of therapy.	Quantitative	Longitudinal

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Continuation of Chart 1

PubMed	Long-term effect of gender-affirming hormone treatment on depression and anxiety symptoms in transgender people: A prospective cohort study	Aldridge <i>et al.</i> United Kingdom	Article, 2020	Using a longitudinal methodology, this study investigates the effect of 18 months of gender-affirming treatment on depression, anxiety, and predictors of mental health in the transgender population.	Quantitative	Longitudinal
PubMed	Circulating testosterone as the hormonal basis of sex differences in athletic performance	Handelsman; Hirschberg; Bermon Australia, Sweden, France, Monaco	Article, 2018	Show evidence that the allowed blood testosterone in transgender athletes should be below 5mol/L.	Quantitative	Longitudinal
PubMed	One size does not fit all in the transgender community	Fee; Brown; Laylor USA	Article, 2003	Show Renée Richards' trajectory.	Qualitative	Historiographical
PubMed	Transgender athletes' experiences with health care in the athletic training setting	Munson; Ensign USA	Article, 2021	Describe common experiences they had with coaches and identify barriers transgender athletes may encounter when seeking care.	Qualitative	Cross-sectional
PubMed	Development of an instrument to assess athletic trainers' attitudes toward transgender patients	Ensign <i>et al.</i> USA	Article, 2018	Develop and validate attitudes towards transgender patients in a trainer instrument.	Qualitative	Cross-sectional
PubMed	Urine and serum sex steroid profile in testosterone-treated transgender and hypogonadal and healthy control men	Savkovic <i>et al.</i> Australia	Article, 2018	Investigate sexual steroid and luteinizing hormone (LH) profiles in the urine and serum of transgender women to determine if, and if so, how they differ from hypogonadal men.	Quantitative	Cross-sectional
PubMed	Exploring trans people's narratives of transition: negotiation of gendered bodies in physical activity and sport	Pereira-García <i>et al.</i> Spain, United Kingdom	Article, 2021	Analyze stories of 8 transgender individuals (3 women, 2 men, and 3 non-binary) who participated in Physical Activity and Sports during gender transition.	Qualitative	Longitudinal

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Continuation of Chart 1

PubMed	Testing sex and gender in sports; reinventing, reimagining and reconstructing histories	Heggie United Kingdom	Article, 2010	Researching histories of sex testing to avoid repeating inaccurate information and false claims about gender fraud, particularly in relation to the “classic” case of Stella Walsh and Heinrich/Hermann/Dora Ratien.	Qualitative	Historiographical
SPORTDiscus	Transgender inclusion in single-sex competition: the case of beauty pageants	Bialystok Canada	Article, 2016	Unfold a portion of sports philosophy discussion to examine the justice of allowing a transgender woman to compete in a beauty pageant.	Qualitative	Cross-sectional
SPORTDiscus	Hurdling over sex? Sport, science, and equity	Ha <i>et al.</i> USA	Article, 2014	Historical review of sex verification policies and specific recommendations for improving fairness for athletes within the current hyperandrogenic policy, including suggestions to clarify the objective of the current policy and ensure privacy and confidentiality.	Qualitative	Historiographical
SPORTDiscus	“Walk me through your testosterone”: an analysis about transgender and hyper-androgynous player’s	Ibarra Argentina	Article, 2020	Problemize the discourse of truth in modern sports institutions in the case of transgender and hyperandrogenic individuals.	Qualitative	Longitudinal
SPORTDiscus	Unisex sports: challenging the binary	Martínková Czech Republic	Article, 2020	Illustrate problems arising with respect to the central traditional binary division in most sports.	Qualitative	Cross-sectional
SPORTDiscus	Gender identity and sports: is the playing field level?	Reeser USA	Thesis, 2005	Focusing on the evolution of policies examining the participation of women and transgender women seeks to examine gender identification issues in competitive sports.	Qualitative	Historiographical
SPORTDiscus	Now that they’re out: experiences of college athletics teams with openly LGBTQ players	Pariera; Brody; Scott USA	Article, 2021	Go beyond controversy and media “celebration” of coming out and examine the current experience of LGBTQ athletes and their teammates.	Qualitative	Cross-sectional

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Continuation of Chart 1

SPORTDiscus	Olympic sports and transsexuals	Gooren Netherlands	Article, 2008	Understand and comprehend where demarcation of transgender participation is allowed.	Quantitative	Cross-sectional
SPORTDiscus	Uma análise axiológica dos projetos de lei sobre pessoas trans e esporte no Brasil	Garcia; Pereira Brazil	Article, 2020b	Analyze the statements of six Bills filed in national Legislative Assemblies that aim to regulate the participation of transgender athletes in Brazilian sports, more specifically, the fundamentalist bases used by the author lawmakers to position themselves axiologically about the theme.	Qualitative	Cross-sectional
SPORTDiscus	Changing sex/gender roles and Sport	Katz; Luckinbill USA	Article, 2017	Argue that gender roles in sports have resulted almost entirely in stereotypes rather than analytical thinking.	Qualitative	Historiographical
SPORTDiscus	Gender and sports studies: an historical perspective	Bandy USA	Article, 2014	Examine scholarship in North America and Great Britain and show the origin of gender and sports study. Show that the scholarship includes a variety of examples and interpretations on the subject.	Qualitative	Historiographical

Legend: USA = United States of America

Source: authors (2022)

3 RESULTS AND DISCUSSION

When quantifying the number of findings in the indicated databases, we can observe that Scopus has the largest collection, with 19 articles, followed by SPORTDiscus, with 10 articles, and PubMed, with 8 articles. This suggests that Scopus, being free to access and having a vast number of indexed journals, accumulates a greater number of articles that were included in the research, while PubMed, which may have restricted access at times, has fewer results.

An important characteristic is the increase in the volume of research starting from the year 2010. Additionally, there is a decrease in the year 2019, without any apparent reason found to justify the decline. Another notable feature is the scarcity of longitudinal studies. This situation points to a significant difficulty in conducting longitudinal research in this context, possibly due to participant migration and/or authors' interests.

It is noteworthy that most of the articles reviewed were qualitative studies (27 out of 37), which typically provide more in-depth information and have a greater impact on social issues. However, these studies predominantly focused on interviewing staff and individuals working within the sport, rather than directly engaging with the target audience.

Few studies extended their research over a prolonged period, nor did they explain why they did not. Longitudinal studies are particularly valuable in this context, as they can reveal how cross-hormone treatments affect individuals over time and offer deeper insights into the evolution of the subject matter. The predominance of cross-sectional studies might be attributed to factors such as athlete migration or the displacement of the target audience due to prejudice.

Additionally, there was a notable lack of studies that interviewed the target population themselves. Many studies did not address what could have been changed or improved, missing the opportunity to incorporate direct feedback from those affected. This gap can be explained by the limited availability of the target audience.

The following section is organized into thematic categories, grouped by similarity. This process involved several steps: first, an initial floating reading to familiarize with the content, followed by the establishment of recording units based on related themes. Finally, an interpretative and referential analysis was conducted using these guiding axes, as suggested by the PRISMA guidelines (Page *et al.*, 2021). The resulting categories are: 1) Public Policies; 2) Coaches and Trainers; 3) Differences in Physiology; and 4) Suggestions for Inclusion. Thus, Chart 3 shows the grouping of the papers that are discussed below:

Chart 3 - Organization and distribution of articles found

CATEGORIES	ARTICLES FOUND	RELATIVE FREQUENCY
Public Policies	10	≈ 27%
Coaches and Trainers	8	≈ 21.6%
Differences in Physiology	10	≈ 27%
Suggestions for Inclusion	9	≈ 24.3%

Source: authors (2022)

3.1 PUBLIC POLICIES

Over the past twenty years, due to changes and reforms related to the theme of transgender athletes in sports, issues concerning public policies have been frequently addressed. An example of this focus is the study conducted by Hartman-Tews, Menzel, and Braumüller (2021). The authors argue that public policies are necessary to address violence in sports, but they also highlight that this violence can be prevented when institutional practices provide a voice for affected individuals and seek to ensure the safety and integrity of all involved. An interesting aspect highlighted by the authors is the paradox existing in Germany, where the national statute includes a commitment to integration and equal opportunities. However, they point out that only a minority of organizations mention the LGBTQ+ community as one of their priorities in combating discrimination. This observation emphasizes the importance of inclusive and gender-sensitive public policies in sports to promote a safer and more equitable environment for transgender athletes.

Indeed, the authors identify three scales of discrimination mechanisms (*macro*, *meso*, and *micro*) that operate in society regarding the theme of transgender athletes in sports. At the *macro* scale, general social factors such as values, practices, and norms are structured to reinforce heteronormativity, perpetuating the idea of a binary and naturalized gender division. At the *meso* scale, discrimination mechanisms are represented by institutions that reinforce the aforementioned values. This includes sports organizations, federations, clubs, and other entities that may adopt discriminatory or exclusionary policies, practices, and norms regarding transgender athletes. Finally, at the *micro* scale, discrimination mechanisms operate at the individual level. In this case, discrimination may be influenced by factors such as social status, age, sociocultural context, and interpersonal interactions. These elements can contribute to perpetuating stereotypes, prejudices, and discriminatory attitudes towards transgender athletes.

This analysis of the different scales of discrimination mechanisms highlights the complexity and depth of the challenges faced by transgender athletes in the sports context. These interconnected mechanisms can create significant barriers to the full and fair participation of transgender athletes in high-performance sports. It is crucial that public policies, sports institutions, and individual actions are directed towards combating these mechanisms and promoting a more inclusive, diverse, and respectful sports environment.

The Brazilian example brought by Garcia and Pereira (2020b) highlights the influence of the rise of volleyball player Tifanny in discussions about the binary characterization of gender in Brazilian sports since 2018. In this context, bills were put to vote seeking to reinforce the binary view of gender in Brazilian sports. These bills represent the ties mentioned as characteristics of the macro and meso scales. The macro scale is evidenced by the fact that four out of the six bills were proposed based on religious precepts, reflecting an attempt to defend religious values and impose a heteronormative view of the binary gender division in Brazilian sports.

The meso scale, on the other hand, is illustrated by the use of public institutions to promote and enforce these values and beliefs. Additionally, the authors also point out that several bills contained identical paragraphs, demonstrating the repetition of discriminatory arguments and discourses. It is relevant to note that among the six bills analyzed by the authors, only two of them explicitly included a characterization of a transgender person. This suggests a lack of understanding and sensitivity regarding the gender identity of transgender athletes and reinforces the need for more inclusive and enlightening public policies on the subject in the Brazilian sports scenario. This example emphasizes the importance of continuing the fight against discrimination and exclusion of transgender athletes in sports, ensuring that they are recognized and respected in their gender identities and have equal opportunities to participate in sports competitions. It also highlights the need to promote greater awareness and education about gender and sexual diversity in the sports context to overcome any existing prejudices and stereotypes.

Indeed, the recommendations and regulations made by the IOC regarding the participation of transgender athletes in sports are important steps towards inclusion and respect for gender diversity. However, as mentioned earlier, institutional constraints based on beliefs, values, and entrenched prejudices in common sense still persist, resulting in barriers to the full inclusion of transgender athletes in society at large.

This situation highlights the ongoing importance of promoting greater awareness and education about gender and sexual diversity in all spheres of sports, including local and regional sports institutions. Additionally, it is essential to create and implement comprehensive and scientifically based public policies that ensure equal opportunities and fair treatment for transgender athletes, without discrimination or exclusion based on their gender identity. Overcoming this paradox requires ongoing efforts from various sectors of society, including governments, sports institutions, the academic community, and non-governmental organizations, to work together in building a truly inclusive, respectful, and welcoming sports environment for all athletes, regardless of their gender identity.

3.2 COACHES AND TRAINERS

There are divergences regarding the increase in the participation of transgender individuals in the sports arena. As discussed by Harper *et al.* (2018), the number of transgender participants may not increase significantly due to various complexities that affect their presence in the sports community. Emotional and social issues faced

by transgender individuals in their daily lives, such as dealing with anxiety and fear of discrimination and prejudice, can deter them from engaging or competing in high-performance sports. These emotional barriers may influence the decision of many transgender athletes not to get involved in sports.

Moreover, the lack of inclusion and representation of transgender athletes in sports can create a sense of exclusion and disinterest in participating in these activities. The absence of role models and references that reflect their gender identities can discourage many from joining the sports scene. These complexities underscore the importance of creating a more inclusive and welcoming sports environment for transgender athletes. It is crucial to implement policies and practices that combat discrimination and prejudice while promoting gender diversity and representation in sports. Establishing safe spaces and providing emotional support may also be essential in encouraging the participation and development of transgender athletes in high-performance sports.

On the other hand, the study conducted by Crossway *et al.* (2019) presents a different perspective, suggesting that the participation of transgender individuals in the sports arena may increase. However, the research results also point to significant concerns regarding the training and preparation of coaches to deal with transgender athletes and their sports and educational issues. Data obtained from interviews with 667 college-level coaches revealed some worrying gaps. Around 35% of coaches stated that they had not received appropriate education to address issues related to the participation of transgender athletes. Additionally, 48% of the respondents admitted to feeling unable to advise student-athletes on sports participation considering the effects of cross-sex hormone treatment and mental health issues.

These results suggest a lack of knowledge and information among coaches regarding the topic. Many coaches admitted not being aware of the available scientific research on the subject and instead deal with the issue based on information from the media or their own personal experiences with transgender family members or friends. This lack of training and knowledge can create barriers to the inclusion of transgender athletes in the sports environment. Coaches play a crucial role in athletes' lives, and their lack of understanding and proper support can negatively affect the experience and performance of transgender athletes.

The research conducted by Garcia and Pereira (2020a) and Crossway *et al.* (2019) presents concerning data regarding the opinions of cisgender coaches and athletes regarding the participation of transgender individuals in sports. Both studies indicate that there is significant resistance and distrust towards this participation.

In Garcia and Pereira's (2020a) study, the results revealed that the majority of cisgender coaches and athletes in Brazil are not in favor of the inclusion of transgender athletes in sports. This resistance can be attributed, in part, to biases and stereotypes related to gender and sexuality issues, rooted in cis-heteronormative biomedical and physiological precepts.

Additionally, Crossway *et al.*'s (2019) research also showed that a significant portion of coaches believe that transgender athletes have physical and sports advantages

over cisgender athletes. This perception may be influenced by misconceptions about gender differences and the assumption that a person's gender identity directly affects their sports abilities. Such discourses against the participation of transgender athletes can create a culture of exclusion and discrimination in the sports environment. It is essential to dismantle these prejudices and misinformation, promoting a broader and more informed education on gender and sexual diversity in sports.

3.3 DIFFERENCES IN PHYSIOLOGY

The discussion about the participation of transgender athletes in high-performance sports has been frequently marked by the notion of a potential physiological advantage that these athletes might have (Hamilton *et al.* 2021). However, as pointed out by Bianchi (2019), this belief is based on a general perception since there are few longitudinal studies on the subject.

The scarcity of studies that assess and investigate high-performance transgender athletes is a significant gap in the research on the topic. The study by Harper (2015), which concluded that the performances of transgender athletes before and after gender transition changed, is often cited to argue that there is no physiological advantage. This study is very important as it is one of the first to evaluate the athletic performance of transgender women. However, the author acknowledges its limitations, such as the fact that the participants were only amateur athletes and that the sample size was small ($n = 8$). Additionally, the findings are only applicable to long-distance runners. Harper (2015) notes that transgender women may be taller and heavier than cisgender women, and these differences could potentially result in better performance in sports where these attributes are key to success, such as shot put and high jump.

However, transgender women might face disadvantages in sports where a larger size could hinder performance, such as gymnastics. Beyond the specificity of the sports, it is even more complex to develop methods of sports analysis for the various existing modalities, especially before and after testosterone suppression, as well as the difficulty of finding a reasonable number of transgender people and athletes to participate in studies of these modalities. Finally, Harper (2015) emphasizes that she cannot definitively state that it is fair to allow transgender women to compete against cisgender women in all sports, given this complexity, although her study is supportive of such inclusion considering the potential advancements presented.

In 2015, the IAAF concluded that there was insufficient evidence to claim that transgender athletes had an advantage over cisgender athletes. This stance is essential as it reflects the need for an evidence-based approach to address the participation of transgender athletes in sports. Indeed, studies like that of Pitsiladis *et al.* (2016) highlight that in some instances cisgender women may have advantages over transgender women athletes. This demonstrates the complexity of issues related to sports performance and the importance of considering a wide range of variables to avoid generalizations and stereotypes.

Another relevant aspect is the psychological and emotional impact of gender transition on athletes. Handelsman, Hirschberg and Berman (2018) point out that hormonal changes can influence factors such as mood, motivation, and aggression. These changes must be carefully considered when discussing the participation of transgender athletes in sports, aiming for a sensitive and respectful approach to ensure that all athletes are treated fairly and equitably.

Furthermore, it is important to recognize that the issue of transgender athlete participation in sports also involves ensuring safety and protection against violence and harassment. The study by Kamis and Glick (2022) illustrates concrete examples of violence and harassment faced by transgender athletes, highlighting the need to create a safe and inclusive sports environment for all athletes, regardless of their gender identity.

The study by Wiik *et al.* (2019) analyzed the effects of cross-sex hormone therapy (CHT) on individuals undergoing gender transition, with assessments before, during, and after hormonal treatment. The results indicated evidence of an increase in muscle mass and radiological mass in patients designated as female at birth who were transitioning to male gender (Female to Male - FTM). On the other hand, for patients designated as male at birth transitioning to female gender (Male to Female - MTF), a 5% decrease in muscle volume and a 4% decrease in thigh cross-sectional area were observed.

These findings are relevant as they demonstrate that cross-sex hormone therapy can have significant effects on individuals' muscle composition during gender transition. These changes may have implications for transgender athletes wishing to compete in high-performance sports, especially in disciplines where muscle mass is a crucial factor for performance. This research highlights the importance of considering the effects of cross-sex hormone therapy when discussing the participation of transgender athletes in sports, striving for a fair and equitable approach that takes into account individual physiological changes resulting from hormone treatment. Sports policies must be based on updated and sensitive scientific evidence to ensure the inclusion of all athletes, regardless of their gender identity.

The study by Wilson *et al.* (2019) investigated the effects of hormone therapy on the cardiac and pulmonary systems in individuals undergoing gender transition. The results revealed significant changes in cardiopulmonary fitness after the application of estrogen and testosterone blockade. Data indicated a reduction in heart stroke volume, going from 136 to 80 ml per beat. Additionally, there was a decrease in peak heart rate, going from 188 to 180 beats per minute, resulting in a decrease in cardiac output from 28.4 to 15.5 liters. These negative changes in cardiopulmonary fitness may have implications for the athletic performance of individuals undergoing gender transition, especially in sports that require high cardiovascular and pulmonary endurance. Therefore, it is crucial to consider these physiological changes when discussing the participation of transgender athletes in sports competitions.

Hasselman, Hirschberg and Berman (2018) emphasize that blood testosterone levels are a determining factor in the differences in sports performance between men

and women. The presence of this hormone in the body is associated with various physical characteristics that can influence athletic potential, such as muscle mass, strength, bone size, bone density, and blood hemoglobin levels. According to their studies, these characteristics are positively influenced by testosterone, contributing to athletic advantages in cisgender athletes.

However, Hasselman and colleagues (2018) also address the effects of cross-sex hormone therapy on transgender athletes. They suggest that cross-sex hormone treatments can reduce or even reverse some of these physical advantages, such as the amount of hemoglobin and muscle characteristics, in a shorter period than during puberty maturation. This suggests that testosterone is not the sole determining factor for athletic performance and that other variables also influence athletic ability.

Schultz (2011) complements this view, highlighting that high levels of testosterone do not always translate into significant improvements in athletic performance, and the body's response to hormones can vary from person to person. He argues that it is essential to consider the existing genetic natural variability in all athletes, regardless of gender or gender identity, and that individual physical characteristics can be advantageous or disadvantageous for certain sports modalities.

These perspectives show that the relationship between hormones, athletic performance, and competitive advantages is complex and multifaceted. When addressing the participation of transgender athletes in sports, it is essential to consider not only hormonal factors but also other biological, genetic, and individual aspects that influence performance and athletic capacity. It is crucial that sports policies be based on solid and sensitive scientific evidence to ensure the inclusion and equal opportunities for all athletes, regardless of their gender identity (Hamilton *et al.*, 2021).

3.4 SUGGESTIONS FOR INCLUSION

The discussion about the inclusion of transgender athletes in sports raises various questions about what would be fair and equitable. Harper *et al.* (2018) propose the idea of a “gender-athlete” as a possible solution. In their study, the authors interviewed 154 people, and the majority of participants (71%) agreed with this idea, while 23% were against it, and 6% abstained. They also allowed those who were against or abstained to present alternatives for the sports scenario.

Those who opposed the “gender-athlete” concept presented different options for sports division. The majority (43%) advocated for chromosome verification, an approach that has been used in the past but was abandoned due to false positives and ethical concerns. The second most popular option (36%) was gonadal sex verification, which is also limited as it can be easily circumvented by medical procedures. Some participants (9%) suggested division based on birth gender, while others (5%) favored division based on legal gender status. A small percentage (2.5%) believed that gender identity or self-identification should be considered.

In contrast, Bianchi (2019) proposes that sports should be divided based on athletes' physical abilities. She argues that the most skilled athletes should be

rewarded, regardless of their gender or gender identity. Bianchi also highlights that testosterone levels can affect the motor part of movement, altering the strength, power, and speed of athletes, and suggests that the division by ability should focus on the ability itself. However, her work does not specifically address team sports and how this approach could be applied in those categories.

In summary, the issue of sports division for transgender athletes is complex and controversial, involving ethical, scientific, and social considerations. The different proposals presented highlight the need for more research and discussions to find a solution that promotes inclusion, equal opportunities, and respect for the rights of all athletes, regardless of their gender identity.

4 CONCLUSIONS

Through the technique of Systematic Review, this study analyzed the scientific literature on the participation of transgender athletes in different databases. The majority of the articles focused on the areas of Physiology and Biology, neglecting aspects from the Humanities and Social Sciences, which ultimately reinforces prejudice and discrimination regarding the participation of these athletes.

This lack of a comprehensive approach is reflected in society, among coaches and professionals involved in sports, as well as in public policies and legislation, which often rely on preconceived beliefs and values rather than scientific evidence.

The lack of preparedness among professionals in the field is also a concerning factor as it generates discomfort and drives transgender athletes away from sports. Insufficient knowledge on the subject can lead to inappropriate and unjust decisions, hindering inclusion and equal opportunities in sports.

Furthermore, comparative studies in the fields of Physiology and Biology still present controversies and uncertainties regarding the existence of sporting advantages for transgender athletes. Therefore, more research must be conducted with high-performance athletes, of a longitudinal nature, to obtain more reliable and scientifically based data.

This study also notes that a significant number of articles ($n = 108$) were excluded due to limitations related to language, availability, and their classification as systematic reviews, which affected the comprehensiveness of the database search. Additionally, the methodology required the use of broad search terms to capture a larger number of articles. However, this approach also resulted in the inclusion of many studies that were not directly relevant to the review's theme.

In conclusion, this study highlights the importance of a multidisciplinary approach to understand the participation of transgender athletes in sports. It is necessary to promote greater integration between the fields of Physiology, Humanities, and Social Sciences to combat prejudice, provide a solid scientific basis for sports policies, and ensure an inclusive and respectful environment for all athletes.

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Resumo: Este estudo explora atletas transgêneros em esportes de alto rendimento, com ênfase nas tratativas desenvolvidas a partir da inserção deste público no esporte. Utilizando a metodologia de revisão sistemática PRISMA nas bases de dados Scopus, PubMed e SPORTDiscus, identificamos 37 artigos publicados a partir do Consenso de Estocolmo de 2003, a primeira regulamentação do COI em relação a transgêneros no esporte. Os resultados revelaram um maior número de artigos na base de dados Scopus, com temas comuns agrupados em quatro áreas: 1) Políticas Públicas; 2) O Papel dos Treinadores; 3) Diferenças Fisiológicas; e 4) Sugestões para Inclusão. Em conclusão, destaca-se a necessidade de uma abordagem mais abrangente que considere os aspectos sociais e humanos mais amplos junto com os fatores fisiológicos. Ao abordar essas lacunas, as organizações esportivas podem desenvolver políticas mais informadas e inclusivas, promovendo um ambiente mais receptivo para atletas transgêneros.

Palavras-chave: Pessoas transgênero. Atletas. Esportes. Revisão sistemática.

Resumen: Este estudio explora atletas transgénero en deportes de alto rendimiento, haciendo hincapié en las tratativas desarrolladas a partir de la inclusión de este público en el deporte. Utilizando la metodología de revisión sistemática PRISMA en las bases de datos Scopus, PubMed y SPORTDiscus, identificamos 37 artículos publicados a partir del Consenso de Estocolmo de 2003, la primera regulación del COI en relación a personas transgénero en el deporte. Los resultados revelaron un mayor número de artículos en la base de datos Scopus, con temas comunes agrupados en cuatro áreas: 1) Políticas Públicas; 2) El Papel de los Entrenadores; 3) Diferencias Fisiológicas; y 4) Sugerencias para la Inclusión. En conclusión, se destaca la necesidad de un enfoque más amplio que considere los aspectos sociales y humanos junto con los factores fisiológicos. Al abordar estas lagunas, las organizaciones deportivas pueden desarrollar políticas más informadas, inclusivas y receptivas para los atletas transgénero.

Palabras clave: Personas transgénero. Atletas. Deportes. Revisión sistemática.

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CONFLICT OF INTERESTS

The authors declare that this work involves no conflict of interest.

AUTHOR CONTRIBUTIONS

Bruno Pires Paes Barretto: Development of the work; Data collection. Discussion of the main points to be addressed; Analytical dissertation according to the bibliographic input and references; Methodological review; Enhancement of discussions; Linguistic review.

Rafael Marques Garcia: Discussion of the main points to be addressed; Analytical dissertation according to the bibliographic input and references; Methodological review; Enhancement of discussions; Linguistic review; Guidance and supervision of the previous stages; Translation; Submission on the platform.

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Erik Giuseppe Barbosa Pereira: Development of the work; Data collection. Discussion of the main points to be addressed; Analytical dissertation according to the bibliographic input and references; Methodological review; Enhancement of discussions; Linguistic review; Guidance and supervision of the previous stages.

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