

Gender differences in fair play behaviours in elite handball: Evidence from World Championship teams

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ABSTRACT

This study aims to examine whether fair play behaviour is associated with competitive performance. An additional objective is to analyse gender differences in Fair Play in the Handball World Championships between 2007 and 2023. A total of 464 games were reviewed to analyse the team's fair play statistics. The Mann-Whitney U test was used to determine any differences between the men's and women's teams on the variables analysed in the study. Statistical power analysis, G*Power 3.1, was used to determine the power statistical analysis and the effect size of the model. According to the team rankings, significant differences were observed between men and women in all variables analysed, except for yellow cards. The findings indicate that teams achieving higher final rankings generally demonstrated more disciplined conduct. These results support the idea that fair play is positively associated with athletic performance, reinforcing the notion that ethical and disciplined behaviour is compatible with competitive success.

Keywords: Handball performance, Final ranking, Gender, Behaviour.

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INTRODUCTION

Sport has long been recognised as an important component of the educational process, contributing significantly to the development of interpersonal communication and social skills (Izquierdo et al., 2021; Graupensperger et al., 2018) as well as supporting the overall personal development of individuals, especially during formative years. Due to its global reach, sport influences cultural norms, educational approaches, and the formation of values and behaviours among young people (Simon et al., 2018). It is a multidimensional phenomenon that promotes values relevant not only in sports but also in everyday life, such as respect, responsibility, integrity, and fairness. When properly guided, sport has been shown to foster prosocial behaviours and moral development (Zhu et al., 2025). Within this context, Fair Play emerges as a key ethical principle. Officially recognised in the Olympic Charter, it represents a central mission of the International Olympic Committee. In recent years, however, sport has faced a growing crisis of values. Instances of misconduct, rule violations, and unethical behaviour aimed at gaining unfair advantages have become increasingly common (Pelegrín Muñoz, 2005; Pelegrín, Serpa, & Rosado, 2013), highlighting the difficulty of promoting prosocial behaviour in high-pressure, result-driven environments. Research has shown that when athletes become fixated on winning at all costs, they tend to adopt a tense and reactive playing style, relying less on strategy and more on aggression, often leading to unethical or inappropriate conduct (Pelegrín, Serpa, & Rosado, 2013). Although such behaviours are generally considered unacceptable, they are sometimes tolerated or even encouraged in pursuit of athletic success (Bohdan & Kowalik, 2022). A study by Fruchart & Rulence-Pâques (2014), involving professional and amateur handball players, found that most professional considered actions like pushing an opponent justifiable in certain situations. According to the authors, this may be partly due to the frequent physical contact inherent in sport, which can shape how athletes perceive and evaluate aggressive behaviour. Similarly, excessive pressure from external sources (Kang, Kim, & Lee, 2021) and overconfidence in one's abilities have also been associated with unethical or antisocial behaviour (Pelegrín et al., 2013). These findings suggest that the competitive nature of the sport can often compromise ethical standards and increase the likelihood of morally questionable conduct (Pilz, 2005). Within the field of sports and exercise sciences, understanding the psychological foundations of Fair Play is essential for encouraging ethical behaviour and positive social interactions in competitive settings. One of the most widely studied constructs in this regard is moral disengagement, which refers to a set of cognitive mechanisms that individuals use to justify unethical or harmful actions, reducing their sense of personal responsibility (Hodge & Gucciardi, 2015; Stanger et al., 2013). In sports, moral disengagement has been linked to various forms of antisocial behaviour, including aggression and the use of performance-enhancing substances (Bandura, 1991; Ring & Kavussanu, 2018). These behaviours are often rationalised by athletes who prioritise outcomes over ethics (Boardley & Kavussanu, 2009). Research has also shown that athletes with more aggressive profiles tend to express higher levels of anger and hostility, especially when they experience frustration or negative evaluation (Forsdike & O'Sullivan, 2022; Lazarević et al., 2014; Pelegrín et al., 2013). Moreover, athletes driven by high levels of extrinsic motivation, such as the pursuit of rewards, recognition, or social comparison, are more likely to adopt these types of behaviours (Boardley & Kavussanu, 2009).

Conversely, constructs such as empathy and moral identity have been positively associated with Fair Play and prosocial behaviour (Kavussanu et al., 2013; Kavussanu & Boardley, 2009). Empathic Athletes demonstrate a greater ability to understand the emotions and perspectives of others, which contributes to more respectful and cooperative behaviour during competition. Recent evidence suggests that empathy-based interventions can be effective in reducing aggressive tendencies (Stanger et al., 2012). For instance, male athletes who participated in an empathy-focused training program reported lower intentions to act aggressively toward opponents (Stanger et al., 2012). This behavioural complexity becomes particularly

evident in high-intensity, physically demanding team sports such as handball (HB). As a fast-paced, high-scoring indoor contact sport, HB exposes players to frequent physical collisions and elevated emotional stress (Fritz et al., 2020). While physical contact is permitted within the rules, especially, especially by defenders attempting to block attackers, such conditions often give rise to conflict and tension, increasing the risk of rule violations and sanctionable behaviours. As in many other team sports (Vansteenkiste et al., 2014; Junge et al., 2000), Fair Play in HB is a dynamic and context-dependent phenomenon. It is influenced by situational factors, such as the match score, a player's position on the court, and their scoring potential (Junge et al., 2000). These external factors interact with internal motivations and may lead to rapid shifts between prosocial and antisocial behaviours. In many cases, the decision to act in a prosocial way, such as assisting an opponent, may conflict with the desire to win (Junge et al., 2000). This ongoing tension between ethical conduct and competitive goals reinforces the view that fair Play is not a fixed rule, but a flexible construct shaped by both psychological and contextual influences. Several studies across different sports have also revealed behavioural differences between male and female athletes, often related to playing styles and attitudes toward rules (Junge et al., 2000; Kavussanu & Ring, 2016). For instance, female athletes are generally more likely to adhere to Fair Play principles, showing greater respect for rules and more cooperative behaviour during competition (Kavussanu & Ring, 2016; Acar et al., 2022; Bermejo et al., 2018; Forsdike & O'Sullivan, 2022; Lazarević et al., 2014; Pelegrín et al., 2013). Furthermore, a study involving 726 athletes found that female participants rated fair play as the most important aspect of sport, while male participants prioritized enjoyment (Iturbide & Elosua, 2012). These differences are often explained by gender-based social norms that develop through differentiated socialization processes from early childhood. In addition, several studies have demonstrated that fair play and disciplinary behaviour significantly affect competitive outcomes. Research in both team and individual sports indicates that unethical conduct, such as receiving cards, technical fouls, or expulsions, reduces the likelihood of success. Conversely, athletes and teams who display greater discipline and fair play often achieve better sporting results (Anwar Ali et al., 2025; Fruchart & Rulence-Pâques, 2016). For instance, a ten-year analysis of German leagues found a negative correlation between unethical behaviour and team performance (Krahé, 2025). Similarly, Badiella et al. (2022), analysing 1.826 football matches from top European leagues, observed that a player expulsion frequently led to increased goal-scoring opportunities for the opposing team, disadvantaging the penalised side. In basketball, a study of 74 athletes aged 18-25 identified an inverse correlation between aggression and sportsmanship (Kalyan, Rao, & Panda, 2023). Further studies in the NBA (Mikołajec, Maszczyk, & Zając, 2013) and the Olympic Games (Leicht, Gómez, & Woods, 2017) found that the number of fouls committed, along with other variables, was a reliable predictor of performance outcomes. In HB, recent studies confirm that the most successful teams in championships or tournaments tend to commit fewer technical fouls. Teams with higher numbers of infractions or exclusions due to unsporting conduct generally perform worse (Anwar Ali et al., 2025; Meletakos et al., 2025). These findings reinforce the idea that adherence to rules and emotional self-regulation are not only ethical imperatives but also strategic advantages in competitive sport (Meletakos et al., 2025).

Despite increasing interest in the ethical dimension of sport, empirical evidence on fair play in HB, especially concerning the relationship between fair play and performance, as well as behavioural differences between male and female athletes at the international level, remains limited. Therefore, the present study aims to examine whether fair play behaviour is associated with competitive performance, as measured by final rankings or outcomes. An additional objective is to analyse gender differences in Fair Play by comparing the behaviours of men's and women's teams participating in the HB World Championships between 2007 and 2023. The findings of this study aim to address a key gap in the literature. For professionals in sport science, federations, and governing bodies, this perspective is essential for developing effective educational and

training programmes that promote fair play, ethical awareness, emotional regulation, and social responsibility in sport.

METHODS

Participants

To analyse statistics team fair play, a total of 464 games from the nine men's World Championships (Germany, 2007; Croatia, 2009; Sweden, 2011; Spain, 2013; Qatar, 2015; France, 2017; Germany-Denmark, 2019; Egypt, 2021; Poland-Sweden, 2023) and the nine women's World Championships (France, 2007; China, 2009; Brazil, 2011; Serbia, 2013; Denmark, 2015; Germany, 2017; Japan, 2019; Spain, 2021; Denmark-Norway-Sweden, 2023) were collected.

Procedures

All the results were retrieved from the results competitions on the official website of the International Handball Federation (IHF) (<http://www.ihf.info/competitions>). All the data were collected by official statisticians of the competition who were previously trained to collect the data. Numerous studies have also used data from the same source previously (Gómez et al., 2014; Konstantinos et al., 2018; Meletakos et al., 2011; Oliveira et al., 2012; Rubia et al., 2020; Saavedra et al., 2018). The reliability of data from IHF was verified by previous important studies which tested match-related statistics of the 2005, 2007, and 2009 Men's World Championships (Meletakos et al., 2011), with a Cohen's kappa coefficient was 0.991; and the 2015 Women's World Championship (Costa et al., 2017), with Cohen's Kappa values for inter- and intra-observer reliability greater than .90 and agreement with IHF scores greater than 95%. No informed consent was necessary because the information on the website that was used in the study is in the public domain.

Measures

The following data were recorded: Blue card (BC), Disqualification with report (DR), Red cards (RC), 2-Minute Suspensions (2-Min), Yellow cards (YC). Matches played (MP), Average per game (AVG), and Total points (TP).

The average fair play score (AVG) for each team is calculated in each championship using the formula $AVG = TP/MP$, where TP represents the total fair play points earned by a team in the championship and MP stands for the number of matches played by the team in that championship. The total fair play points of each team are calculated using the following:

$$TP = (BC) \times 10 + (RC) \times 5 + (2\text{-Min}) \times 2 + (YC) \times 1$$

Therefore, the higher the fair play points, the more severe the disciplinary sanctions imposed on the team. The Fair Play Ranking (FPR) is established based on the average Fair Play (AVG) score of each team in each championship. A lower AVG for the best fair play ranking. The final ranking in the championship is determined by the final position. This variable was divided into six groups: 1st to 4th place, 5th to 8th place, 9th to 12th place, 13th to 16th place, 17th to 20th place, and 21st to 24th place. Other studies considered conducting similar groups (Almeida et al., 2020).

Data analysis

Basic statistical descriptors (mean and standard deviation) were calculated for the variables of women's and men's teams in the World Handball Championship between 2007 and 2023. The Kolmogorov-Smirnov statistical test confirmed the absence of normality. The Mann-Whitney U test was used to determine any

differences between the men's and women's teams on the variables analysed in the study. Statistical power analysis, G*Power 3.1, was used to determine the power statistical analysis and the effect size of the model. The values of this statistic were interpreted in terms of size following recommendations in the literature (Faul et al., 2009): > 0.20 small effect, > 0.50 medium effect, > 0.80 large effect. A p -value of $< .05$ was considered statistically significant. The statistical analysis was performed using the software package SPSS version 24.0 (IBM Corp., Armonk, NY, USA).

RESULTS

Table 1 presents the descriptive statistics for each study variable across men's and women's national teams participating in the World Handball Championships from 2007 to 2023. The data reflects the average values recorded by each team in each respective championship. For the variables average fair play (AVG) and fair play points (FP), men's teams consistently record higher averages than women's teams in all editions of the championship, except for 2017. Similarly, the averages for BC/DR and RC were equal to or higher among men's teams across all tournaments. Regarding 2-minute suspensions and yellow cards, the average value for men's teams also exceeded those of women's teams in every edition except for 2007. The highest average number of 2-minute suspensions and yellow cards among men's teams was observed during the 2009 World Championship with 36.67 ± 9.3 and 28.04 ± 2.11 , respectively. For women's teams, the highest average number of 2-minute suspensions was recorded during the 2019 World Championship (30.58 ± 8.38), while the highest average for yellow card suspensions was observed in the 2009 World Championship (26.83 ± 2.51).

Table 2 presents the results of the Mann-Whitney U test comparing men's and women's teams for each edition of the World HB Championship between 2007 and 2023. The values are reported as averages. Statistically significant differences between the men's and women's teams were observed in the AVG variable for all championships except for the 2017 championships. For the TP variable, significant differences were found in all editions except the 2007, 2015, and 2017 championships. The BC/DR variable showed a significant difference in the 2011 championship ($p < .01$), while RC variable showed significant differences in both the 2011 and 2013 editions ($p < .01$). Regarding 2-minute suspension, statistically significant differences were found in the 2007 and 2013 World Championships ($p < .05$), and in the 2009, 2015, 2021, and 2023 World Championships ($p < .01$). Significant differences for the YC variable were observed in the 2013 ($p < .05$) and 2019 ($p < .01$) Championship. In terms of effect sizes ($f^2 > 0.80$), large effects were observed in multiple editions of the World Championships. Specifically, a large effect was observed for 2Min ($f^2 = 0.82$) in the 2007 championship; for AVG ($f^2 = 0.88$) and 2Min ($f^2 = 0.91$) in 2009; for BC/DR ($f^2 = 1.45$) and RC ($f^2 = 1.00$) in 2011; for AVG ($f^2 = 0.97$) and RC ($f^2 = 0.85$) in 2013; for AVG ($f^2 = 1.00$) and 2Min ($f^2 = 0.91$) in 2015; for YC ($f^2 = 1.04$) in 2019; for AVG ($f^2 = 0.82$), TP ($f^2 = 0.83$), and 2Min ($f^2 = 0.84$) in 2021; and for AVG ($f^2 = 0.84$) in the 2023 championship.

Table 3 presents the descriptive statistics for each variable based on the final ranking of the men's and women's national teams at the World HB Championships held between 2007 and 2023. The data represent the average values of the teams according to their final position in the tournament standings. Among the teams ranked first, the men's teams recorded a lower average AVG (7 ± 4.77) compared to the women's teams (11 ± 6.72). Regarding 2-minute penalties, the first-ranked men's teams averaged 28.67 ± 6.94 , while the first-ranked women's teams averaged 32.44 ± 9.24 .

Table 1. Results of the fair play variables analysed in the Men's and Women's World Championships.

Year	Teams	AVG	TP	BC/DR	RC	2Min	YC	MP
		M(SD)	M(SD)	M(SD)	M(SD)	M(SD)	M(SD)	M(SD)
2007	Men	11.88(1.96)	90.88(25.46)	0	1.38(1.09)	21.42(5.22)	21.42(5.22)	7.67(1.83)
	Women	10.65(2.01)	82.13(26.32)	0	0.92(1.06)	27.17(9.43)	23.21(5.23)	7.67(1.83)
2009	Men	11.75(2.68)	103.25(30.39)	0	1.21(1.28)	36.67(9.3)	28.04(2.11)	9.17(0.38)
	Women	9.67(1.96)	88.46(17.74)	0	0.71(0.85)	29.04(7.17)	26.83(2.51)	9.17(0.38)
2011	Men	11.9(2.27)	91.96(23.14)	1.29(1.19)	1.29(1.19)	31.21(8.66)	22.67(3.27)	7.67(0.76)
	Women	10.48(1.77)	76.83(17.89)	0.04(0.2)	0.33(0.63)	26.96(7.31)	20.83(4.45)	7.33(1.27)
2013	Men	11.78(2.32)	82(17.68)	0.04(0.2)	0.92(1.1)	27.79(6.03)	21.42(3.85)	7(1.02)
	Women	9.82(1.65)	69.29(18.32)	0	0.21(0.41)	24.33(7.71)	19.58(4.22)	7(1.02)
2015	Men	13.6(2.41)	98.08(17.38)	0.04(0.2)	0.58(0.77)	36.38(6.61)	22(4.36)	7.33(1.27)
	Women	11.39(1.94)	83.96(21.52)	0.04(0.2)	0.58(0.71)	29.58(8.17)	21.46(5.22)	7.33(1.27)
2017	Men	10.2(1.66)	71.17(14.47)	0	0.63(0.71)	25.63(5.72)	16.79(4.25)	7(1.02)
	Women	10.27(2.31)	71.21(15.52)	0	0.71(0.85)	25.58(5.83)	16.5(3.76)	7(1.02)
2019	Men	10.54(2.23)	83.38(16.37)	0.04(0.2)	1.04(1.16)	32.25(6.27)	13.25(3.61)	8(1.18)
	Women	9.05(1.94)	72.88(20.45)	0	0.46(0.65)	30.58(8.38)	9.42(3.71)	8(1.18)
2021	Men	9.7(3.21)	65.16(22.18)	0.06(0.24)	1.16(1.52)	26.03(7.3)	6.69(2.91)	6.75(0.98)
	Women	7.51(1.98)	49.97(13.08)	0	0.66(0.78)	20.59(5.39)	5.5(3.09)	6.69(0.99)
2023	Men	8.67(2.01)	59.5(13.24)	0.09(0.39)	1.06(1.19)	24.5(4.18)	4.25(1.95)	7(1.24)
	Women	7.09(1.73)	49.69(14.48)	0	0.56(0.8)	21.56(6.66)	3.75(2.47)	7(1.24)
Total	Men	10.98(2.72)	81.41(24.94)	0.17(0.75)	1.03(1.16)	28.83(8.25)	16.57(8.57)	7.47(1.31)
	Women	9.39(2.37)	70.1(22.76)	0.01(0.09)	0.57(0.78)	25.81(7.99)	15.53(8.91)	7.42(1.36)

Note. AVG: Average per match; TP: Total points of fair play; BC/DR: Blue card/Disqualification with report; RC: Red Cards; 2Min: 2 Minute Suspensions, YC: Yellow cards; MP: Matches played.

Table 2. U-Mann-Whitney test results for the men's and women's teams in each championship.

Variable	2007 (n = 48)								2009 (n = 48)								2011 (n = 48)							
	Men	Women	U	Z	p	1-β	f²	Men	Women	U	Z	p	1-β	f²	Men	Women	U	Z	p	1-β	f²			
AVG	28.75	20.25	186	-2.105	.03*	0.53	0.61	30.15	18.85	152.5	-2.796	.005**	0.83	0.88	29.54	19.46	167	-2.496	.013*	0.63	0.69			
TP	27.15	21.85	224.5	-1.31	.19	0.2	0.33	29.35	19.65	171.5	-2.403	.016*	0.5	0.59	29.10	19.90	177.5	-2.279	.02*	0.67	0.73			
BC/DR	24.50	24.50	288	0	1	-	-	24.50	24.50	288	0	1	-	-	32.67	16.33	92	-4.678	.001**	0.99	1.45			
RC	27.90	21.10	206.5	-1.777	.07	0.29	0.42	27.13	21.88	225	-1.381	.16	0.32	0.45	30.50	18.50	144	-3.245	.001**	0.91	1			
2Min	20.31	28.69	187.5	-2.077	.03*	0.77	0.82	30.38	18.63	147	-2.912	.004**	0.85	0.91	28.27	20.73	197.5	-1.869	.06	0.41	0.53			
YC	21.44	27.56	214.5	-1.521	.12	0.26	0.40	28.15	20.85	200.5	-1.830	.06	0.4	0.52	27.96	21.04	205	-1.716	.08	0.34	0.47			

Variable	2013 (n = 48)								2015 (n = 48)								2017 (n = 48)							
	Men	Women	U	Z	p	1-β	f²	Men	Women	U	Z	p	1-β	f²	Men	Women	U	Z	p	1-β	f²			
AVG	30.96	18.04	133	-3.198	.001**	0.89	0.97	30.83	18.17	136	-3.135	.002**	0.91	1	24.63	24.38	285	-0.062	.95	0.05	0.03			
TP	29.71	19.29	163	-2.580	.01**	0.64	0.70	28.17	20.83	200	-1.816	.06	0.66	0.72	24.46	24.54	287	-0.021	.98	0.05	0			
BC/DR	25	24	276	-1	.31	-	-	24.50	24.50	288	0	1	0.95	1.11	24.50	24.50	288	0	1	-	-			
RC	29.92	19.08	158	-3.066	.002**	0.8	0.85	24.29	24.71	283	-0.116	.9	0.59	0.66	24.19	24.81	280.5	-0.170	.86	0.06	0.1			
2Min	28.98	20.02	180.5	-2.220	.02*	0.38	0.49	29.71	19.29	163	-2.586	.01**	0.85	0.91	24.04	24.96	277	-0.227	.82	0.05	0			
YC	28.69	20.31	187.5	-2.083	.03*	0.32	0.45	25.92	23.08	254	-.704	.48	0.06	0.11	24.96	24.04	277	-0.228	.82	0.05	0.07			

Variable	2019 (n = 48)							2021 (n = 64)							2023 (n = 64)						
	Men	Women	U	Z	p	1-β	f ²	Men	Women	U	Z	p	1-β	f ²	Men	Women	U	Z	p	1-β	f ²
AVG	28.98	20.02	180.5	-2.219	.02*	0.65	0.71	40.34	24.66	261	-3.371	.001**	0.88	0.82	39.95	25.05	273.5	-3.204	.001**	0.9	0.84
TP	28.52	20.48	191.5	-1.991	.04*	0.46	0.56	40.58	24.42	253.5	-3.473	.001**	0.89	0.83	39.92	25.08	274.5	-3.191	.001**	0.77	0.70
BC/DR	25	24	276	-1	.31	-	-	33.50	31.50	480	-1.426	.15	-	-	33.50	31.50	480	-1.425	.15	-	-
RC	27.85	21.15	207.5	-1.820	.06	0.53	0.61	34.58	30.42	445.5	-0.966	.33	0.35	0.41	36.28	28.72	391	-1.770	.07	0.47	0.49
2Min	26.29	22.71	245	-0.888	.37	0.11	0.22	40.72	24.28	249	-3.539	.001**	0.9	0.84	38.55	26.45	318.5	-2.605	.009**	0.52	0.52
YC	30.71	18.29	139	-3.092	.002**	0.93	1.04	36.34	28.66	389	-1.662	.09	0.33	0.39	35.05	29.95	430.5	-1.104	.26	0.13	0.22

Note. AVG: Average per game; TP: Total points; BC/DR: Blue card/Disqualification with report; RC: Red Cards; 2Min: 2 Minute Suspensions, YC: Yellow cards; Z: Mann-Whitney U test; *p < .0; **p < .01.

Table 3. Results based on the ranking of the Men's and Women's World Championships.

Ranking	Teams	FPR	AVG	TP	BC/DR	RC	2Min	YC	MP
		M(SD)	M(SD)	M(SD)	M(SD)	M(SD)	M(SD)	M(SD)	M(SD)
1	Men	7(4.77)	9.5(2.01)	87.67(20.71)	0	1(1)	28.67(6.94)	20(8.13)	9.22(0.66)
	Women	11(6.72)	9.35(2.6)	87.44(24.05)	0	0.33(0.7)	32.44(9.24)	20.89(9.26)	9.33(0.5)
2	Men	9.22(7.2)	9.88(2.31)	91.78(25.43)	0.11(0.33)	1(1.58)	30.67(4)	21(9.26)	9.22(0.66)
	Women	11.56(6.83)	8.87(1.48)	83.33(16.8)	0	0.44(0.72)	30.11(5.53)	20.89(9.32)	9.33(0.5)
3	Men	7.11(2.26)	9.6(1.48)	77.56(28.39)	0.11(0.33)	0.44(0.72)	31.56(5.15)	20.89(10.22)	9.22(0.66)
	Women	11(5.7)	8.91(1.61)	83.22(15.51)	0	0.22(0.44)	31.33(6.4)	19.44(9.4)	9.33(0.5)
4	Men	11.44(7.21)	10.46(2.52)	96.22(21.28)	0.11(0.33)	1.11(0.6)	33.56(7.58)	21.78(9.37)	9.22(0.66)
	Women	10.44(5.48)	9.05(2.46)	84.78(24.07)	0	0.33(0.7)	30.44(5.94)	22.22(10.26)	9.33(0.5)
5	Men	10.78(8.02)	10.51(2.88)	87.44(26.91)	0	0.89(1.05)	31.67(9.28)	19.67(8.7)	8.33(1.11)
	Women	14(6.44)	10.04(2.66)	85.11(25.8)	0	0.56(0.52)	31.89(9.95)	18.56(9.73)	8.44(1.13)
6	Men	8.44(8.17)	9.57(2.55)	79.33(21.61)	0.11(0.33)	0.22(0.44)	28.33(7.03)	19.56(9.32)	8.33(1.11)
	Women	17.89(7.39)	10.53(1.89)	89.33(22.14)	0	0.78(1.3)	33(7.87)	19.44(9.36)	8.44(1.13)
7	Men	11.11(9.26)	10.96(4.15)	90.11(32.74)	0.33(1)	1.89(1.76)	30.67(9.51)	18.89(10.54)	8.33(1.11)
	Women	17.11(7.02)	10.24(1.68)	86.78(18.25)	0	0.33(0.5)	32.44(6.32)	20.22(8.85)	8.44(1.13)
8	Men	14.89(8.17)	11.53(2.89)	98(32.73)	0.44(1.01)	1.67(1.5)	32.67(9.77)	19.22(9.02)	8.33(1.11)
	Women	10.33(7.61)	9.05(3.22)	77.56(34.47)	0	0.67(1.11)	28.22(11.61)	17.78(9.4)	8.44(1.13)
9	Men	13.44(6.4)	11.18(1.83)	79.67(20.08)	0	0.67(0.7)	28.44(7.14)	17.67(7.81)	7.11(1.36)
	Women	12.56(6.46)	9.42(2.43)	64.67(22.84)	0	0.33(0.7)	23.67(6.81)	15.67(8.61)	6.78(1.2)
10	Men	18.56(5.31)	12.61(2.16)	90.44(25.94)	0.11(0.33)	0.89(0.78)	32.11(8.66)	18(9.22)	7.11(1.36)
	Women	14.67(4.61)	10.04(2.31)	68.56(21.84)	0	0.33(0.7)	25.11(6.77)	16.67(8.27)	6.78(1.2)

11	Men	20.11(5.11)	12.96(2.34)	92.67(27.73)	0.44(1.33)	1.56(1.42)	31.22(8.99)	18.22(8.52)	7.11(1.36)
	Women	14.78(9.64)	9.71(1.63)	66.67(20.34)	0	0.56(0.72)	24.67(5.47)	14.56(9.61)	6.78(1.2)
12	Men	15.44(5.07)	11.51(2.08)	81.89(22.64)	0.33(1)	1.11(0.92)	28.11(6.17)	16.78(8.25)	7.11(1.36)
	Women	13.67(8.73)	9.57(1.69)	64.78(15.34)	0	0.56(0.72)	22.78(6.99)	16.44(7.33)	6.78(1.2)
13	Men	15.89(5.88)	11.68(2.3)	76(13.76)	0.11(0.33)	1.11(0.6)	26.78(5.76)	14.89(7.7)	6.56(1.01)
	Women	12.78(8.16)	9.47(3.33)	60.78(21.04)	0	0.22(0.66)	22.11(6.88)	15.44(7.12)	6.44(1.01)
14	Men	20.67(5.4)	13.1(1.81)	85.89(16.99)	0.22(0.66)	1.33(1.22)	30.11(8.32)	16.11(7.68)	6.56(1.01)
	Women	8.11(6.43)	8.27(1.54)	53.33(12.94)	0	0.11(0.33)	19.56(3.5)	13.67(7.29)	6.44(1.01)
15	Men	7.22(5.65)	9.48(1.44)	61.67(9.81)	0	0.22(0.66)	22.44(3.32)	15(7.01)	6.56(1.01)
	Women	19.33(5.87)	11.14(2.64)	72.56(23.22)	0.11(0.33)	0.78(0.66)	26.78(8.18)	14(8.68)	6.44(1.01)
16	Men	10.78(7.87)	10.87(3.97)	73.22(38.27)	0	0.67(1.65)	26.33(12.75)	13.89(7.99)	6.56(1.01)
	Women	12.67(11.07)	9.33(1.72)	59.56(11.29)	0	0.89(0.78)	20.78(4.02)	13.56(6.34)	6.44(1.01)
17	Men	16.22(5.51)	11.78(2.01)	82.11(22.05)	0.22(0.44)	0.89(0.78)	28.89(8.49)	16.78(7.46)	6.89(0.92)
	Women	10.78(6.94)	8.98(1.89)	62.22(16.05)	0	0.22(0.44)	23.44(5.02)	14.22(8.99)	6.89(0.92)
18	Men	14.67(5.38)	11.7(2.45)	81(20.76)	0.22(0.66)	1(0.86)	28.44(7.33)	15.89(7.88)	6.89(0.92)
	Women	14.44(9.34)	9.88(2.55)	68.44(20.36)	0	0.89(0.92)	23.67(6.65)	16.67(8.26)	6.89(0.92)
19	Men	10.67(5.07)	10.44(2.31)	73.11(23.6)	0	0.44(0.52)	27.11(9.76)	15.67(7.64)	6.89(0.92)
	Women	14.33(8.47)	10.32(3.06)	72.89(29.34)	0	0.78(0.97)	26.78(10.58)	15.44(7.84)	6.89(0.92)
20	Men	21.22(5.42)	13.47(1.91)	93.78(22.73)	0.56(1.13)	1.78(1.56)	32.56(10.74)	16.22(7.8)	6.89(0.92)
	Women	14.44(7.14)	10.06(3.23)	70.22(25.55)	0	1(1)	25.67(9.15)	13.89(8.88)	6.89(0.92)
21	Men	13(7.03)	11.21(2.1)	77.67(20.46)	0.11(0.33)	1(1)	27.89(9)	15.56(7.35)	6.89(0.92)
	Women	13(9.64)	9.45(1.89)	65.56(16.2)	0.11(0.33)	0.67(0.86)	23.67(5.17)	13.78(7.67)	6.89(0.92)
22	Men	12.78(9.75)	10.73(3.46)	74.33(26.91)	0.22(0.66)	1.11(1.05)	26.44(10.85)	15.22(8.52)	6.89(0.92)
	Women	12(10.38)	9.01(2.52)	62(18.67)	0	0.78(0.83)	22.11(7)	13.89(8.11)	6.89(0.92)
23	Men	13.11(6.67)	11.15(1.34)	77.33(15.83)	0.22(0.44)	0.89(0.6)	28.11(6)	14.67(8.45)	6.89(0.92)
	Women	14.33(6.24)	9.42(2.29)	65.33(19.58)	0	0.22(0.44)	25.11(6.95)	14(7.22)	6.89(0.92)
24	Men	11.78(8.39)	10.4(2.82)	72(21.52)	0	0.89(0.78)	25.67(7.81)	15.33(8.3)	6.89(0.92)
	Women	12.11(8.14)	9.17(2.02)	63.44(16.5)	0	1.11(0.6)	22.44(6.65)	13(8.7)	6.89(0.92)

Note. FPR: Fair Play Ranking, AVG: Average per match; TP: Total points of fair play; BC/DR: Blue card/Disqualification with report; RC: Red Cards; 2Min: 2 Minute Suspensions, YC: Yellow cards; MP: Matches played.

Table 4. U-Mann-Whitney test results for the men's and women's teams based on the final rankings of the world championships.

Variable	1 st to 4 th (n = 72)							5 th to 8 th (n = 72)						
	Men	Women	U	Z	p	1-β	f ²	Men	Women	U	Z	p	1-β	f ²
RTFP	32.14	40.86	491	-1.77	.07	0.39	0.41	31.96	41.04	484.5	-1.84	.06	0.44	0.44
AVG	40.43	32.57	506.5	-1.59	.11	0.37	0.39	38.13	34.88	589.5	-0.65	.51	0.16	0.24
TP	38.35	34.65	581.5	-0.74	.45	0.10	0.16	37.64	35.36	607	-0.46	.64	0.09	0.15
BC/DR	38.00	35.00	594	-1.75	.07	-	-	38.50	34.50	576	-2.04	.04*	-	-
RC	42.92	30.08	417	-2.93	.003**	0.76	0.65	40.44	32.56	506	-1.74	.08	0.53	0.49
2Min	36.25	36.75	639	-0.1	.91	0.05	0.004	35.40	37.60	608.5	-0.44	.65	0.05	0.06
YC	35.86	37.14	625	-0.25	.79	0.05	0.006	36.82	36.18	636.5	-0.13	.89	0.05	0.03
Variable	9 th to 12 th (n = 72)							13 th to 16 th (n = 72)						
	Men	Women	U	Z	p	1-β	f ²	Men	Women	U	Z	p	1-β	f ²
RTFP	40.68	32.32	497.5	-1.69	.08	0.44	0.44	37.01	35.99	629.5	-0.20	.83	0.05	0.05
AVG	46.74	26.26	279.5	-4.15	.001**	0.99	1.15	43.11	29.89	410	-2.68	.007**	0.75	0.64
TP	45.03	27.97	341	-3.45	.001**	0.96	0.91	42.57	30.43	429.5	-2.46	.01**	0.68	0.60
BC/DR	38.00	35.00	594	-1.75	.07	-	-	37.01	35.99	629.5	-0.60	.54	0.11	0.17
RC	43.00	30.00	414	-2.87	.004**	0.83	0.71	38.78	34.22	566	-1.03	.3	0.29	0.34
2Min	44.53	28.47	359	-3.26	.001**	0.92	0.83	42.14	30.86	445	-2.29	.02*	0.61	0.55
YC	38.71	34.29	568.5	-0.89	.37	0.15	0.22	37.99	35.01	594.5	-0.60	.54	0.07	0.11
Variable	17 th to 20 th (n = 72)							21 st to 24 th (n = 72)						
	Men	Women	U	Z	p	1-β	f ²	Men	Women	U	Z	p	1-β	f ²
RTFP	39.67	33.33	534	-1.28	.19	0.23	0.30	36.26	36.74	639.5	-0.09	.92	0.05	0.02
AVG	44.28	28.72	368	-3.15	.002**	0.91	0.80	44.22	28.78	370	-3.13	.002**	0.81	0.70
TP	42.78	30.22	422	-2.54	.01**	0.71	0.62	42.51	30.49	431.5	-2.43	.01**	0.67	0.59
BC/DR	39.00	34.00	558	-2.30	.02*	-	-	38.01	34.99	593.5	-1.39	.16	0.28	0.34
RC	39.31	33.69	547	-1.21	.22	0.24	0.31	39.69	33.31	533	-1.39	.16	0.29	0.35
2Min	41.57	31.43	465.5	-2.05	.04*	0.55	0.51	41.51	31.49	467.5	-2.03	.04*	0.53	0.50
YC	37.93	35.07	596.5	-0.581	.56	0.08	0.13	38.83	34.17	564	-0.94	.34	0.12	0.19

Note. RTFP: Rank Team Fair Play; AVG: Average per game; TP: Total points; BC/DR: Blue card/Disqualification with report; RC: Red Cards; 2Min: 2 Minute Suspensions, YC: Yellow cards; z: Mann-Whitney U test; *p < .05; **p < .01.

Table 4 presents the results of the Mann-Whitney U test comparing men's and women's teams across different final ranking groups. Values are reported as group means. Statistically significant differences were observed between men's and women's teams ranked 1st to 4th in RC ($p < .01$, $f^2 = 0.65$). Among teams ranked 5th to 8th, significant differences were found in BC/DR ($p < .05$, $f^2 < 0.50$). For the teams ranked 9th to 12th, statistically significant differences were observed in multiple variables: AVG ($f^2 = 1.15$), TP ($f^2 = 0.91$), RC ($f^2 = 0.71$), and 2-minute suspensions ($f^2 = 0.83$). In the 13th to 16th place group, significant differences were found in AVG ($f^2 = 0.64$), TP ($p < .01$, $f^2 = 0.60$), and 2Min ($p < .05$, $f^2 = 0.55$). Among teams ranked 17th to 20th, significant differences emerged in AVG ($f^2 = 0.80$), TP ($p < .01$, $f^2 = 0.62$), as well as in BC/DR and 2Min ($p < .05$, $f^2 = 0.51$). Finally, for the teams ranked 21st to 24th, statistically significant differences were found in AVG ($f^2 = 0.70$), TP ($p < .01$, $f^2 = 0.59$), and 2Min ($p < .05$, $f^2 = 0.50$).

DISCUSSION

The present study aimed to examine the relationship between fair play behaviour and athletic performance, as reflected in final competition rankings, and to explore potential gender differences in fair play among national teams participating in the HB World Championship from 2007 to 2023. Regarding the first objective, the findings indicate that teams achieving higher final rankings generally demonstrated more disciplined conduct. In contrast, lower and mid-ranked teams exhibit higher levels of undisciplined behaviour. This pattern could be attributed to reduced experience or limited capacity for emotional regulation and stress management, which are more prevalent among less successful teams. These results support the idea that fair play is positively associated with athletic performance, reinforcing the notion that ethical and disciplined behaviour is compatible with competitive success. Cultural incidents should also be considered when interpreting behavioural patterns in sport. Cultural dimensions such as individualism, performance orientation, and long-term planning may shape athletes' training practices, competitive behaviours, and emotional responses in high-pressure scenarios (Sava et al., 2024). The present results are consistent with existing literature indicating that athletic success is not necessarily linked to frequent rule violations or excessively aggressive play, but rather to offensive technical-tactical proficiency, team cohesion, and emotional control (Milanović et al., 2018; Bilge, 2012). This aligns with the systematic review by Ferrari et al. (2019) which showed that the most of match analysis research focuses on offensive metrics, goalkeeping performance, and pace of play, while disciplinary with less attention given to disciplinary behaviour. Collectively, these findings highlight the importance of viewing fair play not merely as compliance with rules or the absence of penalties, but as a broader indicator of athletes' personal and moral development. Coaching strategies, team culture, and educational interventions play a vital role in promoting prosocial behaviour and respectful competition (Granero-Gallegos et al., 2017). In addressing the second objective, the study found statistically significant gender differences in fair play indicators. Male teams consistently record higher average values across disciplinary variables such as AVG, TP, BC/DR, RC, and 2-minute suspensions. These findings suggest a tendency towards a more physically intense and less regulated style of play in men's competitions. Prior research supports this observation, indicating that male athletes often adopt more confrontational defensive strategies (Fasold & Redlich, 2018). Interestingly, some penalised physical actions, such as "legal stops" in HB, can function as tactical components rather than violations of ethical conduct. Therefore, a moderate level of strategically applied physicality may contribute to team performance. This perspective is supported by Laxdal and Ivarsson (2023), who found a positive association between 2-minute suspensions and match victories in men's HB, a pattern not observed in women's competitions. The statistically significant differences observed via the Mann-Whitney U test, together with large effect sizes, indicate that men and women exhibit distinct approaches to competitive behaviour. These differences may be attributed to a combination of biological (Hunter et al., 2023), cultural (Capranica et al., 2013), and

psychological factors (Kew et al., 2024) that influence playing style, emotional regulation, and risk-tactical decision.

In line with previous findings in other team sports (Petrie et al., 2024; Taketomi et al., 2021), the current results affirm that gender is a relevant factor in shaping disciplinary conduct and competitive behaviour. Male athletes appear more inclined to employ physical, high-intensity strategies, which often result in increased penalisation. Female athletes, by contrast, tend to show greater adherence to rules and are less frequently involved in sanctionable actions. However, certain exceptions emerged, such as during the 2019 Women's World Championship, an unusually high average number of 2-minute suspensions was recorded (30.58 ± 8.38). This suggests that contextual variables such as match intensity or refereeing style may influence behavioural outcomes. One plausible explanation for the observed gender-based differences involves an underlying psychological mechanism. Research suggests that women typically exhibit higher levels of empathic concern and sensitivity to others' emotions (Kavussanu et al., 2009; Cotterill et al., 2020), which may influence their behavioural responses during competition. In contrast, male athletes may be more susceptible to performance pressure and external evaluation, leading to a more aggressive approach and increasing the incidence of disciplinary infractions (Im et al., 2018). These results support the interpretation of Fair Play as a situationally driven construct, rather than a fixed trait, subject to variations based on game context, match significance, and emotional arousal.

It is also important to account for the potential influence of refereeing decisions on gender differences. For example, Souchon et al. (2013), in a study of 145 male referees, found that female players were judged more strictly, despite committing fewer infractions, indicating the possible presence of unconscious gender bias. However, the results of the present study suggest the opposite: male athletes were sanctioned more frequently, suggesting that the intensity and style of their play had a stronger effect on referee decisions than any potential bias.

Similarly, Pic (2017) conducted an observational analysis of matches from the 2012 Olympic Games and found that men's and women's teams adopted different tactical approaches. Female teams were observed to use more cooperative offensive strategies and to engage in less physical contact, which may reduce the likelihood of disciplinary sanctions. These differences in technical and tactical patterns may help explain the lower TP values recorded in the women's competitions.

Strengths and limitations

One of the main strengths of this study is its focus on gender differences in HB, an area that has received limited attention in the scientific literature. This research contributes valuable empirical evidence on the relationship between gender and fair play in high-level competition contexts, specifically within international HB. Another notable strength is the extended data collection period (2007–2023), which allowed the inclusion of multiple editions of the HB World Championships, enhancing the representativeness and reliability of the results. However, the study presents several limitations. First, it is based exclusively on quantitative data obtained from historical records, without considering the specific context of the game, such as the type of match, the Championship phase, the opponents' characteristics, the nature of the foul, or the player's specific role and position on the court. This restricts the ability to interpret the behaviours observed and to explore situational influences on fair play conduct. Second, the absence of athletes' subjective perspectives and lived experiences limits the depth of the analysis. Third, the potential impact of non-sporting factors, such as variations in refereeing standards between men's and women's competitions, was not examined and may have influenced the results.

Practical applications

The findings of this study provide practical guidance for coaches, sport psychologists, and mental coach, facilitating the promotion of fair play and the enhancement of emotional regulation in high-pressure competitive contexts. Interventions aimed at improving athletes' emotional self-regulation, such as mindfulness training and simulated match scenarios, may contribute to a reduction in red cards and suspensions. Conflict management and the promotion of fair play can be enhanced through post-match feedback sessions and structured reflections, fostering team cohesion and prosocial behaviour. Observed gender differences indicate the need for targeted interventions: in men's teams, efforts should focus on reducing antisocial behaviour and promoting empathy, whereas in women's teams, emphasis should be placed on reinforcing prosocial behaviour and collaborative offensive strategies. Coaches and referees play a critical role in ensuring fairness and consistency in disciplinary decisions, thereby supporting a respectful and sustainable sporting culture.

CONCLUSION

Regarding the first objective, the results did not reveal a consistent relationship between fair play behaviour and final competition ranking, suggesting that a team's level of discipline or frequency of in-game penalties does not necessarily predict placement in the standings. In relation to the second objective, significant gender differences in fair play conduct were observed. Specifically, men's teams accumulated a higher number of penalties across the World Championships analysed, indicating a tendency toward more frequent rule violations compared to women's teams. These findings highlight that fair play is context-dependent and support the need for gender-sensitive interventions in coaching and mental training.

AUTHOR CONTRIBUTIONS

Iván González-García: conceptualization, methodology, data collection, formal analysis, writing - original draft. Ignazio Leale: writing - original draft, visualization. Giuseppe Battaglia: writing - review & editing. Manuel Gómez-López: conceptualization, methodology, writing - original draft, supervision.

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