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Performance of wrestlers at the Olympic Games: gender aspect

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Abstract

Background and Study Aim: With the growing popularity of freestyle wrestling, researchers are increasingly focusing on gender factors that might influence competitive performance and success. The aim of this study is to determine the differences in performance indicators between male and female wrestlers at the 2021 Olympic Games.

Material and Methods: The study involved 192 athletes, with 96 male and 96 female wrestlers. Match records and video footage from the 2021 Tokyo Olympic Games were analyzed for both women's (n=113) and freestyle (n=114) wrestling. Performance indicators were assessed using an expert evaluation approach. Data was statistically analyzed using licensed Excel spreadsheet software, and categorical data was presented in absolute numbers and percentages.

Results: From an analysis of the competitive events at the 2021 Olympic Games, 12 primary technical-tactical actions emerged. In the standing position, leg attacks were predominant, executed by male wrestlers 35.8% of the time and by female wrestlers 30.3%. On the ground, male wrestlers favored the gut wrench (7.6%), while females opted for the ankle lace (9.4%). Both male (926 points) and female wrestlers (912 points) garnered roughly equivalent points for their actions. However, males outperformed females in the standing position, scoring 720 points to the females' 621. Conversely, in ground positions, female wrestlers were more effective, scoring 291 points against the males' 206. Rule violation deductions were notably fewer for female wrestlers (8 instances) than for their male counterparts (27 instances). Additionally, challenge review stoppages were less frequent for females (7 instances) compared to males (18 instances).

Conclusions: The study highlights distinct performance indicators in freestyle wrestling between genders. Male wrestlers predominantly act in the standing position (81.7%), whereas female wrestlers lean towards the ground positions (29.3%). In contrast, males account for only 18.3% on the ground. Overall, male wrestlers perform a higher total number of actions (579) than their female counterparts (518). Notably, female wrestlers secure more early victories, constituting 32.7% of all matches, compared to 24.6% by males. These insights can guide coaches in tailoring training programs that cater to these gender-specific nuances.

Keywords: wrestling, performance, men, women, difference

Introduction

Sporting combat is one of the most ancient and prestigious disciplines in the world of sports, capturing the attention of millions of enthusiasts and participants from the global community. For centuries, athletes have been celebrated for their achievements in this art, honing their techniques and physical abilities, embodying not only the beauty of movements but also the strength of will [1, 2].

However, with the rising popularity of wrestling, the scientific community is paying more attention to significant factors that can influence performance and success in competitive activities in this sport [3]. Among such factors, the gender aspect stands out, playing a crucial role in determining the peculiarities of physiology, psychology, and wrestling strategy for both male and female athletes [4, 5].

In recent decades, due to the growing interest

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in gender studies and sports science, differences in physiological characteristics [6], physical fitness [7], body composition [8], and body structure [9] between men and women have been recognized. Additionally, gender differences have been observed in competitive performance indicators [10, 11] as well as in the expression of psychophysiological functions [12, 13].

Studying these differences is of great importance as it helps us better understand how gender factors can influence athletes' performance and success in competitions [14, 15, 16, 17].

Analyzing gender differences in competitive performance offers new insights for coaches, athletes, and training specialists. Recognizing the nuances between men's and women's performances allows for the optimization of training programs, the development of more effective combat strategies, and the establishment of balanced and equitable conditions for both genders in competitions.

The aim of the study is to determine gender differences in performance indicators among wrestlers at the 2021 Olympic Games.

Materials and Methods

Participants

The study encompassed 192 athletes, split evenly between 96 male and 96 female wrestlers. Each weight category featured 16 participants from both genders. Male wrestlers competed in the 57 kg, 65 kg, 74 kg, 86 kg, 97 kg, and 125 kg categories, while female wrestlers participated in the 50 kg, 53 kg, 57 kg, 62 kg, 68 kg, and 76 kg categories. Performance data was obtained from the official "United World Wrestling" website [18].

Research Design

Protocols and video footage of matches in women's (n=113) and freestyle (n=114) wrestling from the 2021 Tokyo Olympics were examined. The performance indicators analyzed included:

- Match duration (in seconds)
- Number of technical-tactical actions in standing and ground positions
- Number of matches won by fall
- Number of rule violations in both standing and ground positions (standing and parterre cautions)
- Penalties for passive wrestling (activity time)
- Number of challenges in standing and ground positions (protests arising from disputed moments in a match)
- Effectiveness of techniques in standing and ground positions (evaluated in points: 1 point, 2 points, 4 points) [19].

To assess these performance indicators, an expert evaluation method was employed. The expert panel, comprising five individuals, each had over a decade of experience in either officiating or coaching. The consistency among expert ratings was validated by concordance coefficients (W=0.65-0.80; $p<0.05$).

Statistical analysis

Statistical analysis was conducted using Microsoft Excel. For categorical data, results were presented as absolute numbers (n) and percentages (%). Furthermore, a t-test was applied to compare wrestlers' performance indicators. The chosen significance level was set at 0.05.

Results

Table 1 details the technical-tactical actions

Table 1. Variability of technical-tactical actions of wrestlers in the 2021 Olympic Games

Technical-tactical actions		Male (n=96)		Female (n=96)	
		The number of actions	%	The number of actions	%
The stand position	Hip turning throw	5	0.9	18	3.5
	Throw suplex	4	0.7	10	1.9
	Forward bending throw	8	1.4	18	3.5
	Leg attacs	207	35.8	157	30.3
	Take down	61	10.5	44	8.5
	Standing counter	6	1.0	5	1.0
	Step out	117	20.2	62	12.0
	Activity time	65	11.2	52	10.0
	Total in the stand position	473	81.7	366	70.7
The ground position	Gut wrench	44	7.6	35	6.8
	Turn over	32	5.5	41	7.9
	Ankle lace	13	2.3	49	9.4
	Parterre counter	17	2.9	27	5.2
	Total in the ground position	106	18.3	152	29.3
Total		579	100.0	518	100.0

executed by male and female wrestlers during the 2021 Olympic Games. Of the 12 primary actions identified, eight are in the standing position and four in the ground position.

Male wrestlers execute a higher percentage of actions in the standing position (81.7%) than female wrestlers (70.7%). On the other hand, female wrestlers perform more actions in the ground position (29.3%) compared to males (18.3%). In the standing position, leg attacks are most common, with males using this action in 35.8% of instances, and females in 30.3%. On the ground, males predominantly employ the gut wrench (7.6%), while females opt for the ankle lace (9.4%). Males performed a total of 579 actions, surpassing the females' 518. On average, males executed 5.1 actions per match, slightly more than the females' 4.6. Statistically significant differences were observed between these indicators ($p<0.05$). Both winning and losing male wrestlers had a ground action ratio of 1.3 (with winners performing more actions), whereas for females, this ratio was notably higher at 5.3.

Table 2 shows that both male and female wrestlers accumulated roughly similar scores for their actions: 926 points for males and 912 for females.

On average, male athletes scored 8.12 points per match, compared to 8.07 points for female athletes ($p>0.05$). Female wrestlers performed 4-point actions 33 times, while male wrestlers did so 14 times. In the standing position, male wrestlers demonstrated greater effectiveness, accumulating 720 points, as opposed to the 621 points by female wrestlers. However, in the ground position, female wrestlers outperformed with 291 points, compared to the males' 206 points. Of note, female wrestlers had more matches won prematurely, totaling 37 (or 32.7% of all matches), whereas male wrestlers had 28 such victories (24.6% of all matches).

Table 3 details the number of technical (non-standard) situations, including activity time, negative wrestling, standing challenge, ground challenge, standing caution, and ground caution, and the respective points awarded for these infractions.

Female wrestlers were penalized with points for rule violations significantly fewer times (8 times) than male wrestlers (27 times). Additionally, there were fewer stoppages for challenge reviews in matches involving female wrestlers (7 times) compared to those with male wrestlers (18 times). Such occurrences detract from the spectacle of male wrestling.

Table 2. The number of performed actions and points of wrestlers in the 2021 Olympic Games

Technical-tactical actions		Male (n=96)		Female (n=96)	
		The number of actions	%	The number of actions	%
The stand position	The number of one-point actions	116	22.8	63	13.7
	The number of two-points actions	276	54.1	213	46.2
	The number of four-points actions	13	2.5	33	7.2
	The total number of points	720	77.8	621	68.1
The ground position	The number of one-point actions	6	1.2	13	2.8
	The number of two-points actions	98	19.2	139	30.1
	The number of four-points actions	1	0.2	0	0
	The total number of points	206	22.2	291	31.9
The total number of actions		510	100.0	461	100.0
The total number of points		926	100.0	912	100.0

Table 3. The number of non-standard technical situations

Technical situation	Male (n=96)		Female (n=96)	
	The number of actions	%	The number of actions	%
Negative wrestling	6	13.3	0	0
Standing challenge	8	17.8	3	20.0
Parterre challenge	10	22.2	4	26.7
Standing caution	18	40.0	6	40.0
Parterre caution	3	6.7	2	13.3
The total number	45	100.0	15	100.0

Discussion

This article analyzes the competitive performance across various combat sports during the 2021 Olympic Games in Tokyo. From this analysis, scientists have developed models for elite athletes [20, 21], pinpointed the nuances of modern competitive performance [22], highlighted prevalent technical-tactical actions [23], crafted training tasks [24, 25], assessed the influence of rule changes on match profiles [26, 27], evaluated the strengths and weaknesses of athlete preparation [28], forecasted future competition outcomes [3], identified competition-related injuries [29, 30], and delved into the issue of doping [31]. In the realm of freestyle wrestling, the primary technical-tactical actions were identified, corroborating findings from prior research [32, 33].

Research indicates that leg attacks are the predominant technical-tactical actions in the standing position for freestyle male wrestlers [34, 35], a trend corroborated by our findings. Additionally, experts highlight the varied preparation approaches for leg attacks between male and female wrestlers [36].

In ground positions, male wrestlers tend to favor the gut wrench technique, whereas female wrestlers lean towards the ankle lace technique. These preferences can be attributed to physiological differences and distinct training approaches for each technique.

Our study identified performance disparities between male and female wrestlers. Other research in combat sports has explored similar themes. For instance, Tarragó et al. [37] analyzed elite fencing at the World Championship to discern differences across weapons (foil, epee, and saber) and genders. Their findings revealed significant variations ($p<0.05$) in work and rest durations among the three fencing types. However, when comparing genders using the same weapon, no significant differences emerged.

Jansen et al. [38] investigated the impact of strikes during training and competitions for both male and female athletes in boxing and mixed martial arts (MMA). They utilized a specially designed cap to monitor these strikes. Their findings revealed that strikes in MMA resulted in a significantly higher peak angular acceleration compared to boxing ($p < 0.001$). Additionally, there was greater variability in the location of head strikes during MMA competitions. In terms of gender differences, men received a higher number of strikes than women during training sessions.

Slimani et al. [39] conducted a study on high-level kickboxers, analyzing performance aspects based on gender, weight category, round, and match outcome. Their findings revealed that men had higher relative wrestling time, preparatory-active time, total number of attacking actions, upper limb actions, technical actions targeting the head, and high-intensity actions compared to women (all $p=0.05$). Additionally, men executed more jabs and crosses but fewer low kicks than women ($p<0.001$). While men predominantly used upper limb techniques (63.4%) and targeted the head (56.9%) more than the body/legs (43.1%), these tendencies were not significantly different from those observed in women ($p>0.05$).

Menescardi et al. [40] analyzed the movement patterns of male and female Olympic taekwondo athletes, focusing on their tactical actions using Markov processes analysis. Their findings revealed 32 significant sequences for male athletes and 30 for female athletes. Specifically, males had 11 sequences initiated by attacks, 11 by counterattacks, and 10 by defensive actions. In contrast, females displayed nine sequences starting with attacks, 11 with counterattacks, and 10 with defensive maneuvers. Given these gender-specific patterns, coaches and athletes are advised to consider these characteristics when preparing for competitions.

Kruszewski et al. [41] investigated the variations in technical actions employed during wrestling matches between men and women at the 2020 European Championship. Their research highlighted distinct approaches to matches based on gender. While winning by points during regular time was predominant in both women's and men's freestyle wrestling, women were more likely to decide the match outcome by a fall, with 20% of women achieving this compared to 6% of men ($p<0.0001$). The study also observed a range of technical actions executed in both standing and horizontal positions.

The comparison of the total number and quality of points obtained in both styles is another main result of this study. Table 2 illustrates a comparison of the total number and quality of points obtained in both wrestling styles. Male and female wrestlers garnered roughly equivalent points for their technical and tactical actions, with males scoring 926 points and females 912 points. Notably, female wrestlers executed a higher number of 4-point technical and tactical actions, which significantly enhance the sport's appeal. Furthermore, female wrestlers more frequently won matches by technical superiority. The point distribution was consistent across both styles: 2-point actions were most common, followed by 1-point and then 4-point actions. Female wrestlers incurred fewer penalty points for rule violations and had fewer time stoppages for challenge reviews, suggesting that women's wrestling offers a smoother viewing experience. These findings align with the research conducted at the 2020 European Championship [41].

It's recognized that executing numerous technical and tactical actions in a wrestling match

necessitates a robust level of specialized endurance, a sentiment echoed by prior studies [1, 23].

Conclusions

The conducted research indicates differences between performance indicators of male and female wrestlers. Male wrestlers execute more actions in the standing position (81.7%) compared to female wrestlers (70.7%). Conversely, female wrestlers perform more actions in the ground position (29.3%) than male wrestlers (18.3%). The overall number of actions is higher among male wrestlers (579) than among female wrestlers (518). Additionally, female wrestlers have a higher percentage of matches won prematurely (32.7% of all matches) compared to male wrestlers (24.6%). These findings will assist coaches in better adapting to gender differences and developing specific training programs for their athletes.

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Conflict of interest

The authors declare no conflict of interest.

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