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Women's artistic gymnastics at the Paris 2024 Olympic Games – between prediction and reality (apparatus finals)

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Abstract

Aim. Performance prediction can support or influence tactical and strategic preparation. Although artistic gymnastics is considered a sport discipline with high demands across all components of preparation, the tactical approach to a competition can, at times, become the key factor that determines the outcome and can make the difference in achieving a top podium position. The aim of this study is to conduct an analysis comparing our predictions with the actual results obtained by the athletes at the Paris 2024 Olympic Games. We also seek to highlight the importance of predictive analysis in major competitions as a means to guide athlete preparation in an efficient manner

Material and method. We analyzed the results achieved by the gymnasts in the apparatus finals at the Paris 2024 Olympic Games. For each apparatus, we conducted a comparison between the prediction made in the aforementioned article and the results obtained in the Olympic finals.

Results. When predicting results and future performances, we must take into account the uniqueness of each competition, its atmosphere and stakes, as well as the psychological balance that a gymnast must maintain. Although we attempted to formulate predictions by analyzing all continental competitions earlier in the Olympic year, we found that many gymnasts did not participate in these events, as they were not a priority for them. Their strategy was one of discreet preparation, entering directly into the Olympic Games. For this reason, in the future, when developing performance predictions, we will aim to focus on national competitions of countries with strong individual gymnasts.

***Keywords*:** artistic gymnastics; performance prediction; Olympic Games.

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Introduction

Artistic gymnastics is a complex sport discipline with a well-regulated scoring code and competitions that take place under consistently similar conditions. Thus, the ability to anticipate performance based on previous results becomes an essential tool for coaches and athletes.

Performance prediction can support or influence tactical and strategic preparation. Although artistic gymnastics is considered a sport discipline with high demands across all components of preparation, the tactical approach to a competition can, at times, become the key factor that determines the outcome and can make the difference in achieving a top podium position.
Tactical preparation—the strategy for competition readiness—must be organized through the intelligent selection of elements in the routine composition, the order of execution, adaptation to the requirements of the Code of Points, the ability to make rapid decisions during competition, the management of emotions, and the capacity to adjust performance based on the evolution of one's opponents.

Although the specialized literature includes some relatively old articles addressing performance prediction in gymnastics, they are very few.

Lee (1982) conducted a study examining the accuracy of gymnasts' expectations, their coach's expectations, and their previous competition results as predictors of competitive performance. The study found that the gymnasts' expectations were more accurate estimates than their prior scores, while the coach's expectations were even more precise.

Atiković & Kamenjašević (2021) conducted a study to determine the impact of D and E scores in relation to the final result in the women's artistic gymnastics all-around event. Their conclusion was that significant predictors of all-around success are the D and E scores on the uneven bars, as well as the E score on the balance beam.

Lecocq et al. (2025) conducted a study aiming to evaluate the accuracy of performance predictions by comparing the results of a simple predictive method with the actual scores awarded at the 2022 European Championships. They concluded that gymnasts tend to be more consistent on rings and vault than on pommel horse or balance beam. Furthermore, predictions based on the maximum score tend to overestimate results, while those based on the average score are closer to the real score.

Aim

The aim of this study is to conduct an analysis comparing our predictions with the actual results obtained by the athletes at the Paris 2024 Olympic Games.

We also seek to highlight the importance of predictive analysis in major competitions as a means to guide athlete preparation in an efficient manner.

Materials and method

Based on the article published by Corlaci et al. (2024), we analyzed the results achieved by the gymnasts in the apparatus finals at the Paris 2024 Olympic Games. For each apparatus, we conducted a comparison between the prediction made in the aforementioned article and the results obtained in the Olympic finals. This comparison was carried out for D-scores, E-scores, as well as final scores.

Results

Following the analysis of the results obtained by the gymnasts in the apparatus finals at the Paris 2024 Olympic Games, we reached the following findings.

Table 1 and Figures 1–3 present the comparative results between prediction and reality for D-scores, E-scores, and the final score on Vault.

Table 1. Comparative Table Between Prediction and the Results Obtained in the Vault Final

Place	Name	Country	Average D Score	Dif. D Score	Average E Score	Dif. E Score	Final Score	Dif. Final Score
Prediction			5.0	0.0	8.8 - 9.2	0.000	14.000	0.000
Place 1	BILES Simone	USA	6.0	1.0	9.350	0.350	15.300	1.300
Place 2	ANDRADE Rebeca	BRA	5.5	0.5	9.467	0.467	14.966	0.966
Place 3	CAREY Jade	USA	5.3	0.3	9.167	0.166	14.466	0.466
Place 4	AN Chang Ok	PRK	5.3	0.3	8.916	-0.084	14.216	0.216
Place 5	GEORGIEVA Valentina	BUL	4.9	-0.1	9.083	0.083	13.983	-0.017

Place 6	BLACK Elsabeth	CAN	4.9	-0.1	9.033	0.033	13.933	-0.067
Place 7	YEO Seojeong	KOR	5.2	0.2	8.216	-0.784	13.416	-0.584
Place 8	OLSEN Shallon	CAN	5.3	0.3	8.067	-0.934	13.366	-0.634
Average			5.3	0.3	8.912	-0.088	14.206	0.206
Note: Dif. D Score = Difference between the prediction and the D score; Dif. E Score = Difference between the prediction and the D score; Dif. Final Score = Difference between the prediction and the Final score								

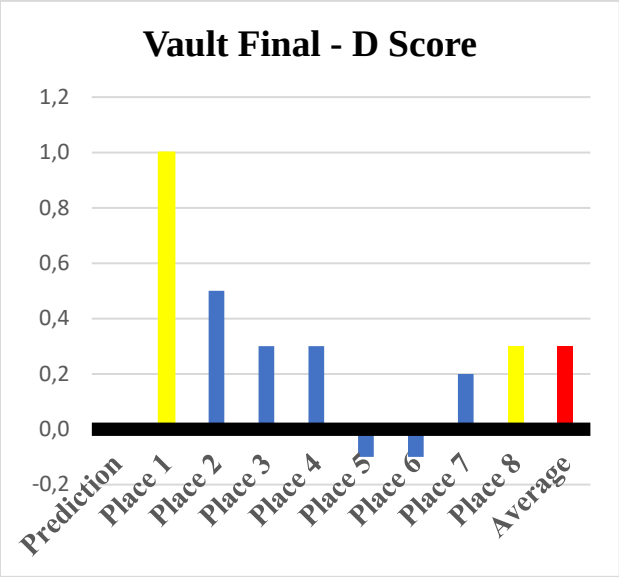

Fig. 1. *Graphical representation of the difference between the predicted score and the D score obtained in the Vault final*

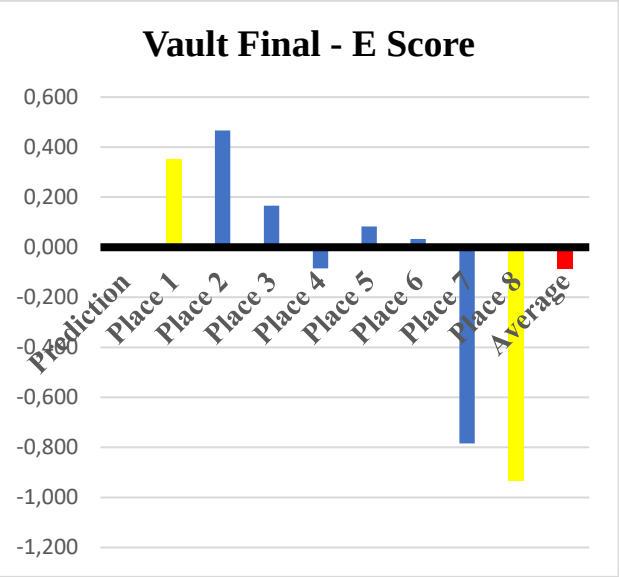

Fig. 2. *Graphical representation of the difference between the predicted score and the E score obtained in the Vault final*

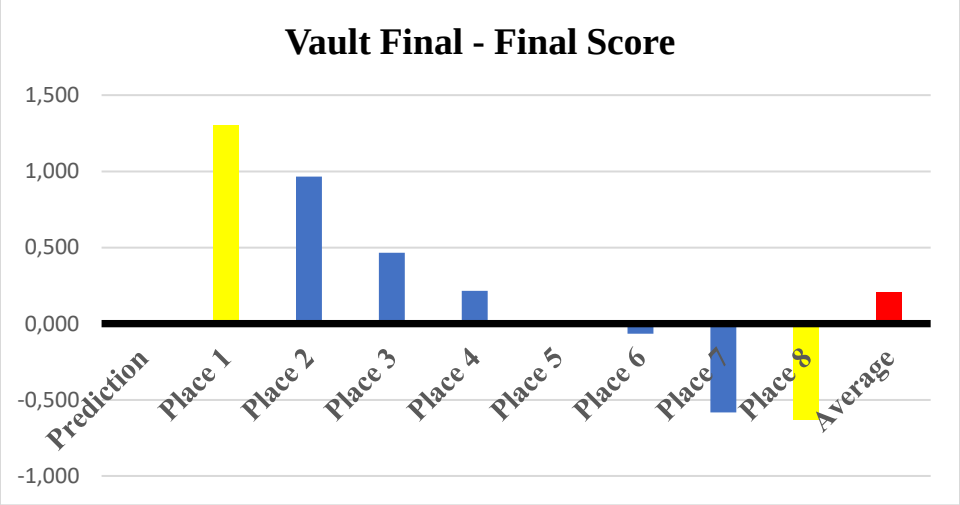

Fig. 3. *Graphical representation of the difference between the predicted score and the final score obtained in the Vault final*

In Table 2 and Figures 4–6, the comparative results between prediction and reality are presented for D scores, E scores, and the final score on the Uneven Bars apparatus.

Table 2. Comparative table between the prediction and the results obtained in the Uneven Bars final

Place	Name	Country	Average D Score	Dif. D Score	Average E Score	Dif. E Score	Final Score	Dif. Final Score

Prediction			6.4	0.0	8.200	0.000	14.600	0.000
Place 1	NEMOUR Kaylia	ALG	7.2	0.8	8.500	0.300	15.700	1.100
Place 2	QIU Qiyuan	CHN	7.2	0.8	8.300	0.100	15.500	0.900
Place 3	LEE Sunisa	USA	6.4	0.0	8.400	0.200	14.800	0.200
Place 4	DERWAEL Nina	BEL	6.5	0.1	8.266	0.066	14.766	0.166
Place 5	D'AMATO Alice	ITA	6.4	0.0	8.333	0.133	14.733	0.133
Place 6	KEVRIC Helen	GER	6.4	0.0	8.166	-0.034	14.566	-0.034
Place 7	DOWNIE Rebecca	GBR	6.5	0.1	7.133	-1.067	13.633	-0.967
Place 8	ZHANG Yihan	CHN	6.1	-0.3	6.700	-1.500	12.800	-1.800
Average			6.6	0.2	7.975	-0.225	14.562	-0.038
Note: Dif. D Score = Difference between the prediction and the D score; Dif. E Score = Difference between the prediction and the D score; Dif. Final Score = Difference between the prediction and the Final score								

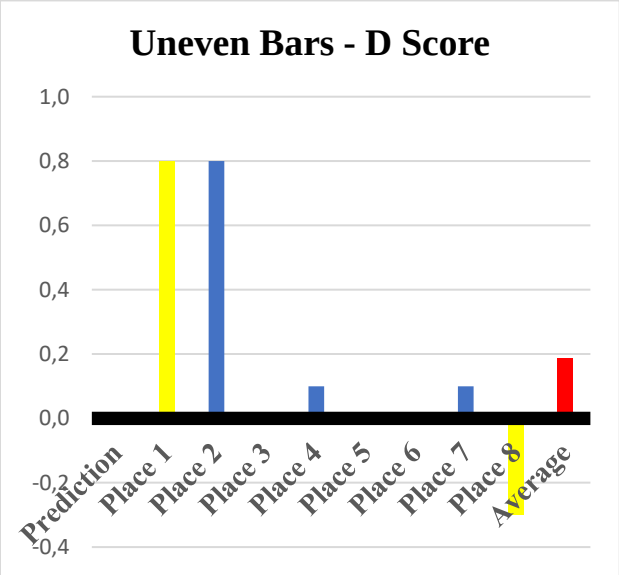

Fig. 4. *Graphical representation of the difference between the predicted score and the D score obtained in the Uneven Bars final*

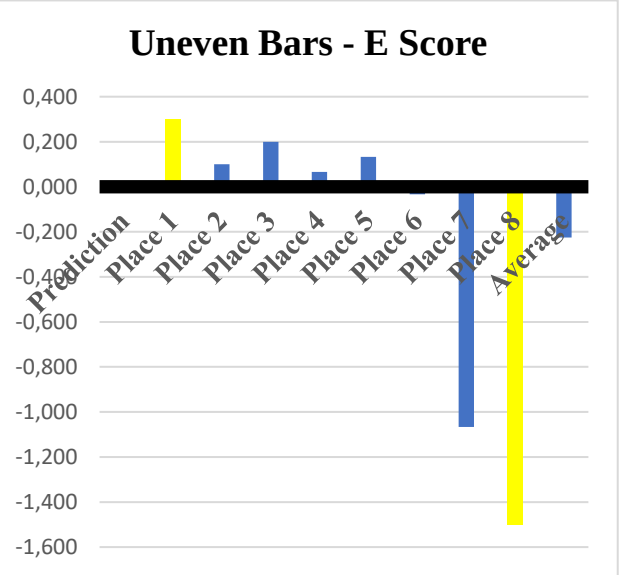

Fig. 5. *Graphical representation of the difference between the predicted score and the E score obtained in the Uneven Bars final*

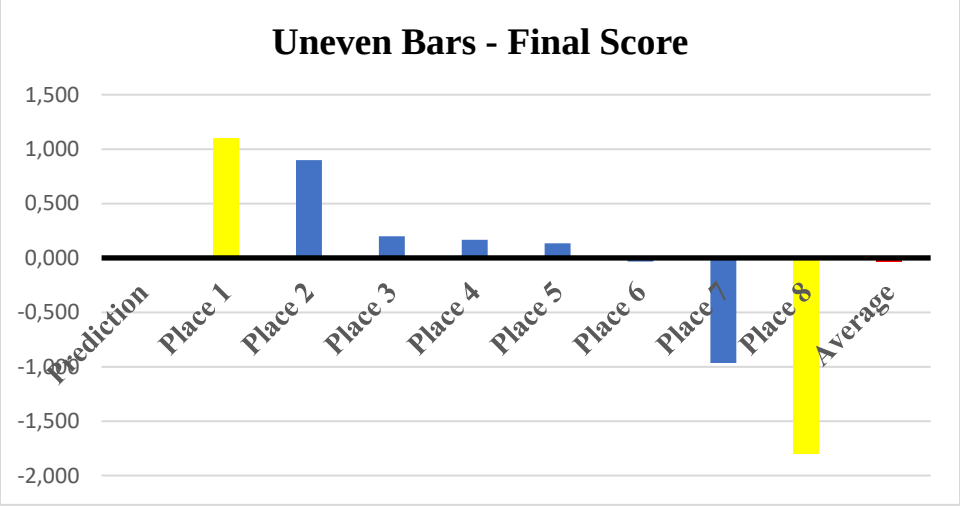

Fig. 6. *Graphical representation of the difference between the predicted score and the final score obtained in the Uneven Bars final*

In Table 3 and Figures 7–9, the comparative results between prediction and reality are presented for D scores, E scores, and the final score on the Balance Beam apparatus.

Table 3. Comparative table between the prediction and the results obtained in the Balance Beam final

Place	Name	Country	Average D Score	Dif. D Score	Average E Score	Dif. E Score	Neutral Ded.	Final Score	Dif. Final Score
Prediction			6.0	0.0	8.2 - 8.5	0.000		14.400	0.000
Place 1	D'AMATO Alice	ITA	5.8	-0.2	8.566	0.216		14.366	-0.034
Place 2	ZHOU Yaqin	CHN	6.6	0.6	7.500	-0.850		14.100	-0.300
Place 3	ESPOSITO Manila	ITA	5.8	-0.2	8.200	-0.150		14.000	-0.400
Place 4	ANDRADE Rebeca	BRA	5.7	-0.3	8.233	-0.117		13.933	-0.467
Place 5	BILES Simone	USA	6.2	0.2	7.200	-1.150	-0.3	13.100	-1.300
Place 6	LEE Sunisa	USA	6.2	0.2	6.900	-1.450		13.100	-1.300
Place 7	SOARES Julia	BRA	5.3	-0.7	7.033	-1.317		12.333	-2.067
Place 8	MANECA-VOINEA Sabrina	ROU	5.8	-0.2	5.933	-2.417		11.733	-2.667
Average			5.9	-0.1	7.446	-0.904		13.333	-1.067

Note: Dif. D Score = Difference between the prediction and the D score; Dif. E Score = Difference between the prediction and the D score; Dif. Final Score = Difference between the prediction and the Final score; Neutral Ded = Neutral Deductions

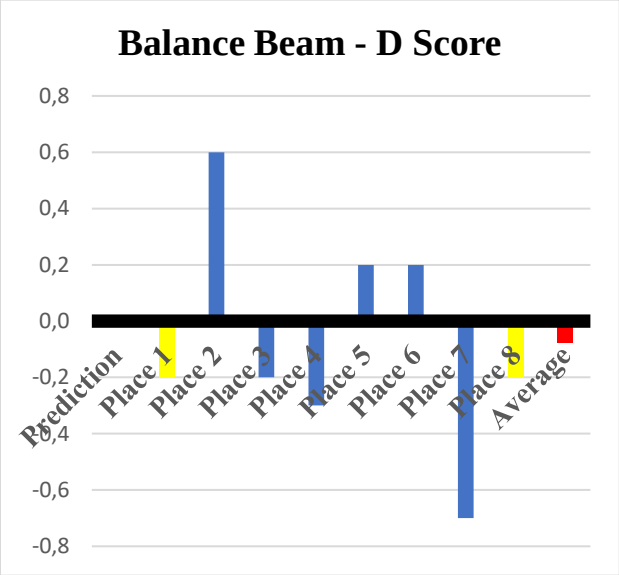

Fig. 7. *Graphical representation of the difference between the predicted score and the D score obtained in the Balance Beam final*

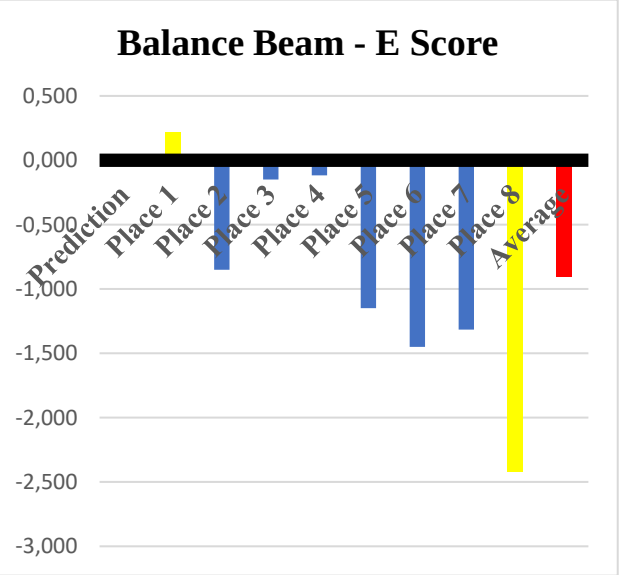

Fig. 8. *Graphical representation of the difference between the predicted score and the E score obtained in the Balance Beam final*

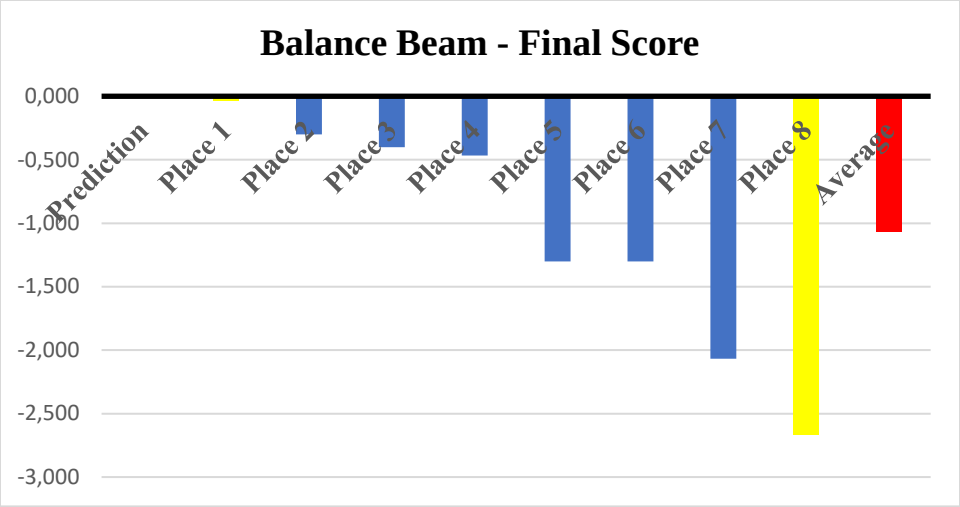

Fig. 9. *Graphical representation of the difference between the predicted score and the final score obtained in the Balance Beam final*

In Table 4 and Figures 10–12, the comparative results between prediction and reality are presented for D scores, E scores, and the final score on the Floor Exercise apparatus.

Table 4. Comparative table between the prediction and the results obtained in the Floor Exercise final

Place	Name	Country	Average D Score	Dif. D Score	Average E Score	Dif. E Score	Neutral Ded.	Final Score	Dif. Final Score
Prediction			6.0	0.0	8.1-8.3	0.000		14.000	0.000
Place 1	ANDRADE Rebeca	BRA	5.9	-0.1	8.266	0.066		14.166	0.166
Place 2	BILES Simone	USA	6.9	0.9	7.833	-0.367	-0.6	14.133	0.133
Place 3	BARBOSU Ana	ROU	5.8	-0.2	8.000	-0.200	-0.1	13.700	-0.300
Place 4	MANECA-VOINEA Sabrina	ROU	5.9	-0.1	7.900	-0.300	-0.1	13.700	-0.300
Place 5	CHILES Jordan	USA	5.8	-0.2	7.866	-0.334		13.666	-0.334
Place 6	D'AMATO Alice	ITA	5.6	-0.4	8.100	-0.100	-0.1	13.600	-0.400
Place 7	KISHI Rina	JPN	5.7	-0.3	7.566	-0.634	-0.1	13.166	-0.834
Place 8	OU Yushan	CHN	5.6	-0.4	7.700	-0.500	-0.3	13.000	-1.000
Place 9	ESPOSITO Manila	ITA	5.7	-0.3	6.533	-1.667	-0.1	12.133	-1.867
Average			5.9	-0.1	7.752	-0.448		13.474	-0.526
Note: Dif. D Score = Difference between the prediction and the D score; Dif. E Score = Difference between the prediction and the D score; Dif. Final Score = Difference between the prediction and the Final score; Neutral Ded = Neutral Deductions									

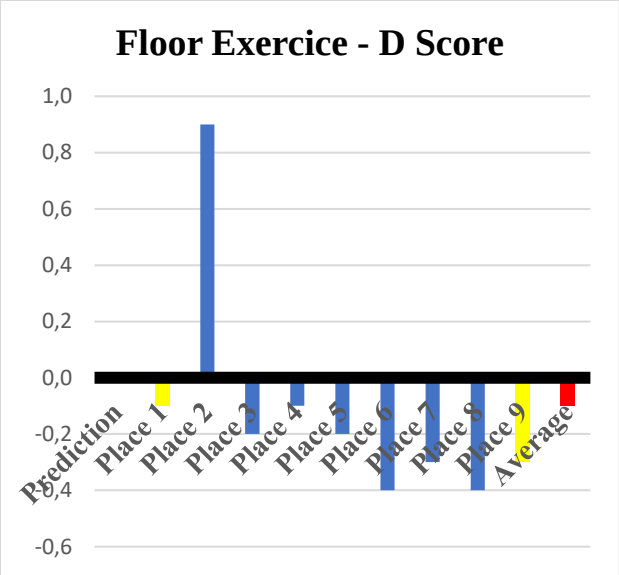

Fig. 10. *Graphical representation of the difference between the predicted score and the D score obtained in the Floor Exercise final*

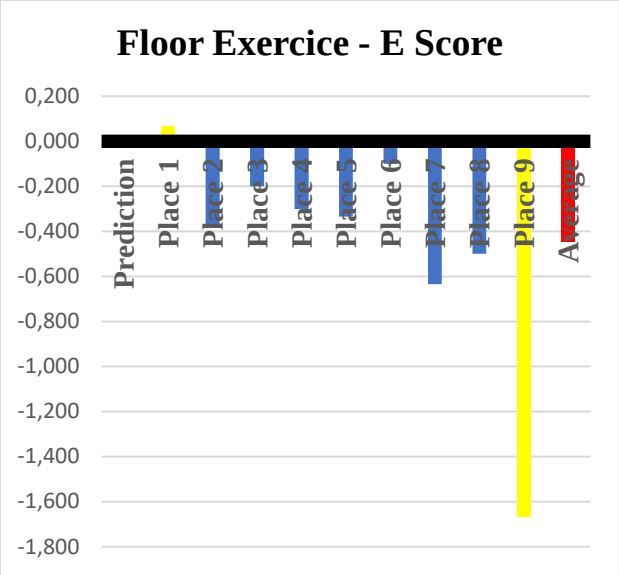

Fig. 11. *Graphical representation of the difference between the predicted score and the E score obtained in the Floor Exercise final*

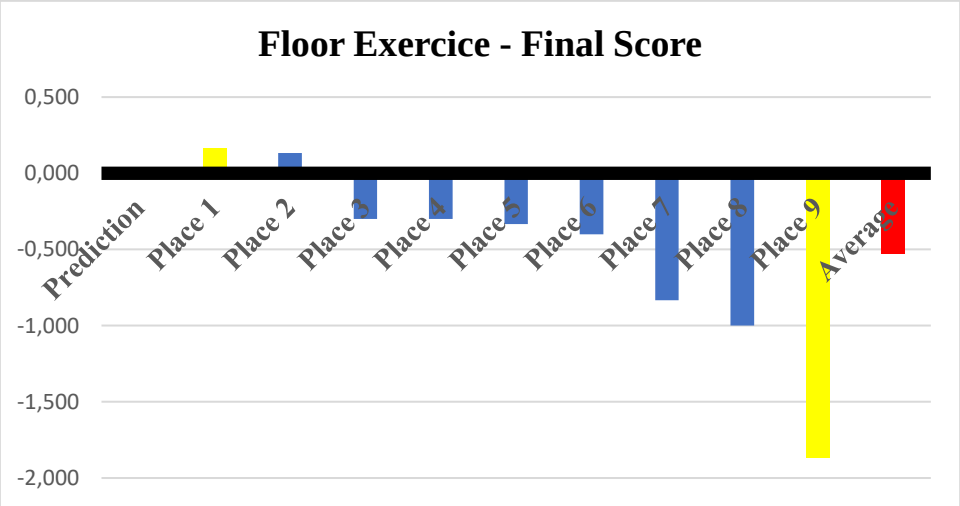

***Fig. 12**. Graphical representation of the difference between the predicted score and the final score obtained in the Floor Exercise final*

Discussions

In the Vault final, two gymnasts performed vaults very close to our predicted values, five gymnasts exceeded the predicted values, and one gymnast (Simone Biles) clearly surpassed the prediction.

From this, we can conclude that the athletes visibly attempted to surpass themselves, significantly increasing their degree of difficulty and raising the bar in this final.

The psychological factor influenced the last two athletes in the ranking, who, paradoxically, missed on the vault with the lower difficulty of the two they presented in competition.

In the competitions previously analyzed—those used to create our predictions—we did not have data for 7 of the 8 finalists at the Olympic Games. Therefore, our prediction had a considerable margin of error, as follows:

- The predicted D score would have ranked 6th;
- The predicted E score would have ranked 6th;
- The predicted final score would have ranked 5th.

One athlete clearly stood out through the difficulty of her vaults, averaging 6.0 points. Simone Biles, in fact, could easily hold her own even in men's vault competitions.

Regarding execution, except for the two athletes who had mistakes, the other six had deductions of approximately 1.0 point. For the top two athletes, the average deductions were between 0.53 and 0.65 points, indicating near-perfect execution.

On the Uneven Bars, two highly skilled athletes confirmed their status by exceeding our predictions significantly: Kaylia Nemour and Qiu Qiyuan. Their scores were almost unimaginable to the average spectator. Both difficulty and execution impressed the audience, specialists, and judges, raising the standard of performance and the overall vision of Uneven Bars preparation.

Only one athlete recorded a D score below our prediction, three achieved equal difficulty, and four had D scores higher than predicted.

Additionally, in the Uneven Bars final, only two of the eight finalists had been included in our previous analysis, and both had a difficulty score equal to or just 0.1 above the predicted value.

The difference between prediction and the average difficulty presented in the final was 0.2 points, due to the athletes' desire to surpass themselves in this major competition.

Regarding execution quality on this apparatus, we observed that the first six gymnasts—those without major errors—recorded an average E score 0.1 points above our predicted value of 8.200.

The final score on Uneven Bars fell within our predicted range, with the exception of the top two athletes, who achieved exceptionally high scores, confirming their value in both execution and difficulty.

On Balance Beam, the predicted difficulty was 0.1 points above the average, with deviations from our forecast distributed symmetrically—some over, some under—relative to the finalists' performances.

For execution, our prediction ranged between 8.200 and 8.500 points, given the nature of this apparatus, where routines are performed on a very narrow surface and elements require near-perfect balance. The beam finalists who did not fall received execution scores within the anticipated range.

The predicted final score was slightly higher—by 0.033 points—than the actual final score of the winner, reinforcing the beam's reputation as "the bridge of sighs."

In our Floor Exercise prediction, the difficulty was set at 6.0. The average difficulty among finalists was 5.9 points. Only one gymnast—Simone Biles—performed a routine with a higher difficulty, at 6.9 points. The lowest difficulty was recorded by Italy's Alice D'Amato and China's Ou Yushan, with 5.6 points.

The floor final is the last event of Women's Artistic Gymnastics competitions, and this was reflected in the athletes' performances. Our predicted execution score was an average of 8.200 points, whereas the gymnasts actually recorded an average execution score of 7.752 points, showing that fatigue, pressure, and the high stakes of the competition significantly affected execution.

Even so, our predicted final score was within the expected parameters. Three finalists had execution scores below our forecast, including Simone Biles; however, she still secured second place thanks to a difficulty score 1.0 point higher than the average of the other gymnasts.

The final score was predicted accurately, being exceeded by less than two tenths of a point by the winner.

Conclusion

Throughout the history of Women's Artistic Gymnastics, there have always been a few exceptional athletes who clearly stood out in competitions, both in the All-Around and in the individual apparatus finals. These athletes also contributed decisively to their teams, separating themselves from the main group of competitors. Even among these top performers, it is not uncommon for execution to fall short, despite high difficulty levels, with performance occasionally failing to exceed the average of other gymnasts.

In line with the points stated above, when predicting results and future performances, we must take into account the uniqueness of each competition, its atmosphere and stakes, as well as the psychological balance that a gymnast must maintain.

Although we attempted to formulate predictions by analyzing all continental competitions earlier in the Olympic year, we found that many gymnasts did not participate in these events, as they were not a priority for them. Their strategy was one of discreet preparation, entering directly into the Olympic Games.

For this reason, in the future, when developing performance predictions, we will aim to focus on national competitions of countries with strong individual gymnasts.

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