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The Analysis of E-Score Performance in Individual All-Around Finalists Across Different Rotations in Artistic Gymnastics

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Abstract : The World Artistic Gymnastics Championships represent the highest level of competition in the sport of gymnastics and are one of the key events for qualifying for the Summer Olympic Games. In the all-around finals, artistic gymnasts must perform according to their rankings from the qualification rounds and follow the groupings and Olympic rotation specified by the event, completing full routines on six rotations for men and four rotations for women. This study analyzes the E-scores of male and female all-around finalists across different rotation. Methods—The subjects of this study were the male and female all-around finalists from the 2022 World Artistic Gymnastics Championships. A one-way ANOVA was used to analyze the E-scores of six rotation for men and four rotations for women in the all-around finals. Results— 1) The results showed that male gymnasts had significantly lower E-scores in the last three rotation compared to the first three. 2) The E-scores of the four rotations for female gymnasts did not reach significance, indicating that their E-score performance across the four rotations was similar. Conclusion— Artistic gymnastics is a high-intensity intermittent sport, primarily relying on ATP-PC and anaerobic glycolysis for energy. Performing routines leads to high lactate levels, and with increased anaerobic activity duration, lactate accumulation can cause fatigue, affecting muscle contraction responses and, consequently, the athletes' performance on each apparatus. The decline in E-scores for male gymnasts in the latter rotation may result from fatigue accumulated from earlier events, leading to more errors. In contrast, female gymnasts did not exhibit significant score declines, possibly due to the number of apparatuses or the nature of the events. Future research could conduct in-depth analyses of multiple competitions or gymnast of different levels in qualification rounds or all-around finals to understand whether fatigue affects subsequent performance based on different starting apparatuses. Such research could also provide coaches and gymnasts with preparation strategies for different starting apparatuses and recovery methods during competitions.

Keywords : world championships, execution, gymnast, routines, high-intensity
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