

International Journal of Physiology, Sports and Physical Education



ISSN Print: 2664-7710
ISSN Online: 2664-7729
Impact Factor: RJIF 8.00
IJPSPE 2025; 7(1): 01-08
www.physicaleducationjournal.net
Received: 10-10-2024
Accepted: 12-11-2024

Han-Chen Huang
College of Tourism, Chung Hua
University, Hsinchu, Taiwan

Lei Huang
An Si Junior High School, New
Taipei City, Taiwan

Chih-Wen Huang
An Si Junior High School, New
Taipei City, Taiwan

Chen-Yu Chang
An Si Junior High School, New
Taipei City, Taiwan

Performance analysis of elite junior female athletes in the 800 M (2021-2024) in Taiwan and Japan

Han-Chen Huang, Lei Huang, Chih-Wen Huang and Chen-Yu Chang

DOI: <https://doi.org/10.33545/26647710.2025.v7.i1a.97>

Abstract

This study compares the performance of junior female athletes from Taiwan and Japan in the 800m heats and finals from 2021 to 2024, focusing on the impact of different competition formats. Data were collected from YouTube race videos and official reports, with lap-time analysis conducted using video analysis software. Results show that Taiwan's "Top N per group + fastest losers" format encourages conservative pacing in heats, leading to better performance in finals. In contrast, Japan's "time-based qualification" format forces athletes to exert maximum effort in heats, resulting in excessive energy depletion and weaker finals performance. Regarding pacing strategies, both countries' athletes adopted a positive split (Faster first lap, slower second lap). Taiwanese athletes exhibited greater lap-time variation, indicating less effective energy management, while Japanese athletes maintained steadier pacing. Overall, Japanese athletes outperformed their Taiwanese counterparts in finals, particularly in stability and late-race performance. The findings suggest that pacing strategies, competition formats, and energy management significantly influence race outcomes. To enhance Taiwanese athletes' competitiveness in international events, future training should focus on improving endurance and energy allocation, with consideration of optimizing competition formats.

Keywords: Qualification design, pacing strategy, positive splits

Introduction

The 800m, a middle-distance event, requires athletes to allocate energy effectively and maintain precise pacing ^[1, 2]. Competitors need quick starts and steady performance, with optimal pacing strategies playing a key role in overcoming fatigue and sustaining competitive form throughout the race ^[2-6].

In the finals, while speed and endurance are crucial, pacing strategies must adapt dynamically to race conditions. Changes in energy reserves and mental state directly influence strategy choices, significantly affecting performance outcomes ^[7-10]. Common pacing strategies include positive splits, negative splits, and even pacing, with selection depending on athletes' physical condition, psychological resilience, and track conditions ^[3-6, 9-11].

This study examines the 800 m performance of junior female athletes from the Taiwan Middle School Athletic Games (Taiwan-MSAG) and Japan Junior High School Championships (Japan-JHSC) from 2021 to 2024. It explores performance variations, pacing strategies, and their impact on results across race stages, offering insights for optimizing athletes' performance and informing coaching strategies.

Literature Review

This study examines the 800 m final performances of junior female athletes from Taiwan and Japan between 2021 and 2024, focusing on pacing strategies, energy allocation, and their impact on results. Data include lap times for the first and second laps in the finals and changes in total time between the preliminary and final rounds. The analysis explores the application of pacing strategies, their relationship to performance, and highlights the importance of pacing and energy management in enhancing race outcomes.

Taiwan and Japan's Elite Junior High School Track and Field Competitions

The Taiwan Middle School Athletic Games (Taiwan-MSAG) and Japan Junior High School

Corresponding Author:
Han-Chen Huang
College of Tourism, Chung Hua
University, Hsinchu, Taiwan

Championships (Japan-JHSC) are the highest-level athletics events for junior athletes in their respective countries, attracting top competitors and showcasing high competitiveness and influence^[12, 13]. In these events, the 800 m race garners attention for its dual demands on physical and mental endurance. Athletes must complete a middle-distance race within a limited time, integrating explosive power with endurance while maintaining precise pacing^[9, 10]. Races demand high speed in the first half without overexertion and an effective sprint in the latter half, requiring exceptional energy distribution and psychological resilience^[14]. Junior female athletes are in the learning phase of mastering optimal pacing strategies and energy regulation. This study aims to analyze the influence of pacing strategies and energy allocation on their results, providing empirical evidence for future training and competition while underscoring the critical role of pacing strategies in the 800m race.

Pacing Strategies

In middle-distance races, pacing strategies significantly influence athletes' performance. Key strategies include Even-split, Positive-split, Negative-split, and Sit-and-kick. These strategies reflect athletes' physical condition and tactical planning and are influenced by track conditions, competition, and race dynamics. Selecting the appropriate strategy requires a combination of scientific training and adaptability during the race.

- **Even-split Strategy:** Athletes maintain a steady pace throughout the race, with nearly identical lap times^[1-8, 14-17]. This strategy suits athletes with strong endurance and stability, conserving energy and minimizing losses from speed fluctuations. However, in races like the 800m that require a fast start, this strategy might not secure an early advantage.
- **Positive-split Strategy:** Athletes start the race at a fast pace, slowing down in the latter half due to fatigue^[3-9, 16, 18]. This approach helps secure a leading position early and avoids congestion, especially for speed-dominant athletes. However, uneven energy distribution may lead to late-race exhaustion or collapse.
- **Negative-split Strategy:** Athletes conserve energy in the first half and accelerate in the latter half^[1, 3-10, 18-20]. This strategy enables peak performance in the second half, suiting athletes with strong finishing bursts. However, a slower initial pace might put the athlete at a disadvantage, requiring confidence in their pacing and sprinting abilities.
- **Sit-and-kick Strategy:** Athletes follow the main group's pace during the early and middle stages, conserving energy for a final sprint^[21]. This strategy is often used in competitive races and suits athletes with excellent explosiveness. However, if opponents accelerate early to widen the gap, the sit-and-kick approach might fail. It also demands a high level of energy reserves.

Common Qualification Systems in 800M Races^[22, 23]

Qualification systems in 800m races often include *Top N in each heat + fastest losers*, *Time-Based Qualification*, and *Timed Finals by Heat*. Below is an analysis of each system:

- **Top N in Each Heat + Fastest Losers:** This system balances group competition with overall performance evaluation, often referred to as "Top N in each heat +

fastest losers." In this system, a fixed number of athletes from each heat (e.g., top 1) advance directly as Automatic Qualifiers, while the remaining qualifiers are selected based on their overall best times (Fastest Losers). This design ensures fairness and competitiveness by minimizing disparities between heats. The Taiwan-MSAG 800M system analyzed in this study adopts this format.

- **Time-Based Qualification:** Known as "Time-Based Qualification" or "Top N by Time," this system selects the fastest athletes purely based on their times, irrespective of heat distribution. Athletes must exert maximum effort in the preliminary round, as the top 8 times advance to the final. By using objective performance as the sole criterion, this system ensures fairness and accurately reflects athletes' abilities. The Japan-JHSC 800M system studied here utilizes this format.
- **Timed Finals by Heat:** This system, referred to as "Timed Finals by Heat," is typically used in small-scale competitions with limited time or numerous participants. Athletes are directly grouped for finals, with the fastest competitors placed in the "fast heat," and final rankings determined by times across all groups. While this system saves time and resources, athletes in slower heats may lack the motivation to perform at their best. It is suitable for single-day events or smaller competitions.

Research Methods

Data Collection

- **Competition Video Analysis:** This study downloaded competition videos of the preliminary and final rounds of 800-meter races featuring female youth athletes from Taiwan and Japan between 2021 and 2024 via the YouTube platform^[24-31]. The SHOTCUT video editing software was used for video analysis. This method allowed for precise extraction of lap time data and athletic performance for each athlete, ensuring the accuracy and reliability of the data.
- **Official Performance Reports:** This study also obtained official performance reports, which included detailed performance data of athletes in different stages (preliminary and final rounds)^[32-36]. These performance data facilitated comparative analyses between the preliminary and final rounds. To improve readability, race results were presented in total seconds, avoiding the complexity of time conversion into minutes and seconds. This simplified data comparison, made the results clearer, and facilitated calculations of averages, differences, and other indicators. Such a standardized format also enhanced statistical analysis and international comparisons, thereby improving data processing efficiency and professionalism.

Data Analysis

- **Calculation of Annual Averages for Preliminary and Final Results:** By calculating the average performance in both stages each year, the study assessed overall performance trends and provided baseline data for further analysis.
- **Analysis of Extreme Values:** The fastest and slowest lap times were identified, and their impact on final results was analyzed. Extreme value analysis helped

pinpoint outlier athletes, enabling an examination of their pacing choices, energy distribution, and strategy effects on final performance.

- **Comparison of Lap Speed Differences Between the First and Second Laps:** By comparing lap speeds, the study evaluated athletes' strategies. It analyzed whether athletes adopted positive pacing strategies (Faster first lap, slower second lap), negative pacing strategies (Slower first lap, faster second lap), or even pacing strategies (Consistent lap speeds).
- **Statistical Analysis of the Relationship Between Pacing Strategies and Final Performance:** Statistical methods were employed to determine the role of various factors in performance differences.

Results and Discussion

Comparative Analysis of Preliminary and Final Results of Junior Female 800m Athletes in Taiwan and Japan

The comparison of the preliminary and final results for junior female 800m athletes from Taiwan and Japan highlights how differences in competition format design impact athletes' performances (Table 1 and Figure 1). Based on the four-year average results, Taiwanese athletes' final results ranged from 140.67 seconds to 144.72 seconds, while Japanese athletes' results were between 132.43 seconds and 134.66 seconds, indicating that Japanese athletes generally outperformed their Taiwanese counterparts.

However, the differences in preliminary results reveal variations in competition formats between the two countries. Taiwan employs a "top finishers in groups + best timings" advancement system, allowing athletes to conserve energy in the preliminary rounds and focus on qualifying rather than achieving peak performance. Consequently, Taiwanese athletes showed slower performances in the preliminaries (four-year average: 144.79 seconds) but improved significantly in the finals (four-year average: 142.40 seconds).

In contrast, Japan uses a "fastest advancement" system, requiring athletes to exert maximum effort in the preliminaries to secure a place in the top eight. This led to better preliminary results for Japanese athletes (Four-year average: 133.09 seconds). However, due to significant energy expenditure and insufficient recovery, their performance in the finals often slightly declined (Four-year average: 133.47 seconds). These differences in competition

formats explain the significant variations in results between the two countries in the preliminary and final rounds.

From 2021 to 2024, Taiwanese athletes generally performed better in the finals than in the preliminaries, while Japanese athletes often experienced the opposite, with final results slightly worse than preliminary performances. Taiwanese athletes' average final times were 2.38 seconds faster than their preliminary times, indicating that they tend to conserve energy in the preliminaries and prioritize qualification over achieving the fastest time. This strategy allowed them to perform better in the finals.

In contrast, Japanese athletes displayed a different trend. The data showed that, except for 2022, Japanese athletes' final results were generally slower than their preliminary results, with time differences of 0.14 seconds, 0.12 seconds, and 1.55 seconds in 2021, 2023, and 2024, respectively. This suggests that the high intensity required in the preliminary rounds under Japan's competition format led to substantial energy depletion, negatively impacting their performance in the finals.

The larger performance gap between the preliminary and final results for Taiwanese athletes reflects their ability to strategically conserve energy under their competition format and focus on delivering their best performance in the finals. On the other hand, Japanese athletes, due to excessive effort in the preliminaries, experienced a decline in their final performance.

These findings reflect the differences in competition format designs between the two countries. Taiwan's format is more strategic, enabling athletes to perform better in the finals, while Japan's format emphasizes intense competition in the preliminaries, which, although enhancing competitiveness, often results in fatigue that impacts final performance.

In summary, the performance differences between Taiwanese and Japanese athletes in the 800m races are primarily attributable to the competition format design. Taiwan's format emphasizes strategy, allowing athletes to conserve energy and perform better in the finals, while Japan's format prioritizes competitiveness in the preliminaries. Taiwan may consider adjusting its competition format to balance competitiveness and strategy by incorporating elements of the "fastest advancement" system. This adjustment could enhance athletes' competitiveness in the preliminaries and further improve overall athletic performance.

Table 1: Comparison of Taiwan and Japan Elite Junior Female Athlete 800m Preliminary and Final Results

Year	Taiwan			Japan		
	Preliminary Average Time (sec)	Final Average Time (sec)	Difference (Final - Preliminary) (sec)	Preliminary Average Time (sec)	Final Average Time (sec)	Difference (Final - Preliminary) (sec)
2021	144.12	141.47	-2.65	134.52	134.66	0.14
2022	145.62	144.72	-0.90	133.65	133.35	-0.30
2023	144.53	142.76	-1.77	132.31	132.43	0.12
2024	144.88	140.67	-4.21	131.88	133.43	1.55
Average	144.79	142.40	-2.39	133.09	133.47	0.38

Taiwan's qualification system: Top N in each heat + fastest losers (Top N in each heat + fastest losers).

Japan's qualification system: Time-Based Qualification.

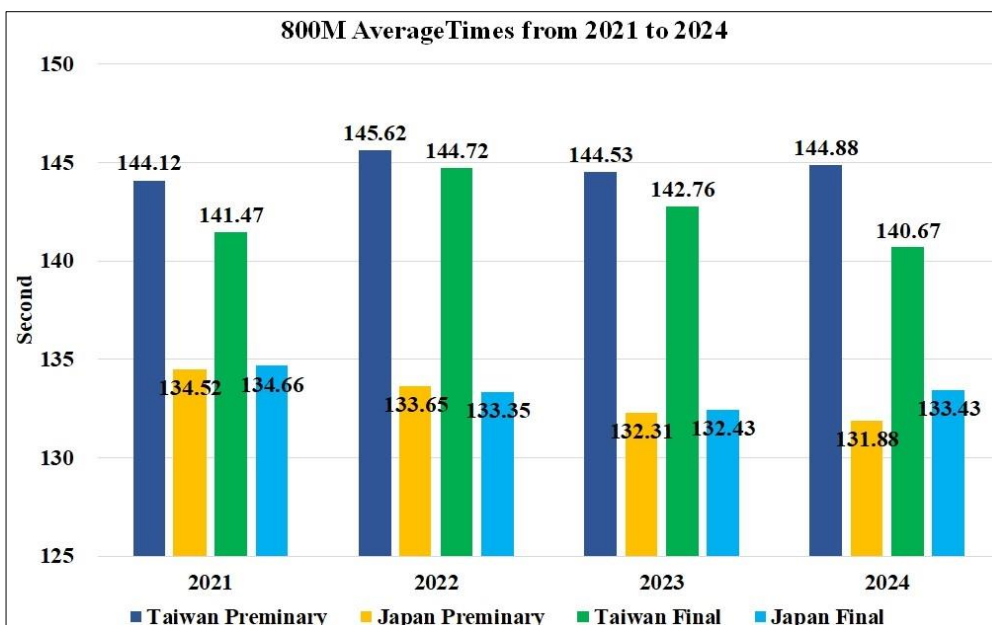


Fig 1: Comparison of Taiwan and Japan Elite Junior Female Athlete 800m Preliminary and Final Average Results

Analysis of Taiwan and Japan Elite Junior Male Athlete 800 m Final Results Distribution

The comparison of the Junior Female 800m final results for Taiwan and Japan from 2021 to 2024 highlights significant performance differences between the two countries (Table 2). Taiwanese athletes' final average times fluctuated over the four years, ranging from 140.67 seconds to 144.72 seconds, with a four-year average of 142.40 seconds. In contrast, Japanese athletes' final average times were more stable, ranging from 132.43 seconds to 134.66 seconds, with a four-year average of 133.47 seconds, indicating that Japanese athletes generally outperformed Taiwanese athletes in overall performance.

When comparing the fastest and slowest times, Taiwanese athletes recorded their fastest times between 133.63 seconds and 135.82 seconds and their slowest times between 147.26 seconds and 154.79 seconds. On the other hand, Japanese athletes' fastest times ranged from 129.10 seconds to 131.37 seconds, with their slowest times ranging from 134.20 seconds to 138.04 seconds. Japanese athletes exhibited smaller fluctuations in their performance, indicating greater stability. In contrast, Taiwanese athletes showed larger fluctuations in their slowest times, suggesting less consistency in their final performance.

A further analysis of the performance gaps reveals that Taiwanese athletes had a larger variation between their fastest and slowest final times, with an average difference of 16.61 seconds over the four years. This demonstrates stronger performance volatility. In contrast, Japanese athletes had a smaller performance gap, with an average difference of 6.4 seconds, reflecting more consistent

competition performance. This further confirms the instability of Taiwanese athletes' final performances compared to Japanese athletes.

From a competition format perspective, Taiwan employs a "group-based top finishers + best times" advancement system, which does not require athletes to exert maximum effort during the preliminary and semi-final stages but rather focuses on conserving energy for qualification. While this system helps athletes preserve their energy, the longer duration of the event may result in greater physical strain, which could affect their final performance. On the other hand, Japan uses a "fastest advancement" system, where athletes must compete fiercely in the preliminaries to secure a top-eight spot. Although this system may deplete energy in the preliminaries, Japanese athletes generally perform better in the finals due to strategic recovery and better management of physical state during the competition.

In summary, the comparison of the Junior Female 800m final results between Taiwan and Japan reveals that Japanese athletes outperform Taiwanese athletes in both overall performance and stability. Taiwanese athletes display greater performance fluctuations and often fail to meet expectations in the finals. Despite the physical demands in Japan's preliminary rounds, Japanese athletes maintain better performance in the finals due to their superior competition state management and recovery strategies. Taiwan could benefit from improvements in competition format design and athlete energy management to enhance performance consistency in the finals and reduce performance gaps.

Table 2: Distribution of Taiwan and Japan Elite Junior Female Athlete 800m Final Results

Year	Taiwan				Japan			
	Final Average (sec)	Final Fastest (sec)	Final Slowest (sec)	Final Difference (Slowest-Fastest) (sec)	Final Average (sec)	Final Fastest (sec)	Final Slowest (sec)	Final Difference (Slowest -Fastest) (sec)
2021	141.47	133.74	150.71	16.97	134.66	131.37	137.95	6.58
2022	144.72	134.61	154.79	20.18	133.35	129.96	138.04	8.08
2023	142.76	133.63	151.47	17.84	132.43	129.10	134.20	5.10
2024	140.67	135.82	147.26	11.44	133.43	129.21	135.05	5.84
Average	142.40	134.45	151.06	16.61	133.47	129.91	136.31	6.40

Analysis of Average Lap Times and Pace Distribution in the Junior Female Athlete 800m Finals between Taiwan and Japan

An analysis of the lap performances in the Junior Female Athlete 800m finals between Taiwan and Japan from 2021 to 2024 (Tables 3 and 4) reveals that both countries' athletes exhibit a similar pacing strategy, following a positive distribution pattern, with a faster first lap and a gradually slowing second lap. However, significant differences still exist between the two countries in terms of lap times and pacing.

In terms of the average time for the first lap, Taiwan's athletes completed it in 66.83 seconds, which is 3.10 seconds slower than Japan's 63.73 seconds. This indicates that Taiwan's athletes start slower and have weaker sprinting abilities. In contrast, Japan's athletes perform better in the first lap, achieving faster lap times.

For the second lap, Taiwan's athletes averaged 75.57 seconds, which is 5.89 seconds slower than Japan's 69.68

seconds. This suggests that Taiwan's athletes struggle more with endurance in the second lap, lacking consistency and resulting in a significantly slower time. On the other hand, Japan's athletes show more stability in their second lap performance, with more balanced energy distribution, enabling them to maintain better performance in the second lap.

Overall, Taiwan's athletes had an average total time of 142.40 seconds over the four years, while Japan's athletes averaged 133.47 seconds, with a difference of 8.93 seconds. This gap primarily stems from the stability and performance improvement in the second lap. Taiwan's second lap times show more fluctuation, with insufficient endurance to maintain speed, while Japan's athletes are able to maintain a higher level of performance in the second lap, giving them an advantage in the overall competition. These analyses suggest that Taiwan's athletes need to improve sprinting and endurance management, as well as their pacing strategies, in order to close the performance gap with Japan's athletes.

Table 3: Lap-by-Lap Average Results and Pacing Strategy of Taiwan Elite Junior Female Athlete 800m Finals

Year	Taiwan				
	1 st Lap Average (Sec)	2 nd Lap Average (Sec)	Difference(2 nd -1 st) (Sec)	Final Average (Sec)	Pacing Strategy
2021	66.82	74.65	7.83	141.47	Positive Split
2022	65.93	78.79	12.87	144.72	Positive Split
2023	68.05	74.71	6.67	142.76	Positive Split
2024	66.53	74.14	7.61	140.67	Positive Split
Average	66.83	75.57	8.75	142.40	

Table 4: Lap-by-Lap Average Results and Pacing Strategy of Japan Elite Junior Female Athlete 800m Finals

Year	Japan				
	1 st Lap Average (Sec)	2 nd Lap Average (Sec)	Difference(2 nd -1 st) (Sec)	Final Average (Sec)	Pacing Strategy
2021	64.67	69.99	5.32	134.66	Positive Split
2022	63.21	70.14	6.92	133.35	Positive Split
2023	62.29	69.92	7.63	132.43	Positive Split
2024	64.76	68.67	3.91	133.43	Positive Split
Average	63.73	69.68	5.95	133.47	

Analysis of Average Performance and Extremes in the Junior Female Athlete 800m Finals between Taiwan and Japan

The average performance and extreme values of the Junior Female Athlete 800m finals between Taiwan and Japan are shown in Figure 2. Firstly, Taiwan's athletes show more fluctuation in lap times, especially a noticeable decrease in speed in the second lap. The performance variability is particularly evident in the years 2022 and 2024. For example, in 2022, the average time for the second lap was 78.79 seconds, which was 12.86 seconds slower than the first lap time of 65.93 seconds, indicating a significant lack of consistency. This is likely related to Taiwan's athletes' energy distribution and strategy, particularly a deficiency in managing endurance during the latter part of the race, leading to a weaker second lap performance.

In contrast, Japan's athletes maintain more stable performance across both laps, with a relatively small

difference between the fastest and slowest times for both laps. For instance, in 2023, Japan's athletes completed the first lap in 69.92 seconds, while the second lap took 62.29 seconds, with a 7.63-second difference, showing a more balanced pacing strategy compared to Taiwan. This indicates that Japan's athletes have a more reasonable energy distribution throughout the race, maintaining a high level of performance in both the initial and final stages.

Overall, Taiwan's athletes demonstrate higher performance variability, especially in the second lap, where fatigue and a drop in physical strength lead to instability. On the other hand, Japan's athletes are able to maintain consistent performance with more balanced energy distribution and better strategy execution. This suggests that Taiwan's athletes could consider strengthening their endurance training and adjusting their strategies to improve overall race stability and reduce the gap with Japan's athletes.

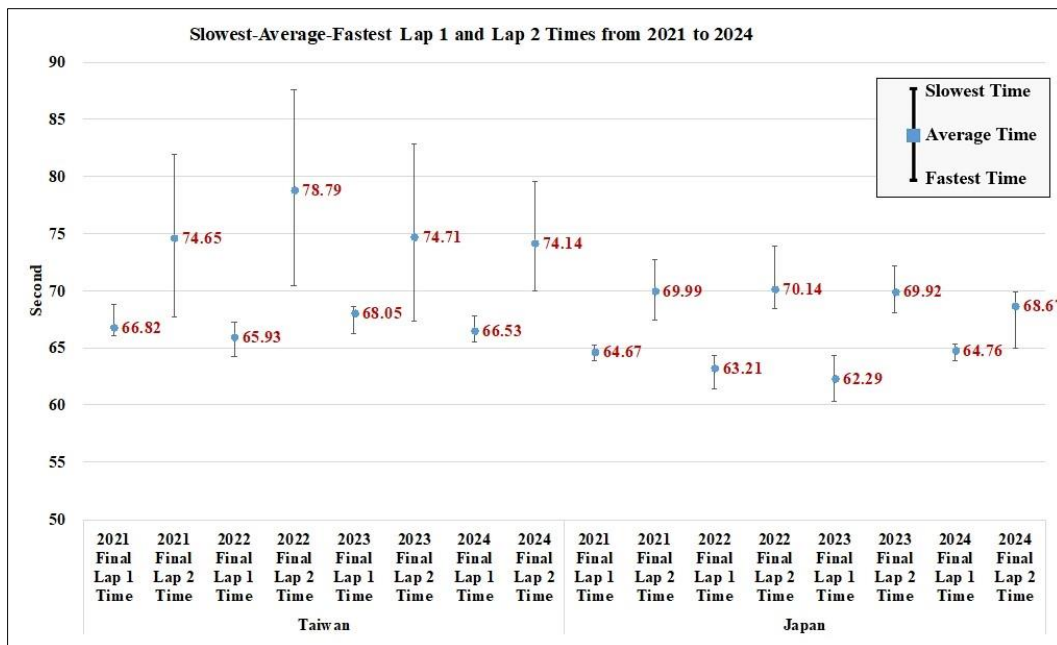


Fig 2: Average Lap Time and Extreme Distribution of Taiwan and Japan Elite Junior Female Athlete 800 m Finals

R² Analysis of Rankings and Performance Times in the 800m Finals for Junior Female Athletes from Taiwan and Japan

According to the data in Tables 5 and 6, the correlation (R²) between rankings and lap times for Junior Female athletes in the 800m finals differs between Taiwan and Japan. For Taiwan athletes, the correlation between rankings and first-lap times (R²) over the four years ranged from 0.7445 to 0.9209 in 2021, 0.6792 in 2023, and 0.7866 in 2024, indicating a strong to very strong relationship. The correlation between rankings and second-lap times was even more significant, with values of 0.9106 in 2021, 0.9812 in 2022, 0.941 in 2023, and 0.953 in 2024, all demonstrating a very strong relationship. The correlation between rankings and the time difference between the two laps (second-lap time minus first-lap time) ranged from 0.9079 in 2021, 0.9749 in 2022, 0.916 in 2023, and 0.843 in 2024, all showing a very strong relationship. In contrast, Japanese athletes had lower correlations with first-lap times, with

values of 0.3475 in 2021, 0.7966 in 2022, 0.0718 in 2023, and 0.5368 in 2024, indicating a weak to moderate relationship. The correlation between rankings and second-lap times was higher, with values of 0.9118 in 2021, 0.7573 in 2022, 0.5935 in 2023, and 0.698 in 2024, reflecting a very strong to strong relationship. The correlation between rankings and the time difference between the two laps was weaker, with values of 0.7701 in 2021 (strong relationship), 0.2138 in 2022 (weak relationship), 0.1096 in 2023 (very weak relationship), and 0.4767 in 2024 (moderate relationship).

Overall, Taiwanese athletes showed a stronger correlation between rankings and second-lap times, as well as the time difference between the two laps. Japanese athletes, however, demonstrated a lower correlation with first-lap times, with more significant correlations between rankings and second-lap times, while showing weaker correlations with the time difference between the two laps.

Table 5: R² Analysis of Final Ranking and Time Performance for Taiwan Elite Junior Female Athletes in the 800 m Final

Year	Taiwan					
	1 st Lap vs. Rank	R ² Classification	2 nd Lap vs. Rank	R ² Classification	(2 nd Lap - 1 st Lap) vs. Rank	R ² Classification
2021	0.7445	Strong Relationship	0.9106	Very Strong Relationship	0.9079	Very Strong Relationship
2022	0.9209	Very Strong Relationship	0.9812	Very Strong Relationship	0.9749	Very Strong Relationship
2023	0.6792	Strong Relationship	0.941	Very Strong Relationship	0.9160	Very Strong Relationship
2024	0.7866	Strong Relationship	0.953	Very Strong Relationship	0.843	Very Strong Relationship

Table 6: R² Analysis of Final Ranking and Time Performance for Japan Elite Junior Female Athletes in the 800 m Final

Year	Japan					
	1 st Lap vs. Rank	R ² Classification	2 nd Lap vs. Rank	R ² Classification	(2 nd Lap - 1 st Lap) vs. Rank	R ² Classification
2021	0.3475	Low Relationship	0.9118	Very Strong Relationship	0.7701	Strong Relationship
2022	0.7966	Strong Relationship	0.7573	Strong Relationship	0.2138	Low Relationship
2023	0.0718	Very Low Relationship	0.5935	Moderate Relationship	0.1096	Very Low Relationship
2024	0.5368	Moderate Relationship	0.6980	Strong Relationship	0.4767	Moderate Relationship

Conclusion

This study compares the performance of junior female athletes from Taiwan and Japan in the 800-meter race from

2021 to 2024, revealing significant differences in race format design, pacing strategies, and energy distribution between the two countries. Taiwan's race format utilizes a

"Top N finishers + fastest losers" qualification system, which helps athletes maintain a more conservative pace during the preliminaries, allowing them to perform better in the finals. In contrast, Japan's time-based qualification system requires athletes to exert maximum effort in the preliminaries, which can boost their competitiveness but may also lead to excessive energy expenditure, negatively impacting their performance in the finals.

In terms of pacing strategies, both countries adopted a positive distribution strategy, with a faster pace in the first lap and a slower pace in the second lap. However, Japanese athletes showed a smaller difference between their first and second lap performances, indicating better endurance than their Taiwanese counterparts. Japanese athletes were able to maintain a more stable performance in the latter part of the race, while Taiwanese athletes experienced a significant decline in their physical performance.

Overall, Japanese athletes outperformed Taiwanese athletes, particularly in the stability of the second lap and energy distribution. These findings suggest that an athlete's pacing strategy, race format design, and energy management are closely related and significantly impact race outcomes. To improve the competitiveness of Taiwanese athletes on the international stage, future training should focus on enhancing the first-lap speed and second-lap endurance. Additionally, adjustments to the race format could have a positive impact on athletes' performances, especially in terms of energy distribution and race pacing adjustments.

References

- Filipas L, Nerli Ballati E, Bonato M, La Torre A, Piacentini MF. Elite Male and Female 800-m runners' display of different pacing strategies during season-best performances. *Int. J Sports Physiol Perform.* 2018;13(10):1344-1348. <https://doi.org/10.1123/ijsp.2018-0137>
- Amo J, Planas-Anzano A, Zakyntinaki M, Ospina-Betancurt J. Effort distribution analysis for the 800m race: IAAF World Athletics Championships, London 2017 and Birmingham 2018. *Biol Hum Kinet.* 2021;13(1):103-110. <https://doi.org/10.2478/bhk-2021-0013>
- Huang HC, Huang L. Analysis of the Performance and Pacing Strategies in the 800 m for Junior Female Athletes in the Taiwan Middle School Athletic Games (2022-2024). *Int. J. Sports Exercise Phys. Educ.* 2025;7(1):12-22. <https://doi.org/10.33545/26647281.2025.v7.i1a.151>
- Huang HC, Huang L. Analysis of the Performance and Pacing Strategies in the 800m for Junior Male Athletes in the Taiwan Middle School Athletic Games (2022-2024). *Int. J. Sports Exercise Phys. Educ.* 2025;7(1):1-11. <https://doi.org/10.33545/26647281.2025.v7.i1a.150>
- Huang HC, Huang L. Analysis of 800m results and pacing strategies for female athletes in the Japan Junior High School championships (2021-2024). *J Sports Sci Nutr.* 2025;6(1):12-23. <https://doi.org/10.33545/27077012.2025.v6.i1a.297>
- Huang HC, Huang L. Analysis of 800m results and pacing strategies for male athletes in the Japan junior high school championships (2021-2024). *J Sports Sci Nutr.* 2025;6(1):01-11. <https://doi.org/10.33545/27077012.2025.v6.i1a.296>
- Tucker R, Lambert MI, Noakes TD. An analysis of pacing strategies during men's world-record performances in track athletics. *Int. J Sports Physiol Perform.* 2006;1(3):233-245. <https://doi.org/10.1123/ijsp.1.3.233>
- Hanley B, Stellingwerff T, Hettinga FJ. Successful pacing profiles of Olympic and IAAF World Championship middle-distance runners across qualifying rounds and finals. *Int. J Sports Physiol Perform.* 2019;14:894-901.
- Sandford GN, Pearson S, Allen SV, Malcata RM, Kilding AE, Ross A, *et al.* Tactical behaviors in men's 800-m Olympic and World-Championship medalists: A changing of the guard. *Int J Sports Physiol Perform.* 2018;13(2):246-249. <https://doi.org/10.1123/ijsp.2016-0780>
- Tsai YM, Chen CJ, Chen MK. Four weeks of 800-meter interval running training teaching programs for different teaching abilities of running training results. *Nat Chung Hsing Univ J Sports.* 2016;15:61-69. <https://www.airitilibrary.com/Article/Detail?DocID=a000559-201601-201602230010-201602230010-61-69>
- Chen C, Ma J, Song J, He S, Tan M. Characteristics of elite male 800-m runner's race performance based on hybrid computing methods. *Appl Bionics Biomech.* 2023;2023:1-8. <https://doi.org/10.1155/2023/7368369>
- Japan Association of Athletics Federations. The 48th Japan National Junior High School Championships. Japan Association of Athletics Federations. Dec 2024. Available from: <https://www.jaaf.or.jp/competition/>
- Sports Administration, Ministry of Education. National Middle School Athletic Games. Dec 2024. Available from: <https://www.sa.gov.tw/>
- Rave JM. The relationship between tactical positioning and the race outcome in 800-m running at the 2016 Olympic Games and 2017 IAAF World Championship. *J Hum Kinet.* 2020;71:299-305. <https://doi.org/10.2478/hukin-2019-0090>
- Kelemen B, Csányi T, Revesz L, Benczenleitner O, Toth L. Comparison of winning and record tactics in elite-level male middle-distance running. *J Phys Educ Sport.* 2023;469-475. <https://doi.org/10.7752/jpes.2023.02058>
- Casado A, González-Mohino F, Gonzalez Rave JM, Boullosa D. Pacing profiles of middle-distance running world records in men and women. *Int. J Environ Res Public Health.* 2021;18:12589. <https://doi.org/10.3390/ijerph182312589>
- Kelemen B, Benczenleitner O, Tóth L. Are 800-m runners getting faster? Global competition performance trends between 1999 and 2021. *J Phys Educ Sport.* 2022;22(9):2231-2237.
- Duffield R, Dawson B, Goodman C. Energy system contribution to 400-metre and 800-metre track running. *J Sports Sci.* 2005;23:299-307.
- Hanley B, Casado A, Renfree A. Lane and Heat Draw Have Little Effect on Placings and Progression in Olympic and IAAF World Championship 800 m Running. *Front Sports Act Living.* 2019;1:19. <https://doi.org/10.3389/fspor.2019.00019>
- Abbyss CR, Laursen PB. Describing and Understanding Pacing Strategies during Athletic Competition. *Sports Medicine,* 2008;38(3):239-252. <https://doi.org/10.2165/00007256-200838030-00004>

21. Hutchinson A. How to Beat Mo Farah: Strategic moves are key when you're racing for place. Runner's World. 2016. Available from: <https://www.runnersworld.com/training/a20810055/how-to-beat-mo-farah/>
22. Chinese Taipei Athletics Association. Athletics Rules. Retrieved December 2024, from https://www.athletics.org.tw/public/news_data.aspx?id=8010
23. World Athletics. Competition Rules. Retrieved December 2024, from <https://worldathletics.org/about-iaaf/documents/book-of-rules>
24. Japan National Junior High School Championships Track and Field LIVE Channel. The 51st National Junior High School Championships. Dec 2024. Available from: <https://www.youtube.com/@LIVETFRemaker/videos>
25. Japan National Junior High School Championships Track and Field LIVE Channel. The 50th National Junior High School Championships. Dec 2024. Available from: <https://www.youtube.com/@LIVETFRemaker/videos>
26. Athletics Family. The 49th National Junior High School Championships. Dec 2024. Available from: <https://www.youtube.com/@runfamily>
27. Nagasaki Sasebo Athletics Channel. The 48th National Junior High School Championships. Dec 2024. Available from: <https://www.youtube.com/@kct88at2011>
28. MOESports. 2024 National Middle School Athletic Games "Track and Field". Dec 2024. Available from: <https://www.youtube.com/playlist?list=PLXpYB9vilmbQVOQxvbJxtRxcGslumbENN>
29. MOESports. 2023 National Middle School Athletic Games "Track and Field". Dec 2024. Available from: <https://www.youtube.com/playlist?list=PLXpYB9vilmbTQEPCXstKF5kEoYYEjCMG>
30. MOESports. 2022 National Middle School Athletic Games "Track and Field". Dec 2024. Available from: <https://www.youtube.com/playlist?list=PLXpYB9vilmbR6eulhK3D3mcLIR6ntFGoo>
31. Coach Max, 2021 National Middle School Athletic Games "Track and Field". Dec 2024. Available from: <https://www.youtube.com/playlist?list=PLYgPvHDChpPcCJ6BFn0bK1aRPcbYOk6Qu>
32. Taiwan Middle School Athletic Games Executive Committee: Historical Competition Results Query Website. Dec 2024. Available from: <https://113sport.tp.edu.tw/Module/ScoreHistory/Inde.php>
33. Japan Association of Athletics Federations. Results of the 51st National Junior High School Championships. Japan Association of Athletics Federations. Dec 2024. Available from: <https://www.jaaf.or.jp/competition/detail/1851/>
34. Japan Association of Athletics Federations. Results of the 50th National Junior High School Championships. Japan Association of Athletics Federations. Dec 2024. Available from: <https://www.jaaf.or.jp/competition/detail/1751/>
35. Japan Association of Athletics Federations. Results of the 49th National Junior High School Championships. Japan Association of Athletics Federations. Dec 2024. Available from: <https://www.jaaf.or.jp/competition/detail/1639/>
36. Japan Association of Athletics Federations. Results of the 48th National Junior High School Championships. Japan Association of Athletics Federations. Dec 2024. Available from: <https://www.jaaf.or.jp/competition/detail/1559/>