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Comparative Analysis of the Best Finswimmers Strategies in the 800 Meter Surface Monofins at the World Championships

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Abstract The use of strategy in competitions is an important aspect in improving an athlete's performance. So, it is very important for athletes and coaches to understand this. This research involved 48 finswimming athletes, 24 male athletes, 24 female athletes in the 800-meter surface monofins event at the 2016-2022 World Championships, participants were selected from the best positions 1-8. This research uses secondary data obtained from the CMAS website. The data normality test in this study used Shapirow-wilk. To find out the differences between each round, use the one-way ANOVA test. The results of this research show that in the first round, there was a significant time acceleration for female athletes in 2018 with an average time of 24.17 seconds. The time difference between rounds was significant for male athletes in the 2nd to 4th rounds ($p < 0.05$), while female athletes showed significant time differences in almost all rounds with a value < 0.05. This research concludes that the average male and female athletes in each world championships use a parabola strategy, there is a difference in the average time in each round and there is also a difference in time between male and female athletes.

Keywords: finswimming; analysis strategy; performance

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INTRODUCTION

Finswimming is an aquatic sport which is carried out underwater or on the surface of the water using additional monofins and snorkels. The finswimming championship itself has 6 discipline events, including sprint events (50 meters - 100 meters), intermediate events (200 meters - 400 meters) and long distance events (800 meters - 1500 meters) (Rules 2006).

Like swimming, finswimming has several factors that can support improving performance, such as anthropometry, biomechanics, physiology, psychology and playing strategies (Arnett 2001; Aspenes and Karlsen 2012; Gabriela and Gatti 2004; Muhammad Firdaus et al. 2022; Silva et al. 2012). In the 800 meter surface monofins event, it is a long distance event which uses around 80-90% of the aerobic metabolism used (Barbosa et al. 2010; Barroso et al. 2023).

The use of strategy in swimming is the most important aspect in improving performance in each lap, especially in middle and long distances (Menting et al. 2019; Oliveira et al. 2019). This will have a significant impact on the final time results for long distance numbers (McGibbon et al. 2020). So, it is very important to use strategy during competitions and during training.

However, the current problem is that there is minimal understanding among athletes and coaches regarding the use of effective strategies (Dalamitros et al. 2023; Sridana et al. 2024). So, the impact that occurs due to a lack of knowledge in implementing game strategies will cause premature fatigue. This fatigue occurs due to uncontrolled energy expenditure without us realizing it while swimming.

The urgency of this research is very important because it is to provide finswimming coaches and athletes with an understanding of good playing strategies during competitions and training so that it can help coaches improve the performance of their athletes. Therefore, the aim of this research is to find out the best strategy used in the world finswimming championship.

METHOD

The participants in this study were 48 fins swimming athletes, consisting of 24 male athletes and 24 female athletes in the 800 meter surface mono-fins category in the World

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Championships held from 2016 to 2022 (2016 Greece, 2018 Serbia and 2022 Colombia). In order to obtain representative participant results, athletes were selected who entered the final event by occupying positions 1-8 in the final event.

All data in this study uses secondary data where all time results obtained were obtained from the official website of the Confédération Mondiale des Activités Subaquatiques (CMAS) https://www.cmas.org/ where all data has been officially verified.

This research uses a quantitative type with descriptive methods, presenting the results of the mean and standard deviation. The data normality test in this study used the Shapiro-Wilk test. Testing differences in data for each round in each world championships using the One-way ANOVA test. All data analysis in this study used social science software (SPSS Inc., Chicago, IL, USA) version 26.0 and Graphad Prism 9.

RESULT AND DISCUSSION

The average results and normality test of lap times for both male and female athletes in the 800 meter event are shown in the table

Table 1. Average Results and Normality Test

Split Time		*Mean ± St.Dev* (second) men 2022	2018	2016	*Shapirow Wilk*	women 2022	2018	2016	*Shapirow Wilk*
50 m	1	22,26±0,53	22,02±0,41	21,99±0,56	0,809	24,43±0,35	24,17±0,91	23,78±0,70	0,401
100 m	2	24,02±0,23	23,55±0,55	23,09±0,46	0,565	26,37±0,40	25,76±0,73	25,13±0,70	0,742
150 m	3	24,47±0,18	24,29±0,72	23,81±0,37	0,559	26,74±0,59	26,42±0,32	25,87±0,45	0,707
200 m	4	24,79±0,12	24,61±0,64	24,12±0,47	0,565	27,01±0,49	26,64±0,27	26,23±0,39	0,411
250 m	5	24,66±0,21	24,80±0,49	24,62±0,40	0,786	27,10±0,39	26,63±0,20	26,60±0,44	0,743
300 m	6	24,78±0,36	24,71±0,51	24,43±0,46	0,148	27,54±0,25	26,76±0,34	26,50±0,54	0,588
350 m	7	24,69±0,41	24,68±0,45	24,70±0,50	0,062	27,43±0,57	26,64±0,31	26,71±0,46	0,770
400 m	8	24,89±0,52	24,74±0,57	24,80±0,38	0,057	27,78±0,58	26,75±0,46	26,74±0,57	0,370
450 m	9	24,76±0,62	24,87±0,54	24,93±0,69	0,326	27,63±0,46	26,70±0,55	26,74±0,53	0,258
500 m	10	24,80±0,43	24,77±0,41	24,70±0,43	0,184	27,71±0,54	26,90±0,68	26,71±0,44	0,509
550 m	11	24,84±0,84	25,11±0,54	24,90±0,62	0,846	27,78±0,61	26,82±0,55	26,63±0,61	0,313
600 m	12	25,02±0,77	25,29±0,65	24,87±0,49	0,507	27,68±0,70	26,77±0,55	26,67±0,58	0,680
650 m	13	24,94±1,27	25,01±0,73	25,03±0,57	0,302	27,47±0,60	26,47±0,63	26,77±0,43	0,756
700 m	14	24,86±1,23	24,95±0,64	24,64±0,78	0,932	27,45±0,57	26,47±0,37	26,77±0,66	0,887
750 m	15	24,27±1,49	24,44±0,83	24,37±0,64	0,732	26,66±1,12	26,19±0,57	26,44±1,01	0,273
800 m	16	23,41±1,66	23,39±2,28	22,97±1,20	0,531	25,27±0,94	24,78±0,79	25,18±1,23	0,835

Table 1 shows the results of the normality test in each round that both male and female athletes show normal distribution of data with a significant value > 0.05. Shows an acceleration in the time of the first and last laps compared to laps 2-15. In the first round, the acceleration time was shown by female athletes in 2018 with a time of 24.17 seconds. To see the results of the time difference in each round, see Figure 1.

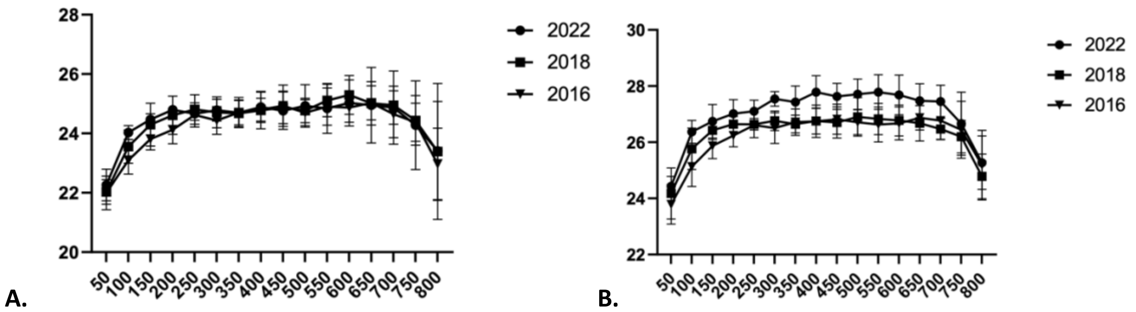

Figure 1. Average results and standard deviation in each round in the image (A) Male Athletes (B) Female Athletes

Table 2. Difference Test Results in Each Round

Waktu	Putra			Putri		
Putaran	df	F	Sig.	df	F	Sig.
1		0,662	0,526		1,745	0,199
2		8,958	< 0,001*		7,646	< 0,001*
3		4,039	< 0,001*		6,991	< 0,001*
4		4,450	< 0,001*		7,622	< 0,001*
5		0,494	0,617		5,606	< 0,001*
6		1.284	0,298		14,350	< 0,001*
7		0,006	0,994		7,035	< 0,001*
8	23	0,166	0,848	23	9,636	< 0,001*
9		0,145	0,866		7,574	< 0,001*
10		0,121	0,887		6,983	< 0,001*
11		0,347	0,711		8,563	< 0,001*
12		0,860	0,438		6,499	< 0,001*
13		0,019	0,982		4,434	< 0,001*
14		0,228	0,798		6,551	< 0,001*
15		0,051	0,951		0,492	0,618
16		0,157	0,856		0,533	0,595

You can see that table 2 shows the different test results for male and female athletes in each round for 3 championships. Male athletes showed differences in rounds 2-4 with a significant value of <0.05. In contrast to female athletes, almost all rounds have quite significant differences in time, such as rounds 2-14 with a significant value of <0.05.

This research found that the average athlete used a parabolic tempo strategy which can be described as a U-shaped curve by accelerating the speed at the start of the lap and at the end of the lap which can be seen in Figure 1. The results obtained were that there was an acceleration in time at the start of the lap, this was due to the additional start and underwater push at a distance of 800 meters (Costa et al. 2010; Lipińska, Allen, and Hopkins 2016). The second round had a slower time difference than the first round. After that, the swimmer will stabilize his speed until lap 15. This is useful for saving energy in the middle of the lap so he can sprint at the end of the lap (Micklewright et al. 2017), and in the final lap the athlete will increase his speed thereby creating a faster time. This research is in line with previous research which states that athletes who have good endurance will adopt a parabolic strategy by increasing their speed at the beginning, while in the middle of the round they will stabilize their speed and at the end of the round they will accelerate their speed again(Barroso et al. 2023; Demarie et al. 2023; López-Belmonte et al. 2022; Oliveira et al. 2019).

This research also found that there was a difference in lap times during the 3 events, which can be seen in table 2, where for male athletes there was a time difference in rounds 2 to 4, while for female athletes there was a significant time difference in rounds 2 to 14. Not only that, this research found differences between genders where the average speed of female athletes was much slower than that of male athletes. This can be seen in table 1. This difference occurs because the mental and physical abilities of male and female athletes have different levels (Yusuf, Wiradihardja, and Hermawan 2022). differences so that it is necessary to apply the right approach strategy to these athletes(de Koning et al. 2011). Not only that, differences in anthropometry and body physiology between male and female athletes can influence their time speed (di Prampero 1986).

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CONCLUSION

The conclusion of this research is that during the 3 world championships, the average finswimming athlete adopted a parabola strategy. Every event there is a change in time which makes the travel time faster for each round. Furthermore, there is a difference in time between sons and daughters, this is due to differences in anthropometry, physiology and physical abilities

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