Tuijin Jishu/Journal of Propulsion Technology
ISSN: 1001-4055
Vol. 44 No. 4 (2023)

Personality and Hydrodynamic Analysis of Finswimming Athletes: Bifins Relay Position in Central Java Province

Sungkowo[1], Tandiyo Rahayu[2], Donny Wira Yudha Kusuma[3], Agus Kristiyanto Kumbara[4]
[1,2,3]Faculty of Sports Science, Universitas Negeri Semarang, Indonesia
[4]Universitas Negeri Sebelas Maret, Indonesia

Abstract
Athletes' performance, especially in basic finswimming techniques in diving, is an effort that athletes must have as a basic requirement for achievement. The research method is correlational on ex post facto data on the achievements of bifins relay diving athletes at the multi-event National Championship in Pupua. Independent variables: 1) hydrodynamic analysis of the bifins technique with waves of 5cm, 10cm, without waves, and resistance dynamometer. 2) Myers-Birggs Type Indicator (MBTI). Dependent variable: relay speed bifins 4 X 100 M. The results of the MBTI test indicators introvert, extrovert, Sensing, Intuition, Thinking, Feeling, Judging, Perceiving on the speed of the Bifins relay concluded that Personality does not have a significant influence on speed. Research results of 4 Bifins Relay athletes: hydrodynamic analysis test of Bifins movement technique at bottom sweep angle, inside sweep angle and leg angle have different criteria: effective. less effective, ineffective. Resistance test results of 4 athletes in position "A" with both arms straight, position "B" recovery with the left hand, position "C" recovery with the right hand using speeds of 1 m/hour, 1.25 m/hour, 1.50 m/hour, 1.75 m/hour hour, 2 m/hour shows that the four athletes have different resistance strengths. The results of the hydrodynamic analysis of speed in the athlete's left body position, recovery in position A and position C did not have a significant effect. The right body position and recovery position B have a significant effect on speed.
Conclude that every finswimming athlete has a different technical style, some have effective styles and some have ineffective styles. By understanding and mastering these techniques you can minimize obstacles and can produce great power. The personality traits of each athlete cannot be related to speed, because speed is related to physical and movement techniques.In statistical calculations related to personality (MBTI indicators), if they are connected to bifins relay speed, there is no significant effect, due to the minimal number of research samples.

Keywords*: Personality; Bi-fins technique; Resistance test. Bifins relay*

Introduction

Sports performance is closely related to the best performance movements carried out in practice using certain benchmarks or parameters. An athlete's problem with achieving achievements does not only concern physical problems, but in reality is a multi-factorial problem. To influence performance, there are two important basic factors, namely physiological factors and athlete psychology (Bompa & Buzzichelli, 2021; Top & Akil, 2018). Physiological factors related to biomotor potential and abilities such as speed, strength, agility and endurance. Anthropometric factors related to measurements such as: height, weight, arm length, measurement of sports urgency differ from one branch to another. Furthermore, psychological factors are related to the athlete's mental readiness and ability to train and compete, athlete performance characteristics are related to different personalities or personalities which include attitudes and behavior (Awruk & Janowski, 2016; Bompa O. Tudor, 2019).

The role of psychology as an intermediary between players' physical, technical and tactical abilities (Razali Abdullah et al., 2016; Swann et al., 2017), psychology is one of the keys to successful sports performance because of its influence on athletes' competitive succes (Anderson et al., 2014). In physiological variables

represent between 45 % and 48% of sports performance, and when psychological variables are added, the proportion of variance increases to approximately 79-85% in performance in certain sports (Olmedilla et al., 2019). Then a finswimming athlete who has good mental toughness can show results from better performance during training, competitions, and even in everyday life (Ekmekçi & Miçooğulları, 2019; Sheard & Golby, 2006). Mental toughness can determine how psychologically prepared an athlete is both when training and when competing (Beattie et al., 2017; Liew et al., 2019). If the athlete's psychological condition is good then when they compete they have the opportunity to perform at their best. Mental toughness is a combination of emotions, attitudes, behavior and values that make individuals able to resolve the obstacles and pressures experienced by remaining consistent in maintaining motivation and full concentration so that the goals that have been set can be achieved (Beattie et al., 2019; Gucciardi et al., 2015; Stuart Beattie,. Lew Hardy,. Andrew Cooke, 2020). From this discussion it can be concluded that the effects of athlete psychology have an important role and can improve performance during the training process and facing competitions.

Athletes' physical training is an important part of all sports, especially finswimming or diving, which aims to shape the body's condition as a basis for increasing endurance, speed, fitness and achieving achievements (Oshita et al., 2013). Then the tactics in diving include defense and attack management, where athletes can strategize strength, speed and endurance when competing (Oshita et al., 2013; Sulistiyono et al., 2021). From this discussion, it can be concluded that physical condition and arranging tactics or racing strategies play an important role, as well as finswimming in the bifins relay event which really determines victory, where the coach can set the strategy for the 4 bifins athletes to be placed in the number 1 athlete. up to number 4.

MEMS Sensors Applied in Finswimming Movement Analysis research uses Micro Electro Mechanical System (MEMS) sensors to analyze finswimming actions for 50 meters. The sensors analyze leg acceleration and angular velocity differences between elite and sub-elite athletes. The results are: there are significant differences between the elite athlete group and the sub-elite athlete group; and the elite athlete group was better than the sub-elite athlete group by 20% in movement technique (Lin, 2015). In the study hydrodynamic profile of young swimmers: changes over a competitive season there were twenty-five swimmers (13 men and 12 women) evaluated in (a) October (M1); (b) March (M2); and (c) June (M3). The efficiency of swimming technique consists of speed fluctuations, stroke index, and estimates of entropy or thermodynamic quantities. As a result swimming efficiency increases between M1 and M3. There is a trend for passive and active drag to increase from M1 to M2, but it is lower in M3 than in M1. Therefore, hydrodynamic changes during the season occur in a non-linear fashion, where the interaction between development and training periodization is explained by the unique path chosen by each young swimmer (Barbosa et al., 2015). In the results of the PON Papua diving competition, the Central Java team experienced an increase in performance by winning 1 silver and 3 bronze (PB, 2021), compared to the PON in Bandung in 2016 where the Central Java team did not get a medal and only entered the final (PB, 2016). Central Java diving athletes in individual numbers at PON Papua were able to get good achievements, namely in the 5 point course the men got a silver medal, the women's 100 meter surface got a bronze medal, the women's 50 meter surface got a bronze medal, the men's 50 meter apnea got a bronze medal, but in the team event, namely the women's 4 X 100 meter Bifins relay, they only got 6th place(PB, 2021). In this relay number, each individual has a different style of technique which results in their performance being less effective and lagging far behind other provinces which results in the influence of water waves from their opponents. From this discussion, it can be concluded that each finswimming athlete has a different technical style, some have an effective style and some have an ineffective style. It is important to know the basic techniques of bifins, because by understanding and mastering these techniques, athletes can minimize resistance and produce great power.

The objectives of this study are (1) Personality for Diving Athletes, (2) conduct a survey analysis of the hydrodynamics of bifins motion on athletes diving in the 4 x 100-metre bifins relay using hydrodynamic analysis consisting of a resistance dynamometer and a quality tracking sensor and (3) perform a hydrodynamic correlational analysis of bifins relay speed based on field observations and analysis of documents in the form of pertinent articles.

Materials and Methods

The quantitative descriptive research method was utilised, together with a survey and a correlational approach (Akhiruyanto et al., 2022; Hadi et al., 2022; Simanjuntak et al., 2022). The variables of this study are bi-fins motion techniques (X_1), *Myers-Birggs Type Indicator* (MBTI) (X_2), and best-time bi-fins relay (Y_1). This study included four female bifins relay diving participants from the National Sports Week (PON). A survey was used to obtain information. The tests were carried out at the Agency for the Assessment and Application of Technology's (BPPT) hydrodynamics laboratory or the BRIN hydrodynamics technology centre in Surabaya, Indonesia and *Instrument test of Myers-Birggs Type Indicator*. The following figure shows the pattern of interrelationships between research variables:

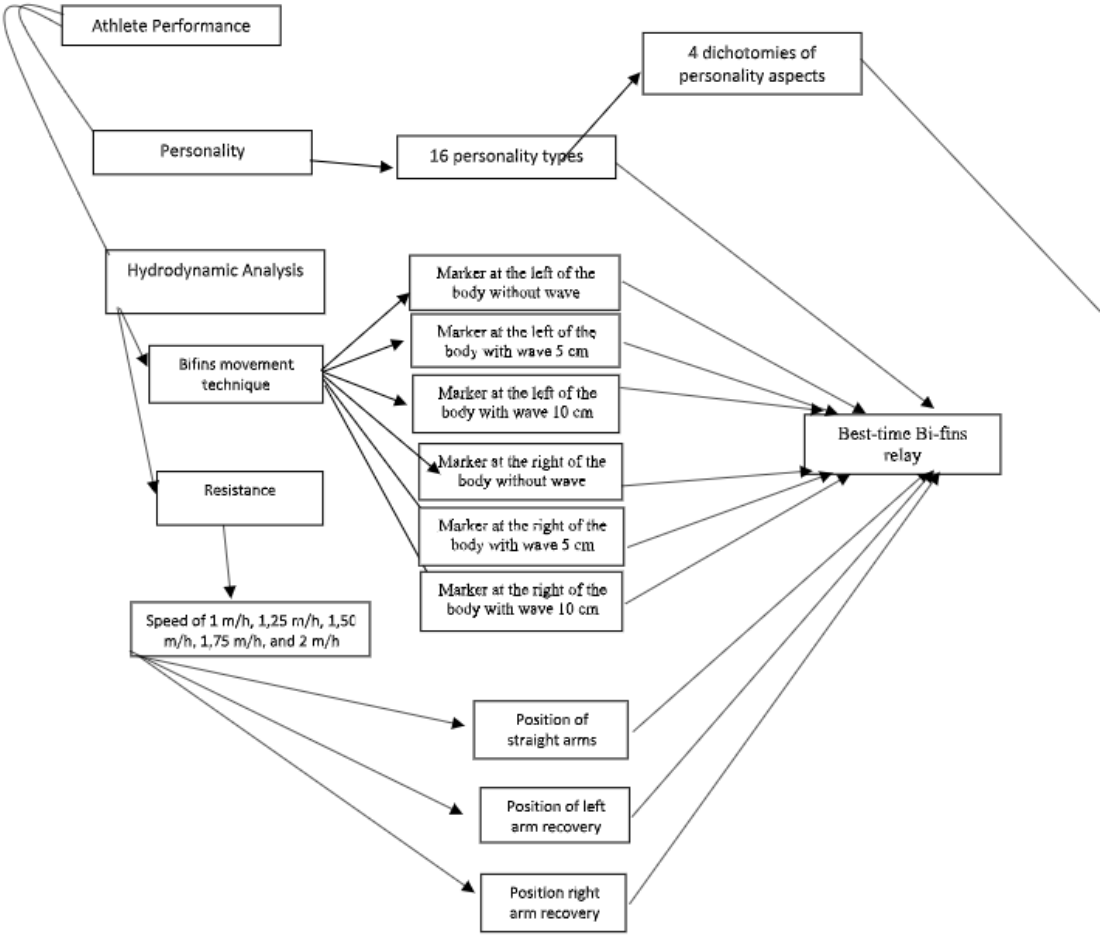


Figure 1. The pattern of interrelationships between variables

Instrument dan Procedure

Myers-Birggs Instrument Type Indicator (MBTI)

The research instrument used the Indonesian version of the Myers Briggs Type Indicator (MBTI), totaling 60 questions. The MBTI consists of 8 different personality type preferences. Preferences are organized into 4 dichotomies with subcategories assessing key aspects of personality, including Extraversion (E) – Introversion (I), Sensing (S) – Intuition (N), Thinking (T) – Feeling (F), Judging (J) – Perceiving (P) And is applied only once, and has a reliability scale of 0.6 to 0.8 (Kusuma et al., 2018).

Procedure The questionnaire is given to athletes within 15-20 minutes and an explanation is given beforehand to fill out the questionnaire. Athletes fill out multiple choice questions; there are no right or wrong answers. The MBTI instrument is not a test. Athletes choose the most suitable answer according to their heart.

Resistance Dynamometer and Qualisys (under-water camera)

All data collection activity was performed at hydrodynamics laboratory of balai teknologi hidrodinamika or Indonesia National Research and Innovation Agency (BRIN) in Surabaya. Hydrodynamics analysis using a resistance dynamometer and qualisys (under-water camera) was set to measure the performance of the swimmer's technique (Hidrodinamika, 2021; Qualisys, 2015). The calibration of qualisys under-water camera can be seen in the table 1.

Table 1. The calibration results of camera

Camera	X (mm)	Y (mm)	Z (mm)	Points	Avg. residual (mm)	Calibration passed
01	-2859.27	4766.74	-13.89	1370	0.72087	Valid
02	368.40	5032.20	-93.18	1376	0.48534	Valid
03	2439.49	4818.11	-61.11	1456	0.60806	valid

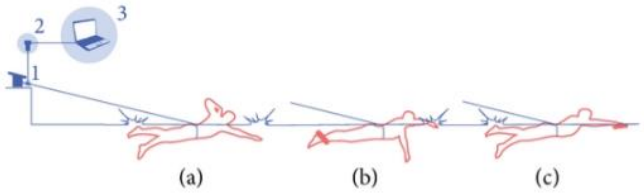
Table 2. The calibration of resistance dynamometer

Push Validation				
Input mass (kg)	Input (N)	Output (N)	Out after zero (N)	Delta (N)
0	0	-6,7	0,0	0,0
5	49	-55,5	-48,8	-0,2
7	68,6	-75,1	-68,4	-0,2
17	166,6	-173,0	-166,2	-0,4
12	117,6	-124,0	-117,3	-0,3
5	49	-55,5	-48,8	-0,2
0	0	-6,7	0,0	0,0
Pull Validation				
0	0	22,6	0,0	0,0
5	49	71,6	49,1	0,1
10	98	120,7	98,2	0,2
15	147	169,8	147,2	0,2
20	196	218,8	196,3	0,3
15	147	169,8	147,3	0,3
10	98	120,8	98,2	0,2
5	49	71,8	49,2	0,2
0	0	22,6	0,1	0,1

The instrument analysis of involves passive and active drag. Bifins technique is related to anthropometry, swimming kinematics, and movement efficiency. Swimmers received three different trials as follows: 1)without wave, 2) water conditions with regular waves and a wave height of 5 cm, and 3) water conditions with regular waves and a wave height of 10 cm.

In arm movements, the bi-finswimming number is the same as the crawl-style swimming movements. Arm movement is divided into several movements, namely entry and alignment (entering the arm), stroke (down and catch sweep, insweep, and upsweep), and recovery (Cohen et al., 2018; Dalamitros et al., 2014). According to sub-arm movements, bottom sweeping and inner sweeping are considered as movements with big force to drove forward (de Medeiros Vidal et al., 2020; Maglischo EW, 2003). Bottom sweeping with elbow degree 90° – 120° (both arms). Inner sweeping with 40^0 – 60^0 (both arms). The limb movement in the bifins number is the same as the crawl-type swimming action; the difference is that the bifins number uses fins (CMAS, 2019). to move both legs upbeats and downbeats alternately, knee flexion then rises to 30^0 – 40^0 (Maglischo EW, 2003; Selim Alili,

2013). The criteria of bifins movement technique can be seen in the table 3 (Cohen et al., 2018; Maglischo EW, 2003; Selim Alili, 2013).



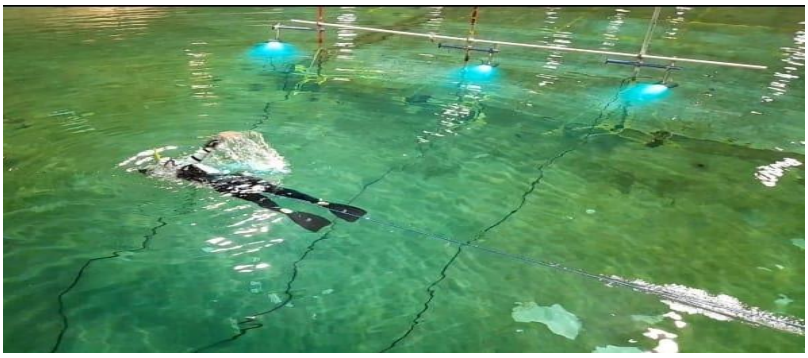


Figure 2 The testing of bifins movement technique with a qualisys under-water camera

Table 3. The criteria of bifins movement technique

Number	Leg-angle	Criteria
1	Under 19^0	No effective
2	20^0 - 29^0	Less effective
3	30^0 - 40^0	Effective
4	41^0 - 50^0	Less effective
5	51^0 - up	No effective

Number	Low-prod-angle	Criteria
1	Under 69^0	No effective
2	70^0 - 89^0	Less effective
3	90^0 - 120^0	Effective
4	121^0 - 140^0	Less effective
5	141^0 - up	No effective

Number	inner-prod-angle	Criteria

1	Under 19^0	No effective
2	20^0 - 39^0	Less effective
3	40^0 - 60^0	Effective
4	61^0 - 80^0	Less effective
5	81^0 - up	No effective

Resistance dynamometer in finswimming must be able to minimize water resistance toward the swimmer's body (Barbosa et al., 2015; Papic et al., 2020). The water stream and the swimmers' body type affect the resistance, and there are three different testing positions: 1) Sliding position of both hands in front, 2) Recovery position of the right arm, and 3) Recovery position of the left arm.

Figure 3. The testing of resistance dynamometer instrument

Results

Results of Completing the Myers-Briggs Type Indicator Questionnaire

The results of the study showed that after filling out the Myers Briggs Type Indicator questionnaire, 4 athletes had the following personality data:

Table 4. MBTI Scale for Diving Athletes number 1

MBTI SCALE					
Number	Dimensions				Status
1	Introvert (I)	60%	40%	(E) Ekstrovert	Ok
2	Sensing (S)	53%	47%	(N) Intuition	Ok
3	Thinking(T)	53%	47%	(F) Feeling	Ok
4	Judging (J)	13%	87%	(P) Perceiving	Ok
Your Personality Type: **ISTP**					

Based on table 4, for diver athlete 1 with the MBTI scale Introvert 60% - Extrovete 40%, Sensing 53% - Intuition 47%, Thinking 53% - Feeling 47%, Judging 13% - Perceiving 87% then you get the ISTP personality type which has the personality type generally very realistic, logical, spontaneous, and focused on the present. People with ISTP personalities also have good problem-solving and crisis-facing abilities. It is not surprising that ISTP individuals are often nicknamed 'The Mechanic' or 'The Craftsman' (Setiyaningrum et al., 2020; Smail, 2017). World swimmers/divers who have MBTI personality with the ISTP type are as follows: Caeleb Remel Dressel is a freestyle and butterfly swimmer from the United States who won 5 gold medals at the 2020 Tokyo Olympics and Mark Andrew Spitz is a national swimmer from America, he won 7 medals gold at the world-record time championship (Https://en.wikipedia.org/wiki, n.d.; PDB_Personality-database, 2021).

Table 5. MBTI Scale for Diving Athletes 2

MBTI SCALE					
Number	Dimensions				Status
1	Introvert (I)	67%	33%	(E) Ekstrovert	Ok
2	Sensing (S)	60%	40%	(N) Intuition	Ok
3	Thinking(T)	53%	47%	(F) Feeling	Ok
4	Judging (J)	60%	40%	(P) Perceiving	Ok
Your Personality Type: **ISTJ**					

Based on table 5, for diver athlete 2 with an MBTI scale of Introvert 67% - Extrovete 33%, Sensing 60% - Intuition 40%, Thinking 53% - Feeling 47%, Judging 60% - Perceiving 40%, the ISTJ personality type usually tends to be quiet and serious, but very persistent, responsible, and reliable. ISTJ individuals generally always want order and regularity in every aspect of their life. Therefore, he was nicknamed 'The Organized Planner' (Al-Dlaigan et al., 2017; Purbowati, 2021). World swimmers/divers who have the MBTI personality with the ISTJ type are as follows: Klete Derik Keller is a 400M freestyle swimmer, 4x200M relay from the United States who won 5 Olympic medals in 2000, 2004 and Quan Hongchan is a national diver from China, he is a 10th individual diver meter platform event earned a gold medal at the summer Olympics (Https://en.wikipedia.org/wiki, n.d.; PDB_Personality-database, 2021).

Table 6. MBTI Scale for Diving Athletes number 3

MBTI SCALE					
Number	Dimensions				Status
1	Introvert (I)	87%	13%	(E) Ekstrovert	Ok
2	Sensing (S)	87%	13%	(N) Intuition	Ok
3	Thinking(T)	40%	60%	(F) Feeling	Ok
4	Judging (J)	80%	20%	(P) Perceiving	Ok
Your Personality Type: **ISFJ**					

Based on table 6, for diver 3 athletes with the MBTI scale: Introvert 87% - Extrovete 13%, Sensing 87% - Intuition 13%, Thinking 40% - Feeling 60%, Judging 80% - Perceiving 20%, then getting the ISFJ personality type is one type. the most common personality. People with the ISFJ personality are usually known as individuals who are full of attention, warmth, and a positive aura that can bring calm to the people around them. This is why ISFJ individuals are nicknamed 'The Protector' (Soleimani et al., 2018). World swimmers/divers who have an MBTI personality with the ISFJ type are as follows: Katie Ledecky is a 400M, 800M and 1500M freestyle swimmer from the United States who won 7 Olympic gold medals and 19 gold medals in world swimming championships and Constance Mabel Jeans is a 4x100 relay swimmer M freestyle won 2 silver medals at the Olympics (Https://en.wikipedia.org/wiki, n.d.; PDB_Personality-database, 2021).

Table 7. MBTI Scale for Diving Athletes 4

MBTI SCALE					
Number	Dimensions				Status
1	Introvert (I)	80%	20%	(E) Ekstrovert	Ok
2	Sensing (S)	67%	33%	(N) Intuition	Ok
3	Thinking(T)	53%	47%	(F) Feeling	Ok
4	Judging (J)	67%	33%	(P) Perceiving	Ok
Your Personality Type: **ISTJ**					

Based on table 7, for diving athlete 4 with the MBTI scale: Introvert 80% - Extrovete 20%, Sensing 67% - Intuition 33%, Thinking 53% - Feeling 47%, Judging 67% - Perceiving 33%, then the ISTJ personality type usually tends to be quiet. and serious, yet very persistent, responsible, and reliable. ISTJ individuals generally

always want order and regularity in every aspect of their life. Therefore, he was nicknamed 'The Organized Planner' (Al-Dlaigan et al., 2017; Purbowati, 2021). World swimmers/divers who have MBTI personalities with the ISTJ type are as follows: David Popovici is a 100M, 200M freestyle swimmer from Romania who won 5 medals at the Junior World Record and World Aquatics Championships. Klete Derik Keller is a 400M freestyle swimmer, 4x200M relay from the United States who won 5 Olympic medals in 2000, 2004 and Quan Hongchan is a national diver from China, he was an individual 10 meter platform event diver who got a gold medal at the Summer Olympics (Https://en.wikipedia.org/wiki, n.d.; PDB_Personality-database, 2021).

The Relationship between the Myers-Briggs Type Indicator (MBTI) of Diving Athletes and the Speed of the Bifins 4 X 100 Meter Relay of Diving Athletes

The results of data processing show the Myers Briggs Type Indicator / MBTI with the speed of the 4 x 100 meter Bifins relay as follows:

Table 8. Myers-Briggs Type Indicator for Bifins Relay Speed

Speed	MBTI Indicator							
	Introvet	Extrovet	Sensing	Intuition	Thinking	Feeling	Judging	Perceiving
r	0,800	-0,800	0,800	-0,800	-0,775	0,775	0,800	-0,800
Sig.	0,200	0,200	0,200	0,200	0,225	0,225	0,200	0,200

Based on table 8, the results of the MBTI test for the introvert indicator with the speed of the 4 x 100 meter Bifins relay can be seen in the table, it has an r value of 0.800 with a significance of 0.200 which shows a value of ≥ 0.05, so it can be concluded that introversion does not have a significant influence on speed.

Based on table 4.17, the results of the MBTI test indicator for extrovert with a relay speed of 4 x 100 meter bifins can be seen in the table as having an r value of -0.800 with a significance of 0.200 which shows a value of ≥ 0.05, so it can be concluded that extrovert does not have a significant influence on speed.

Based on table 4.17, the results of the MBTI indicator sensing test with a relay speed of 4 x 100 meter bifins can be seen in the table, it has an r value of 0.800 with a significance of 0.200 which shows a value of ≥ 0.05, so it can be concluded that sensing does not have a significant effect on speed.

Based on table 4.17, the results of the MBTI indicator intuition test with a 4 x 100 meter bifins relay speed can be seen in the table, it has an r value of -0.800 with a significance of 0.200 which shows a value of ≥ 0.05, so it can be concluded that intuition has no significant influence on speed.

Based on table 4.17, the results of the MBTI thinking indicator test with the speed of the 4 x 100 meter Bifins relay can be seen in the table as having an r value of -0.775 with a significance of 0.225 which shows a value of ≥ 0.05, so it can be concluded that thinking does not have a significant influence on speed.

Based on table 4.17, the results of the MBTI feeling indicator test with the 4 x 100 meter bifins relay speed can be seen in the table, it has an r value of -0.775 with a significance of 0.225 which shows a value of ≥ 0.05. So it can be concluded that feeling does not have a significant influence on speed.

Based on table 4.17, the results of the MBTI indicator judging test with a relay speed of 4 x 100 meter bifins can be seen in the table, it has an r value of 0.800 with a significance of 0.200 which shows a value of ≥ 0.05. So it can be concluded that judging does not have a significant effect on speed.

Based on table 4.17, the results of the MBTI perceiving indicator test with a 4 x 100 meter bifins relay speed can be seen in the table as having an r value of -0.800 with a significance of 0.200 which shows a value of ≥ 0.05. So it can be concluded that perceiving does not have a significant influence on speed.

Results are aiming to explore the correlation between hydrodynamics analysis of bifins with the water without wave, with wave and resistance test

The snippets of some movements to catch the bottom sweeping, inner sweeping, and leg degree can be seen in table 4. Data from one swimmer in three different water conditions (without wave, wave 5 cm, and wave 10 cm).

Table 9. Results of analysis of bi-fins motion techniques on athletes number 1-4

	First bifins athlete						
Number	Wave Conditions	The bottom sweeping (^{0})		Inner sweeping (^{0})		leg degree (^{0})	
		left	Right	left	Right	left	Right
1	Without wave	129 (LE)	159 (IE)	127 (IE)	158 (IE)	40 (E)	53 (IE)
2	Wave 5 cm	134 (LE)	147 (IE)	140 (IE)	154 (IE)	39 (E)	46 (LE)
3	Wave 10 cm	145 (IE)	146 (IE)	154 (IE)	152 (IE)	18 (IE)	44 (LE)
	Second bifins athlete						
Number	Wave Conditions	The bottom sweeping (^{0})		Inner sweeping (^{0})		leg degree (^{0})	
		left	Right	left	Right	left	Right
1	Without wave	147 (IE)	119 (E)	144 (IE)	133 (IE)	29 (LE)	40 (E)
2	Wave 5 cm	148 (IE)	120 (E)	146 (IE)	132 (IE)	29 (LE)	43 (IE)
3	Wave 10 cm	144 (IE)	144 (IE)	142 (IE)	128 (IE)	34 (E)	26 (IE)
	Third bifins athlete						
Number	Wave Conditions	The bottom sweeping (^{0})		Inner sweeping (^{0})		leg degree (^{0})	
		left	Right	left	Right	left	Right
1	Without wave	154 (IE)	159 (IE)	151 (IE)	159 (IE)	31 (E)	35 (E)
2	Wave 5 cm	150 (IE)	155 (IE)	146 (IE)	158 (IE)	28 (LE)	17 (LE)
3	Wave 10 cm	150 (IE)	152 (IE)	147 (IE)	155 (IE)	33 (E)	31 (E)
	Fourth bifins athlete						
Number	Wave Conditions	The bottom sweeping (^{0})		Inner sweeping (^{0})		leg degree (^{0})	
		left	Right	left	Right	left	Right
1	Without wave	105 (E)	107 (E)	105 (IE)	112 (IE)	8,1 (IE)	26 (LE)
2	Wave 5 cm	100 (E)	112 (E)	95 (IE)	117 (IE)	9,3 (IE)	24 (LE)
3	Wave 10 cm	103 (E)	109 (E)	94 (IE)	119 (IE)	7,3 (IE)	18 (IE)

Interpretation of results First bifins athlete

Based on the table 4 above, the results of bifins analysis test with a marker at the left of the body are as follows: Without wave: a) the bottom sweeping degree is 129º which is considered less effective, b) the inner sweeping degree is 127º which is included in the ineffective category, and c) the leg degree is 40º (effective). Wave 5 cm are: a) the bottom sweeping degree is 134º which is considered ineffective, b) the inner sweeping degree is 140º which is included in the ineffective category, and c) the leg degree is 39º (effective). Wave 10 cm are: a) the bottom sweeping degree is 145º which is considered ineffective, b) the inner sweeping degree is 154º which is included in the ineffective category, and c) the leg degree is 18º (ineffective).

The results of bifins analysis test with a marker at the right of the body are as follows: Without wave: a) the bottom sweeping degree is 159º which is considered ineffective, b) the inner sweeping degree is 158º which is included in the ineffective category, and c) the leg degree is 53º (ineffective). Wave 5 cm are: a) the bottom sweeping degree is 147º which is considered ineffective, b) the inner sweeping degree is 154º which is included in the ineffective category, and c) the leg degree is 46º (less effective). Wave 10 cm: a) the bottom sweeping degree is 146º which is considered ineffective, b) the inner sweeping degree is 152º which is included in the ineffective category, and c) the leg degree is 44º (less effective).

Interpretation of results Second bifins athlete

The results of bifins analysis test with a marker at the left of the body are as follows: Without wave: a) the bottom sweeping degree is 147º which is considered ineffective, b) the inner sweeping degree is 144º which is

included in the ineffective category, and c) the leg degree is 29º (less effective). Wave 5 cm are: a) the bottom sweeping degree is 148º which is considered ineffective, b) the inner sweeping degree is 146º which is included in the ineffective category, and c) the leg degree is 29º (less effective). Wave 10 cm are: a) the bottom sweeping degree is 144º which is considered ineffective, b) the inner sweeping degree is 142º which is included in the ineffective category, and c) the leg degree is 34º (effective).

The results of bifins analysis test with a marker at the right of the body are as follows: Without wave: a) the bottom sweeping degree is 119º which is considered effective, b) the inner sweeping degree is 132º which is included in the ineffective category, and c) the leg degree is 40º (effective). Wave 5 cm are: a) the bottom sweeping degree is 120º which is considered effective, b) the inner sweeping degree is 133º which is included in the ineffective category, and c) the leg degree is 43º (less effective). Wave 10 cm: a) the bottom sweeping degree is 144º which is considered effective, b) the inner sweeping degree is 128º which is included in the ineffective category, and c) the leg degree is 26º (less effective).

Interpretation of results Third bifins athlete

The results of bifins analysis test with a marker at the left of the body are as follows: without wave: a) the bottom sweeping degree is 154º which is considered ineffective, b) the inner sweeping degree is 151º which is included in the ineffective category, and c) the leg degree is 31º (effective). Wave 5 cm are: a) the bottom sweeping degree is 150º which is considered ineffective, b) the inner sweeping degree is 146º which is included in the ineffective category, and c) the leg degree is 28º (less effective). Wave 10 cm are: a) the bottom sweeping degree is 150º which is considered ineffective, b) the inner sweeping degree is 147º which is included in the ineffective category, and c) the leg degree is 33º (effective).

The results of bifins analysis test with a marker at the right of the body are as follows: without wave: a) the bottom sweeping degree is 159º which is considered ineffective, b) the inner sweeping degree is 159º which is included in the ineffective category, and c) the leg degree is 35º (effective). Wave 5 cm are: a) the bottom sweeping degree is 155º which is considered ineffective, b) the inner sweeping degree is 158º which is included in the ineffective category, and c) the leg degree is 17º (ineffective). Wave 10 cm: a) the bottom sweeping degree is 152º which is considered ineffective, b) the inner sweeping degree is 155º which is included in the ineffective category, and c) the leg degree is 31º (effective).

Interpretation of Fourth bifins athlete

The results of bifins analysis test with a marker at the left of the body are as follows. Without wave: a) the bottom sweeping degree is 105º which is considered effective, b) the inner sweeping degree is 105º which is included in the ineffective category, and c) the leg degree is 8,1º (ineffective). Wave 5 cm are: a) the bottom sweeping degree is 100º which is considered effective, b) the inner sweeping degree is 95º which is included in the ineffective category, and c) the leg degree is 9,3º (ineffective). Wave 10 cm are: a) the bottom sweeping degree is 103º which is considered effective, b) the inner sweeping degree is 94º which is included in the ineffective category, and c) the leg degree is 7,3º (ineffective).

The results of bifins analysis test with a marker at the right of the body are as follows: Without wave: a) the bottom sweeping degree is 107º which is considered effective, b) the inner sweeping degree is 112º which is included in the ineffective category, and c) the leg degree is 26º (less effective). Wave 5 cm are: a) the bottom sweeping degree is 112º which is considered effective, b) the inner sweeping degree is 117º which is included in the ineffective category, and c) the leg degree is 24º (less effective). Wave 10 cm: a) the bottom sweeping degree is 109º which is considered effective, b) the inner sweeping degree is 119º which is included in the ineffective category, and c) the leg degree is 18º (less effective).

Results of resistance testing on bi-finswimming relay athletes

Table 10. The following are the findings of a resistance testing analysis in bifins relay athletes:

	No	Speed	Position "A" both hands straight (Final Force)	Position "B" Left-hand recovery (Final Force)	Position "C" Right-hand recovery (Final Force)
First bifins athlete	1	1,00	2,916	5,009	5,068
	2	1,25	4,752	6,159	5,928
	3	1,50	6,863	7,934	8,228
	4	1,75	9,350	11,367	10,067
	5	2,00	13,203	16,298	15,265
Second bifins athlete	1	1,00	3,101	3,679	3,691
	2	1,25	4,441	4,854	5,260
	3	1,50	5,213	5,619	6,888
	4	1,75	6,166	7,188	9,083
	5	2,00	9,463	10,747	11,753
Third bifins athlete	1	1,00	2,637	3,960	3,649
	2	1,25	3,501	5,287	4,717
	3	1,50	4,927	6,498	6,262
	4	1,75	7,193	8,531	8,427
	5	2,00	9,135	11,452	11,274
Fourth bifins athlete	1	1,00	2,615	3,795	3,498
	2	1,25	3,470	4,925	4,495
	3	1,50	4,370	5,476	5,353
	4	1,75	5,671	7,114	7,376
	5	2,00	8,139	10,291	10,846

Interpretation of results First bifins athlete

According to the table above The results of resistance dynamometer with A position (straight arms) with differences in speed are: 1) 1 m/h produces resistance force 2,916 kg, 2) 1,25 m/h produces resistance force 4,752 kg, 3) 1,50 m/h produces resistance force 6,863 kg, 4) 1,75 m/h produces resistance force 9,350 kg, and 5) 2 m/h produces resistance force 13,203 kg. The results of resistance dynamometer with B position (left arm recovery) with differences in speed are: 1) 1 m/h produces resistance force 5,009 kg, 2) 1,25 m/h produces resistance force 6,159 kg, 3) 1,50 m/h produces resistance force 7,934 kg, 4) 1,75 m/h produces resistance force 11,367 kg, and 5) 2 m/h produces resistance force 16,298 kg. The results of resistance dynamometer with C position (left arm recovery) with differences in speed are: 1) 1 m/h produces resistance force 5,068 kg, 2) 1,25 m/h produces resistance force 5,928 kg, 3) 1,50 m/h produces resistance force 8,228 kg, 4) 1,75 m/h produces resistance force 10,067 kg, and 5) 2 m/h produces resistance force 15,265 kg.

Interpretation of results Second bifins athlete

The results of resistance dynamometer with A position (straight arms) with differences in speed are: 1) 1 m/h produces resistance force 3,101 kg, 2) 1,25 m/h produces resistance force 4,441 kg, 3) 1,50 m/h produces resistance force 5,213 kg, 4) 1,75 m/h produces resistance force 6,166 kg, and 5) 2 m/h produces resistance force 9,463 kg. The results of resistance dynamometer with B position (left arm recovery) with differences in speed are: 1) 1 m/h produces resistance force 3,679 kg, 2) 1,25 m/h produces resistance force 4,854 kg, 3) 1,50 m/h produces resistance force 5,619 kg, 4) 1,75 m/h produces resistance force 7,188 kg, and 5) 2 m/h produces resistance force 10,747 kg. The results of resistance dynamometer with C position (left arm recovery) with differences in speed are: 1) 1 m/h produces resistance force 3,691 kg, 2) 1,25 m/h produces resistance force

5,260 kg, 3) 1,50 m/h produces resistance force 6,888 kg, 4) 1,75 m/h produces resistance force 9,083 kg, and 5) 2 m/h produces resistance force 11,753 kg.

Interpretation of results Third bifins athlete

Based on the table above, the results of resistance dynamometer with A position (straight arms) with differences in speed are: 1) 1 m/h produces resistance force 2,637 kg, 2) 1,25 m/h produces resistance force 3,501 kg, 3) 1,50 m/h produces resistance force 4,927 kg, 4) 1,75 m/h produces resistance force 7,193 kg, and 5) 2 m/h produces resistance force 9,135 kg. The results of resistance dynamometer with B position (left arm recovery) with differences in speed are: 1) 1 m/h produces resistance force 3,960 kg, 2) 1,25 m/h produces resistance force 5,287 kg, 3) 1,50 m/h produces resistance force 6,498 kg, 4) 1,75 m/h produces resistance force 8,531 kg, and 5) 2 m/h produces resistance force 11,542 kg. The results of resistance dynamometer with C position (left arm recovery) with differences in speed are: 1) 1 m/h produces resistance force 3,649 kg, 2) 1,25 m/h produces resistance force 4,717 kg, 3) 1,50 m/h produces resistance force 6,262 kg, 4) 1,75 m/h produces resistance force 8,427 kg, and 5) 2 m/h produces resistance force 11,274 kg.

Interpretation of results Fourth bifins athlete

Based on the table above, The results of resistance dynamometer with A position (straight arms) with differences in speed are: 1) 1 m/h produces resistance force 2,615 kg, 2) 1,25 m/h produces resistance force 3,470 kg, 3) 1,50 m/h produces resistance force 4,370 kg, 4) 1,75 m/h produces resistance force 5,671 kg, and 5) 2 m/h produces resistance force 8,139 kg. The results of resistance dynamometer with B position (left arm recovery) with differences in speed are: 1) 1 m/h produces resistance force 3,795 kg, 2) 1,25 m/h produces resistance force 4,925 kg, 3) 1,50 m/h produces resistance force 5,476 kg, 4) 1,75 m/h produces resistance force 7,114 kg, and 5) 2 m/h produces resistance force 10,291 kg. The results of resistance dynamometer with C position (left arm recovery) with differences in speed are: 1) 1 m/h produces resistance force 3,498 kg, 2) 1,25 m/h produces resistance force 4,495 kg, 3) 1,50 m/h produces resistance force 5,353 kg, 4) 1,75 m/h produces resistance force 7,376 kg, and 5) 2 m/h produces resistance force 10,846 kg.

Discussion

Discussion of the Relationship between the Myers-Briggs Type Indicator (MBTI) of Diving Athletes and the Speed of the 4 X 100 Meter Bifins Relay

The opinion of some psychologists is that personality influences athlete performance (Hughes et al., 2003; Lesyk & Kornspan, 2000). Athletes' performance can also be predicted based on certain personality traits (Hughes et al., 2003). Meanwhile, others argue that personality factors do not significantly influence athlete performance. Various studies have recently been conducted (Dohme, L, Piggott, Backhouse, Morgan, 2019; Jackson et al., 2001). Sports performance has an insignificant correlation with MBTI. Psychological factors in anxiety tend to influence athletes' performance (Yang, 2004). Athlete performance must understand situations under pressure and athletes must be able to reduce these situations well (Laborde et al., 2014). Competitions with speed, socio-economic status, characteristics or personality of athletes are not significant factors in determining sports performance (Gross, 1998). Based on table 8, the results of the MBTI test indicators for introvert, extrovert, Sensing, Intuition, Thinking, Feeling, Judging, Perceiving on the speed of the bifins relay, it is concluded that it does not have a significant influence on speed. Researchers' observations of athletes have proven that each athlete has different personality traits. The personality traits of each athlete cannot be related to speed, because speed is related to physical and movement techniques. In statistical calculations related to the MBTI indicator, if it is connected to the bifins relay speed, there is no significant effect, due to the small number of research samples. A sample size that is too small greatly influences insignificant data results (Sullivan & Feinn, 2012).

Discussion of Hydrodynamic Analysis of Bifins Relay Speed

Based on the previous study of adolescent finswimmers, from two different intensity treatments both could affect early myocardial adaptations ($P < .05$), this phenomenon marked by the increase myo-cardiac mass of left ventricle (101,34 ± 23,65), concentric and eccentric hypertrophy. This might be caused by different training

protocol and training mode (Stavrou et al., 2018). Another previous study, applying Micro Electro Mechanical Systems (MEMS) in finswimming movement analysis as the sensory instrument to analyze the finswimming movement for 50 m stated that there are significant differences in elite compared to sub-elite, and the elites are better in movement techniques (20%) form the sub-elite. The study analysed the leg acceleration and the difference in speed-angle (Lin, 2015). Furthermore, a study performed by Basbosa stated that changes in hydrodynamic during the season occurred by non-linear mode way, there is an interaction between the development and training periodization which is become the personal choices of each young swimmer. Hence, the swimming technique efficiency consisted of speed fluctuation, stroke index, and entropy estimation or thermodynamic quantity (Barbosa et al., 2015). There are many factors that could affect the capability of swimmers such as the swimming technique and the equipment (Steinberg et al., 2011).

From the results of the hydrodynamic analysis test on first bifins athlete at the bottom sweeping angle only had 2 less effective criteria and 4 ineffective criteria. The results showed that the left arm technique at the bottom sweeping angle with conditions without waves, with waves with less criteria effective which results in a less than optimal thrust and has an impact on the diver's forward pace which is less effective. In the 10cm wave, the angle is too high which results in ineffective propulsion due to the influence of the 10cm wave resulting in an unstable diver's technique. Furthermore, in the right arm technique at the downward sweep angle with no waves, the 5 cm wave and 10 cm wave are ineffective criteria which result in the diver's speed boost being ineffective. In the deep sweep angle in the position of the left arm, and right arm, conditions without waves and waves are ineffective criteria that affect the forward speed very ineffective. Where the sweep angle is too high it has an impact on the movement speed which is not effective. Then the left leg angle has an effective criterion of 2 in conditions without waves and 5 cm waves. From these results, the left leg technique already has a good kick and has an impact on an effective forward thrust. But in the 10 cm wave with ineffective criteria, from these results, the left leg technique has an ineffective prod and has an impact on ineffective forward thrust because in 10 cm wave conditions the leg technique cannot maintain its technique. At the right leg angle, criteria 1 is ineffective in conditions without waves, and 2 criteria are less effective in waves of 5 cm, and in waves of 10 cm. from these results the right leg with a position without having a prod and forward speed is not effective. In conditions with waves, the legs have less effective propulsion and propulsion which results in a less-than-optimal diver's speed.

The results of the hydrodynamic analysis test on second bifins athlete at the downward sweep angle only had 2 effective criteria and 4 ineffective criteria. resulting in a push that is not optimal and has an impact on the diver's forward pace which is not effective. Furthermore, in the right arm technique, the downward sweep angle with no waves and 5 cm waves is an effective criterion that results in maximum thrust and has an impact on the effective diver's speed. However, for waves with a height of 10 cm, the criteria are not effective, which results in the detection rate not being maximized. Why is the angle 144° because the effect of a 10 cm high wave greatly affects the swimmer's body and the diver's movement technique? On the inside sweep angle of both the left and right arms, conditions without waves and waves are ineffective criteria that affect the forward speed very ineffective. Where the inside sweep angle is a continuation of the bottom sweep, which has an impact on the movement speed which is not effective. Then the left leg angle has criterion 2 which is less effective in conditions without waves and 5 cm waves, in 10 cm waves with effective criteria. From these results, the left leg technique already has a good whip and has an impact on good forward thrust, because in 10cm wave conditions the leg technique can get the criteria for being effective. At the right leg angle, criteria 1 is effective in conditions without waves, and 2 criteria are less effective in waves of 5 cm, and in waves of 10 cm. from these results the right leg has a whip and the forward thrust is less effective

The results of the hydrodynamic analysis test on third bifins athlete at the downward sweep angle have criteria in all conditions without waves and with waves having the criteria of ineffective. These results show that the left arm technique at the downward sweep angle has an angle that is too high which results in not optimal thrust and has an impact on the diver's forward speed which is not effective. Furthermore, the right arm technique at the downward sweep angle also has an ineffective criterion which results in not maximal thrust and has an impact on the diver's ineffective speed. The swimmer in the downward sweep technique has a technical resistance that is not effective when influenced by wave conditions. At the deep sweep angle in the position of the left arm, and

right arm, conditions without waves and waves are ineffective criteria that affect the forward speed to be ineffective. Where the inside sweep angle is a continuation of the bottom sweep, which has an impact on the less effective movement speed. Then the left leg angle has an effective criterion in conditions without waves, a 5 cm wave has the criterion of less effective and a 10 cm wave has an effective criterion. From these results, the left leg technique already has a good whip and has an impact on effective forward thrust because in all wavy and non-wave conditions the angle of the leg technique is good. The right leg angle has the criteria for being effective in conditions without waves and 10 cm waves which have an impact on effective forward thrust because in all wave and non-wave conditions the angle leg technique is good. but in waves of 5 cm, the criteria are not effective. from these results, the right leg technique has effective propulsion and forward acceleration, but in the 5cm wave condition the angle is too small

The results of the hydrodynamic analysis test on fourth bifins athlete at the bottom sweeping angle have criteria in all wave conditions with an effective criterion of 6. The results show that the left arm technique at the bottom sweeping angle with conditions without waves, with waves with effective criteria which results in maximum boost and impact on the diver's forward rate, is very effective. Furthermore, the right arm technique at a downward sweep angle with no waves, 5 cm waves, and 10 cm waves are effective criteria that result in maximum thrust and have an impact on the diver's speed very effectively. The swimmer named Ashifa in the downward sweep technique has good resistance even though it is influenced by waves. At the angle of sweep in Bifins Relay swimmer number 4 in the position of the left arm, and right arm, conditions without waves and waves are ineffective criteria which affect the forward pace to be less effective. Where the inside sweep angle is a continuation of the bottom sweep, which has an impact on the less effective movement speed. Then the left leg angle has ineffective criteria in conditions without waves, waves of 5 cm, and waves of 10 cm. From these results, the left leg technique does not have good propulsion and the impact on forward thrust is not effective because in all wavy and non-wave conditions the angle of the leg technique is too small. The right leg angle has less effective criteria in conditions without waves and 5 cm waves which have an impact on the forward thrust which is less effective because in all wave and non-wave conditions the leg angle technique is small. Likewise, for waves of 10 cm, the criteria are not effective. from these results, the right leg has a protrusion and the forward thrust is ineffective because the angle is too small.

The results of the resistance test of bifins athlete 4 in position "A" with both arms straight, Position “B” with left arm recovery, Position “C” with right arm recovery using 5 different speeds, for more details see the table for position "A" with both arms straight as follows:

Table 11. The Resistance Test

Name	Height	Weight	Speed	Resistance Strength
The first bifins athlete	162 cm	67 kg	1 – 2 m/h	4,752 – 13,203 kg
The second bifins athlete	156 cm	55 kg	1 – 2 m/h	3,101 – 9,463 kg
The third bifins athlete	168 cm	57 kg	1 – 2 m/h	2,637 – 9,135 kg
The fourth bifins athlete	157 cm	46 kg	1 – 2 m/h	2,615 – 8,139 kg

Name	Height	Weight	Speed	Resistance Strength
The first bifins athlete	162 cm	67 kg	1 – 2 m/h	5,009 – 16,298 kg
The second bifins athlete	156 cm	55 kg	1 – 2 m/h	3,679 – 10,747 kg
The third bifins athlete	168 cm	57 kg	1 – 2 m/h	3,960 – 11,452 kg
The fourth bifins athlete	157 cm	46 kg	1 – 2 m/h	3,795 – 10,291 kg

Name	Height	Weight	Speed	Resistance Strength
The first bifins athlete	162 cm	67 kg	1 – 2 m/h	5,068 – 15,265 kg
The second bifins athlete	156 cm	55 kg	1 – 2 m/h	3,691 – 11,753 kg
The third bifins athlete	168 cm	57 kg	1 – 2 m/h	3,649 – 11,274 kg
The fourth bifins athlete	157 cm	46 kg	1 – 2 m/h	3,498 – 10,846 kg

The results of the resistance test regarding the endurance strength of bifins athletes with an assessment of the resistance strength value are smaller than the swimmer has effective water resistance, conversely, if the bifins athletes has a greater water resistance values then he has ineffective water resistance. The smaller the value of the resistance strength, the swimmer can make the forward movement of the bifins number finswimming effectively. The table shows that The fourth bifins athlete has the least resistance compared to the other swimmer.

From this discussion it was concluded that each finswimming swimmer has a different style of technique, some have an effective style and some have an ineffective style (Barbosa et al., 2013; Kunitson & Port, 2017; Stavrou et al., 2018). The basic technique of finswimming is important to understand because by understanding and mastering this technique, swimmer can minimize obstacles and can generate great power (Cohen et al., 2018; Nicolas & Bideau, 2009).

Reference

[1] Akhiruyanto, A., Hidayah, T., Amali, Z., Yudhistira, D., & Siwi, A. B. (2022). *Evaluation on the Physical Condition of Football Extracurricular Participants before and during the COVID-19 Pandemic*. *10*(2), 303–308. https://doi.org/10.13189/saj.2022.100221

[2] Al-Dlaigan, Y. H., Alahmari, A. S., Almubarak, S. H., Alateeq, S. A., & Anil, S. (2017). Study on personality types of dentists in different disciplines of dentistry. *Journal of Contemporary Dental Practice*, *18*(7), 554–558. https://doi.org/10.5005/jp-journals-10024-2083

[3] Anderson, R., Hanrahan, S. J., & Mallett, C. J. (2014). Investigating the Optimal Psychological State for Peak Performance in Australian Elite Athletes. *Journal of Applied Sport Psychology*, *26*(3), 318–333. https://doi.org/10.1080/10413200.2014.885915

[4] Awruk, K., & Janowski, K. (2016). Motivation for physical activity and mental health indicators in Male Gym Attendees. *Physical Culture and Sport, Studies and Research*, *69*(1), 65–73. https://doi.org/10.1515/pcssr-2016-0003

[5] Barbosa, T. M., Costa, M. J., Morais, J. E., Morouço, P., Moreira, M., Garrido, N. D., Marinho, D. A., & Silva, A. J. (2013). Characterization of speed fluctuation and drag force in young swimmers: A gender comparison. *Human Movement Science*, *32*(6), 1214–1225. https://doi.org/10.1016/j.humov.2012.07.009

[6] Barbosa, T. M., Morais, J. E., Marques, M. C., Silva, A. J., Marinho, D. A., & Kee, Y. H. (2015). Hydrodynamic profile of young swimmers: Changes over a competitive season. *Scandinavian Journal of Medicine and Science in Sports*, *25*(2), e184–e196. https://doi.org/10.1111/sms.12281

[7] Beattie, S., Alqallaf, A., & Hardy, L. (2017). The effects of punishment and reward sensitivities on Mental toughness and performance in swimming. *International Journal of Sport Psychology*, *48*(3), 246–261. https://doi.org/10.7352/IJSP.2017.48.246

[8] Beattie, S., Alqallaf, A., Hardy, L., & Ntoumanis, N. (2019). The mediating role of training behaviors on self-reported mental toughness and mentally tough behavior in swimming. *Sport, Exercise, and Performance Psychology*, *8*(2), 179–191. https://doi.org/10.1037/spy0000146

[9] Bompa O. Tudor, B. A. C. (2019). *Periodization theory and methodology of training*. Human Kinetics, Inc.

[10] Bompa, T., & Buzzichelli, C. (2021). *Periodization of Strength Training for Sports. Human Kinetics. Fourth edition.* Human Kinetics.

[11] CMAS. (2019). *CMAS RULES CMAS Finswimming Rules Version 2019 / 01 Index*. *01*, 3.

[12] Cohen, R. C. Z., Cleary, P. W., Mason, B. R., & Pease, D. L. (2018). Forces during front crawl swimming at different stroke rates. *Sports Engineering*, *21*(1), 63–73. https://doi.org/10.1007/s12283-017-0246-x

[13] Dalamitros, A. A., Manou, V., & Pelarigo, J. G. (2014). Laboratory-based tests for swimmers: Methodology, reliability, considerations and relationship with front-crawl performance. *Journal of Human Sport and Exercise*, *9*(1), 172–187. https://doi.org/10.4100/jhse.2014.91.17

[14] de Medeiros Vidal, J., Tucher, G., Nogueira, L., Novaes, R. C., de Souza Vale, R. G., de Castro, M. O. R., da Silva Medeiros, N. G., & de Cassio Costa Telles, S. (2020). Crawl technique observation sheet for beginning swimmers: An evaluation proposal for swimming teachers. *Motriz. Revista de Educacao Fisica*, *27*, 1–6. https://doi.org/10.1590/S1980-65742021016920

[15] Dohme, L, Piggott, Backhouse, Morgan, G. (2019). *Psychological Skills and Characteristics Facilitative of Youth Athletes' Development: A Systematic Review*. *33*, 261–275.

[16] Ekmekçi, R., & Miçooğulları, B. O. (2019). *Developing Mental Toughness with Mental Training and Meditation*. 2018–2020. https://doi.org/10.17758/eirai7.dir1019410

[17] Gross, D. J. (1998). *PREDICTORS OF NFL FOOTBALL PLAYER SUCCESS IMPLICATIONS FOR STUDENT-ATHLETES*. UNIVERSITY OF SOUTHERN CALIFORNIA.

[18] Gucciardi, D. F., Hanton, S., Gordon, S., Mallett, C. J., & Temby, P. (2015). The Concept of Mental Toughness: Tests of Dimensionality, Nomological Network, and Traitness. *Journal of Personality*, *83*(1), 26–44. https://doi.org/10.1111/jopy.12079

[19] Hadi, Yudhistira, D., Romadhoni, S., & Kurnianto, H. (2022). Analysis of Agility, Strength and Power Differences in Basketball Players in Relation to Age. *International Journal of Human Movement and Sports Sciences*, *10*(4), 748–753. https://doi.org/10.13189/saj.2022.100415

[20] Hidrodinamika, B. T. (2021). *BPPT HIDRODINAMIKA SURABAYA.pdf*.

[21] Https://en.wikipedia.org/wiki. (n.d.). swimming career. In *https://en.wikipedia.org/wiki/Katie_Ledecky#Swimming_career*.

[22] Hughes, S. L., Case, H. S., Stuempfle, K. J., & Evans, D. S. (2003). Personality Profiles of Iditasport Ultra-Marathon Participants. *Journal of Applied Sport Psychology*, *15*(3), 256–261. https://doi.org/10.1080/10413200305385

[23] Jackson, S. A., Thomas, P. R., Marsh, H. W., & Smethurst, C. J. (2001). Relationships between Flow, Self-Concept, Psychological Skills, and Performance. *Journal of Applied Sport Psychology*, *13*(2), 129–153. https://doi.org/10.1080/104132001753149865

[24] Kunitson, V., & Port, K. (2017). Analysis of swimming technique among elite finswimmers. *Journal of Human Sport and Exercise*, *12*(Proc3), 831–836. https://doi.org/10.14198/JHSE.2017.12.PROC3.07

[25] Kusuma, D. W. Y., Raharjo, H. P., & Mugiyo, H. (2018). *Personality Profiles Using Mbti Test For Sport Talent Identification For Students*. *12*(Isphe), 168–171. https://doi.org/10.2991/isphe-18.2018.39

[26] Laborde, S., Lautenbach, F., Allen, M. S., Herbert, C., & Achtzehn, S. (2014). The role of trait emotional intelligence in emotion regulation and performance under pressure. *Personality and Individual Differences*, *57*, 43–47. https://doi.org/10.1016/j.paid.2013.09.013

[27] Lesyk, J. J., & Kornspan, A. S. (2000). Coaches' expectations and beliefs regarding benefits of youth sport participation. *Perceptual and Motor Skills*, *90*(2), 399–402. https://doi.org/10.2466/pms.2000.90.2.399

[28] Liew, G. C., Kuan, G., Chin, N. S., & Hashim, H. A. (2019). Mental toughness in sport: Systematic review and future. *German Journal of Exercise and Sport Research*, *49*(4), 381–394. https://doi.org/10.1007/s12662-019-00603-3

[29] Lin, C. (2015). *MEMS Sensors Applied in Finswimming Movement Analysis*. *2*(1).

[30] Maglischo EW. (2003). *Swimming Fastest: The essential reference in technique, training, and program designs* (p. 780). Human Kinetics. https://books.google.co.id/books/content?id=cSSW4RhZOiwC&pg=PA1&img=1&zoom=3&hl=en&ots=qnpB7yS-81&sig=ACfU3U3qkgkNUpOlL-HlHx1lZx8YUpR4IQ&w=1280

[31] Nicolas, G., & Bideau, B. (2009). A kinematic and dynamic comparison of surface and underwater displacement in high level monofin swimming. *Human Movement Science*, *28*(4), 480–493. https://doi.org/10.1016/j.humov.2009.02.004

[32] Olmedilla, A., Ruiz-Barquín, R., Ponseti, F. J., Robles-Palazón, F. J., & García-Mas, A. (2019). Competitive psychological disposition and perception of performance in young female soccer players. *Frontiers in Psychology*, *10*(MAY), 1–9. https://doi.org/10.3389/fpsyg.2019.01168

[33] Oshita, K., Ross, M., Koizumi, K., Tsuno, T., & Yano, S. (2013). Gender difference of aerobic contribution to surface performances in finswimming: Analysis using the critical velocity method. *Asian Journal of Sports Medicine*, *4*(4), 256–262. https://doi.org/10.5812/asjsm.34244

[34] Papic, C., McCabe, C., Gonjo, T., & Sanders, R. (2020). Effect of torso morphology on maximum hydrodynamic resistance in front crawl swimming. *Sports Biomechanics*, *00*(00), 1–15. https://doi.org/10.1080/14763141.2020.1773915

[35] PB, P. (2016). *LAPORAN HASIL SELAM PON BANDUNG 2016.pdf* (p. 3). Panitia Selam PON Bandung.
[36] PB, P. (2021). *LAPORAN BUKU HASIL PERLOMBAAN NOMOR KOLAM DAN LAUT PON 2021 new.pdf*. Panitia Selam PON Papua.
[37] PDB_Personality-database. (2021). *https://www.personality-database.com/profile?pid=1&cid=5&sub_cat_id=440*.
[38] Purbowati, D. (2021). Tes MBTI : 16 Tipe Kepribadian, Klasifikasi dan Penjelasannya. In *Aku Pintar*.
[39] Qualisys. (2015). *Oqus Underwater - Motion capture camera for advanced underwater measurements*. 5–8. internal-pdf://121.149.11.16/PI_Oqus_Underwater_20151124.pdf LB - Qualisys%0Ahttp://www.qualisys.com/cameras/oqus-underwater/
[40] Selim Alili. (2013). TECHNIQUE AND METHODOLOGY OF TRAINING IN SWIMMING CRAWL. *CRNOGORSKA SPORTSKA AKADEMIJA, „Sport Mont“*, 380–388.
[41] Sheard, M., & Golby, J. (2006). PST Program in Swimming EFFECT OF A PSYCHOLOGICAL SKILLS TRAINING PROGRAM ON SWIMMING PERFORMANCE AND POSITIVE PSYCHOLOGICAL DEVELOPMENT determinants of swimming faster. Yet despite evidence of the benefits of mental skills training on sport performance. *PST Program in Swimming*, *2*, 7–24. https://s3.amazonaws.com/academia.edu.documents/33129542/Effect_of_a_psychological_skills_training_program_on_swimming_performance_and_positive_psychological_development.pdf?AWSAccessKeyId=AKIAIWOWYYGZ2Y53UL3A&Expires=1547606276&Signature=WkaOB5XYRLZD%2BW
[42] Simanjuntak, V., Rahayu, T., & Yudhistira, D. (2022). *Analysis of Body Mass Index and Physical Condition of Martial Athletes in West Kalimantan Province : Study towards PON 2021*. *10*(4), 768–774. https://doi.org/10.13189/saj.2022.100417
[43] Soleimani, N., Nagahi, M., Nagahisarchoghaei, M., & Jaradat, R. (2018). The Relationship between Personality Types and the Cognitive - Metacognitive Strategies. *Journal of Studies in Education*, *8*(2), 29. https://doi.org/10.5296/jse.v8i2.12767
[44] Stavrou, V., Tsarouhas, K., Karetsi, E., Michos, P., Daniil, Z., & Gourgoulianis, K. I. (2018). Adolescent finswimmers: Early myocardial adaptations in different swimming styles. *Sports*, *6*(3), 1–9. https://doi.org/10.3390/sports6030078
[45] Steinberg, F., Dräger, T., Steegmanns, A., Dalecki, M., Röschmann, M., & Hoffmann, U. (2011). Title: Fit2dive-A field test for assessing the specific capability of underwater fin swimming with SCUBA. *International Journal of Performance Analysis in Sport*, *11*(1), 197–208. https://doi.org/10.1080/24748668.2011.11868540
[46] Stuart Beattie,. Lew Hardy,. Andrew Cooke, and D. G. et al. (2020). *Mental Toughness Training*. 255–270.
[47] Sulistiyono, Andry, A., Nawan, P., Fatkurahman, A., Nurhadi, S., & Dewangga, Y. (2021). Effect of 10 weeks game experience learning (GEL) based training on teamwork, respect attitude, skill and physical ability in young football players. *Teoria Ta Metodika Fizicnogo Vihovanna*, *21*(2), 173–179. https://doi.org/10.17309/TMFV.2021.2.11
[48] Sullivan, G. M., & Feinn, R. (2012). Use of partial least squares (PLS) in strategic management research: a review of four recent studies. Strategic Management Journal, 20(2), 195–204. *Journal of Graduate Medical Education*, *4*(3), 279–282.
[49] Top, E., & Akil, M. (2018). Effects of the Sports on the Personality Traits and the Domains of Creativity. *World Journal of Education*, *8*(3), 56. https://doi.org/10.5430/wje.v8n3p56
[50] Yang, T. F. K. F. C. S. A. J. (2004). THE CORRELATION BETWEEN PSYCHOLOGICAL TYPE AND PERFORMANCE TIME WHILE WEARING A RESPIRATOR. *Thesis*, *21*(1), 1–128. http://journal.um-surabaya.ac.id/index.php/JKM/article/view/2203