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Somatotype and Swimming Performance of National Level Male Swimmers in India

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Abstract: ***The purpose of the study was to find out Somatotype and Swimming Performance of National-level Male Swimmers in India. Sixty-one (N=61) men, in the age group of eighteen to twenty-five (18 to 25) years, were selected from the pertinent population using recommended sampling procedures at various coaching camps in India and who had been National level competitive swimmers for the last few years. Heath Carter Somatotype method was used for somatotyping and the sites to be measured for the calculation of somatotype were Height (cm), Weight (Kg), skinfold thickness such as, Triceps (mm), Subscapular (mm), Supraspinale (mm), Calf (mm), Breadths such as, Humerus (cm), Femur (cm) and girth include Upper arm (cm) and Calf (cm). The result indicates that for Backstroke (Balanced Endomorph), for Breaststroke (Mesomorphic-Ectomorph), For Butterfly (Balanced Endomorph, Mesomorphic-Endomorph) and for Freestyle (Balanced Mesomorph) had taken less time than other somatotypes. So, it is clear that the shape and size of the body are strictly influencing throughout the competition especially at the time finishing. So, while training swimmers, attention should be given for developing a suitable somatotype for each swimming stroke category.***

Keywords: Somatotype, Swimming Performance

1. Introduction

For every sports and game, a right body is one of the influential factors for further development and high-level achievements. This is because the need for specific qualities of every sport varies according to the need of particular sports or games. For example, weightlifter, basketball player, rowers, shooters, gymnastics etc. and athletics which includes sprinters, throwers, long-distance runners etc. are seen in different body structures. Craig Sharp, a professor of sports science at Brunel University discussed that an athlete who is well trained and equipped and also has tactical sense etc., cannot reach the top performance unless his/her body is suited for that particular sports. This is proved with the example of Kenyan runners they have slim legs with high calf muscles, which is a very efficient anatomy for a runner Parry, V. (2018).

Here, it is very relevant to study about swimmers' body type. Swimmers' body structure is differentiated from other sports. Apart from this, the Indian swimmers' body type varies from international swimmers. Will it be the reason that the Indian swimmers are not able to win in Olympics or World championships? The researches have already proved and the sports field are aware that in athletics various athletes' body type is different according to the need of the event. Similarly, in competitive swimming, it is clear that the four strokes are differentiated from one another. So, each category of swimmers may be differentiated like athletes of different events. Here, it is a need to conduct research related to this topic to reach valid conclusions. Because Swimming is an enormously challenging sports for competitors' and it is very interesting to watch for the audience. In most of the cases, the sprint swimmers first, second and third positions are differentiated with a fraction of a second. Competitive swimming is an individual sport and each swimming style involve the coordinated movement of all body parts. So, each and every aspect of a swimmer is highly influencing during the competition. "Winning" is the goal of every athlete and the responsibility of the coach is to improve the performance capability of their swimmers. The inborn ability of each swimmer to adapt and respond to the training programme will greatly influence their performance. Therefore, it is intelligent of every veteran coach to find out those swimmers with the best talent. The sports scientists and researchers design different studies to find out these characteristics precisely with the aim of conveying genuine results to attain the best results.

2. Methodology

The purpose of the study was to find out Somatotype and Swimming Performance of national level male swimmers. Sixty-one (N=61) men, in the age group of eighteen to twenty-five (18 to 25) years, were selected from the pertinent population using recommended sampling procedures at various coaching camps in India and who had been National level competitive swimmers for the last few years. Heath Carter Somatotype method was used for somatotyping and the sites to be measured for the calculation of somatotype were Height (cm), Weight (Kg), skinfold thickness such as, Triceps (mm), Subscapular (mm), Supraspinale (mm), Calf (mm), Breadths such as, Humerus (cm), Femur (cm) and girth include Upper arm (cm) and Calf (cm).

3. Analysis of Data

The analysis of data is presented in two parts. The first part is the number of swimmers in each main stroke category and somatotype category. The second part includes the Somatotype and Swimming performance.

(i) Number of swimmers in each main stroke category and somatotype category.

The number of swimmers in each Main stroke category and each Somatotype category is given in Table 1 and Figure 1, Table 2 and Figure 2, Table 3 and Figure 3 respectively. In the collected data 43% of the swimmers selected Butterfly style. 39% of the swimmers have Endomorphic-Mesomorph somatotype. For different swimming strokes that is

Backstroke, Breaststroke, Butterfly, and Freestyle, the Endomorphic-Mesomorph somatotype was shown high in number.

Table 1: Frequency Table for Main stroke Category

Main Stroke	Number of Swimmers	Percentage
Back stroke	12	20%
Breast stroke	12	20%
Butterfly	26	43%
Freestyle	11	18%

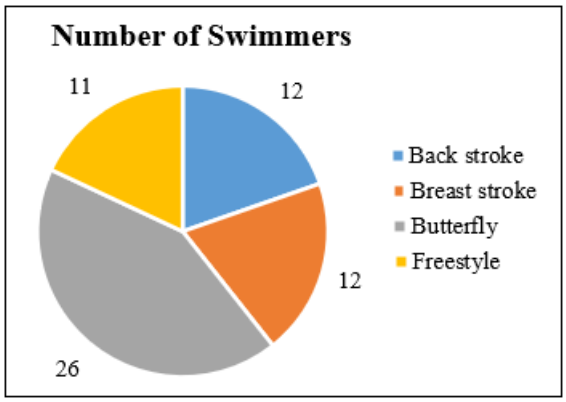

Figure 1: Main Stroke Category

Table 2: Frequency Table for Somatotype Category

Somatotype	Number of Swimmers	Percentage
Endomorphy	1	2%
Balanced Endomorph	3	5%
Endomorphic-Mesomorph	***24***	***39%***
Endomorphic-Ectomorph	11	18%
Balanced Mesomorph	7	11%
Mesomorphic-Endomorph	9	15%
Mesomorphic-Ectomorph	3	5%
Balanced Ectomorph	2	3%
Ectomorphic-Mesomorph	1	2%

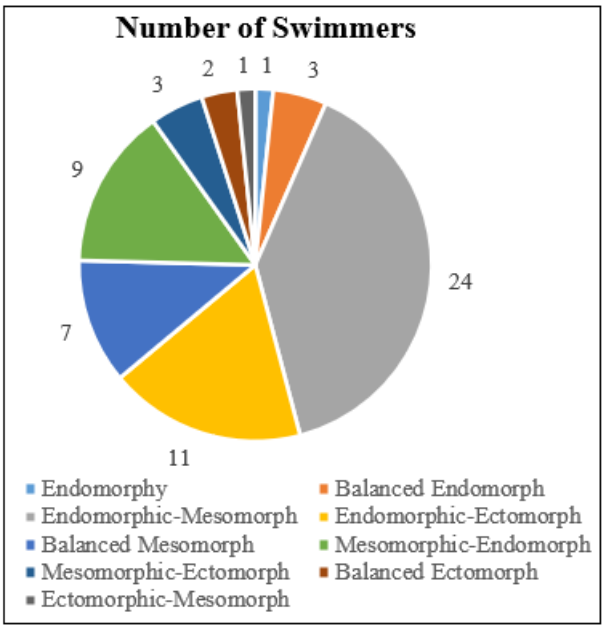

Figure 2: Somatotype Category

Table 3: Number of Somatotype for Different Swimming Strokes

Somatotype	Backstroke	Breast stroke	Butterfly	Freestyle
Endomorphy	0	0	1	0
Balanced Endomorph	2	0	1	0
Endomorphic-Mesomorph	5	6	9	4
Endomorphic-Ectomorph	3	1	4	3
Balanced Mesomoprh	1	2	3	1
Mesomorphic-Endomorph	0	2	4	3
Mesomorphic-Ectomorph	0	2	4	3
Balanced Ectomorph	1	0	1	0
Ectomorphic-Mesomorph	0	0	1	0

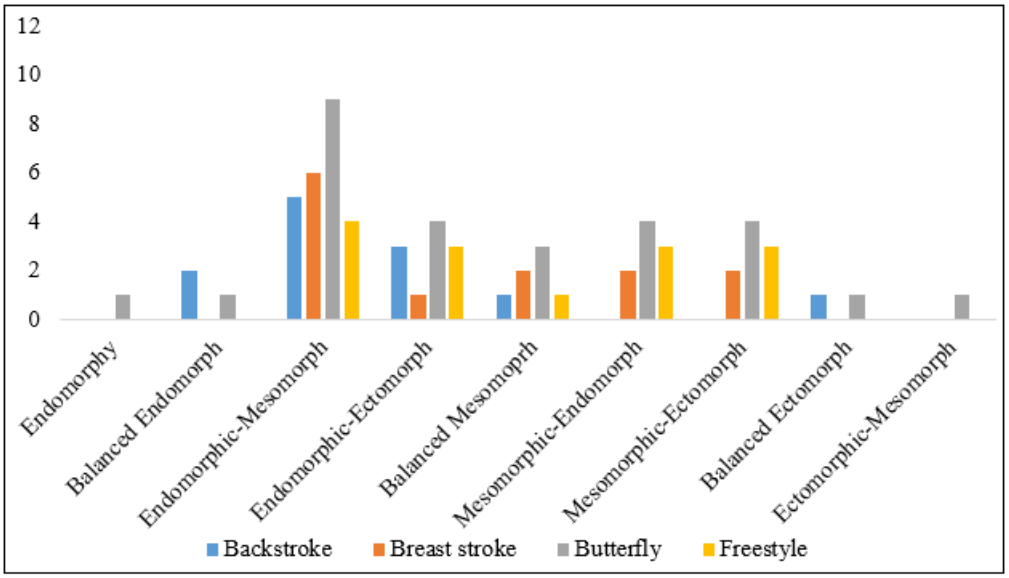

Figure 3: Number of Somatotype for Different Swimming Strokes

(ii) Swimming Performance Analysis for Different strokes and Somatotype Category.

The average time for Freestyle and Main stroke and their diagrammatic representations are given in Table 4, Figure 4. The Freestyle took less time than other swimming styles and Breaststroke requires more time.

Table 4: Time (Mean) of Different Swimming Strokes

Main Stroke	Time (Main Stroke)	Time (freestyle)
Back stroke	30.90	26.64
Breast stroke	33.84	26.65
Butterfly	27.55	26.13
Freestyle	26.03	26.03

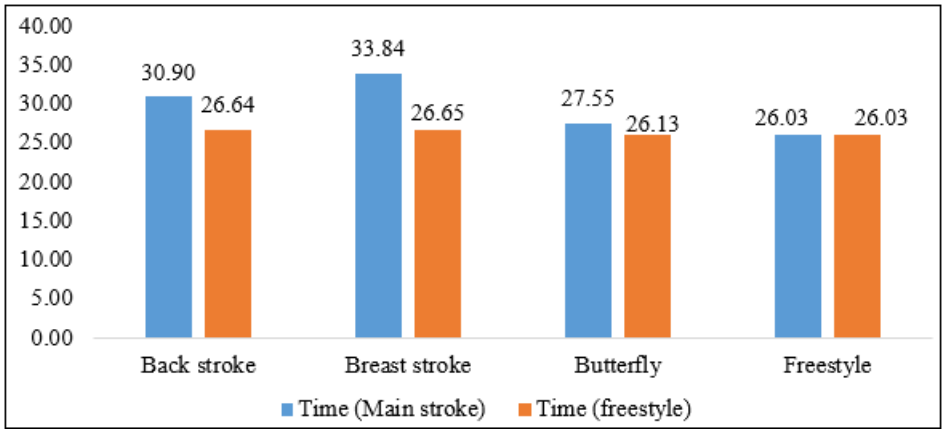

Figure 4: Time (Mean) of Different Swimming Strokes

The average time for Somatotype with Freestyle and Main stroke and its diagrammatic representation are given in Table 5, Figure 5. The result indicates that Endomorph and Balanced Endomorph had taken less time than other somatotypes.

Table 5: Time Comparison (Mean) of Somatotype for Main stroke and Freestyle

Somatotype	Time (Main Stroke)	Time (Freestyle)
Endomorph	*27.13*	*24.37*
Balanced Endomorph	*27.82*	*25.84*
Endomorphic-Mesomorph	29.07	26.27
Endomorphic-Ectomorph	29.75	26.48
Balanced Mesomorph	30.14	26.13
Mesomorphic-Endomorph	28.71	26.14
Mesomorphic-Ectomorph	28.52	26.45
Balanced Ectomorph	30	28
Ectomorphic-Mesomorph	29	26

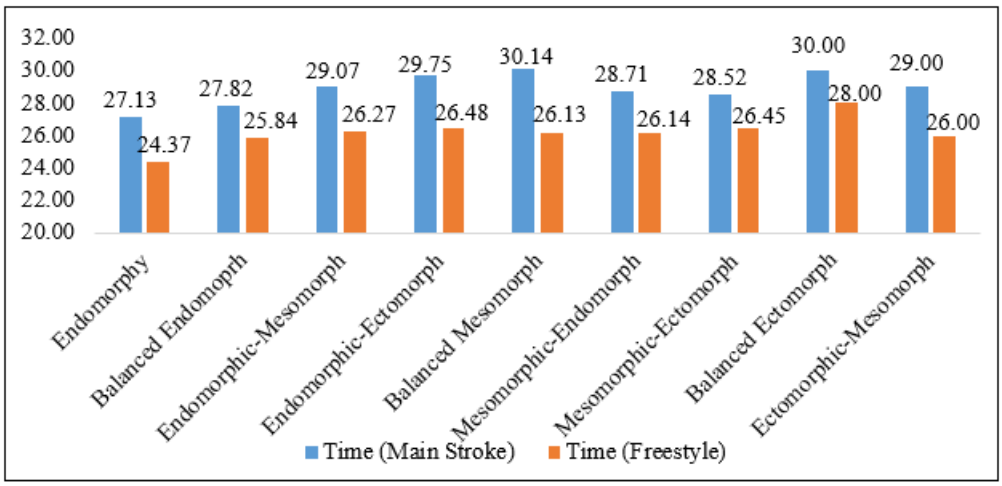

Figure 5: Time Comparison (Mean) of Somatotype for Main stroke and Freestyle

The average time taken by different Somatotype for Different Swimming Strokes and their diagrammatic representation are given in Table 6 and Figure 6. The result indicates that for Backstroke (Balanced Endomorph), for Breaststroke (Mesomorphic-Ectomorph), For Butterfly (Balanced Endomorph, Mesomorphic-Endomorph) and for Freestyle (Balanced Mesomorph) had taken less time than other somatotypes.

Table 6: Time Comparison (Mean) of Somatotype for Different Swimming Strokes.

Somatotype	Backstroke	Breaststroke	Butterfly	Freestyle
Endomorphy	-	-	27.13	-
Balanced Endomorph	***28.50***	-	***26.47***	-
Endomorphic-Mesomorph	29.15	33.01	27.63	26.31
Endomorphic-Ectomorph	34.34	37.00	27.55	25.68
Balanced Mesomorph	33.00	35.00	28.00	***24.00***
Mesomorphic-Endomorph	-	35.21	***26.98***	26.67
Mesomorphic-Ectomorph	-	***30.56***	27.50	-
Balanced Ectomorph	32.00	-	28.00	-
Ectomorphic-Mesomorph	-	-	29.00	-

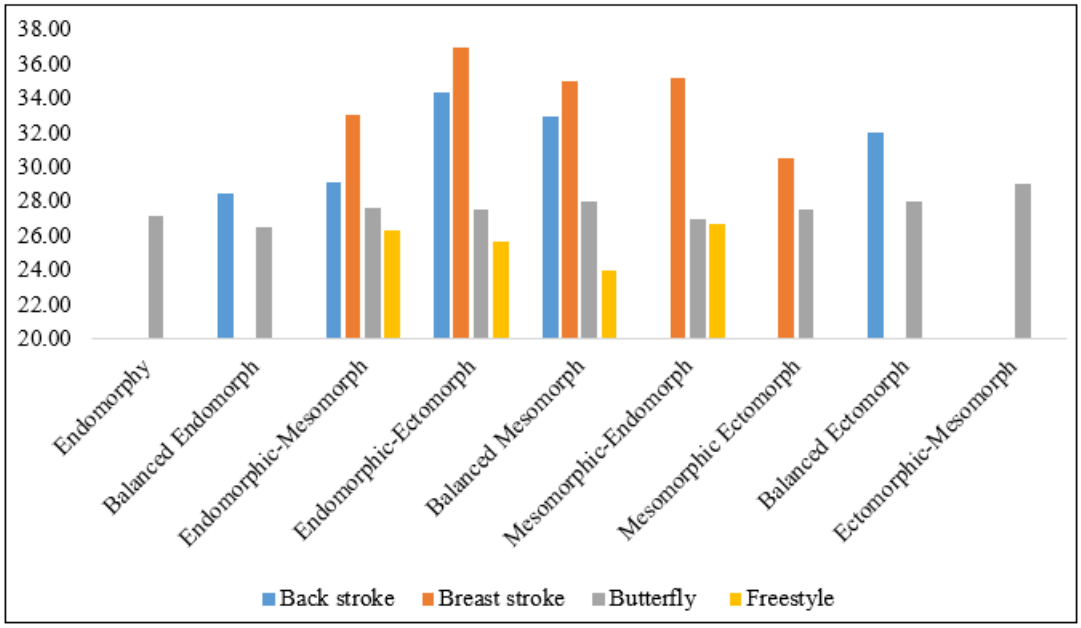

Figure 6: Time Comparison (Mean) of Somatotype for Different Swimming Strokes

4. Discussion

International swimming competitions feature four strokes: Freestyle, Butterfly, Backstroke, and Breaststroke. According to world records posted on USAswimming.com, the Freestyle remains the fastest stroke, followed by Butterfly and Backstroke. Breaststroke is the slowest competitive stroke. Porter, L. (2017, September 11). This study result also showed that Freestyle took less time and Breaststroke required more time compared to other swimming styles.

39% (high percentage) of the swimmers have Endomorphic-Mesomorph somatotype category. Endomorphic-Mesomorph somatotype was shown high in number also for different swimming strokes such as Backstroke, Breaststroke, Butterfly, and Freestyle. In 1948, Cureton somatotyped Olympic swimming champions. He concluded that swimmers of top ability “represent the mesomorphic ideal of body build." Pug and others evaluated the body build of 12 channel swimmers by somatotyping. With few exceptions, the channel swimmers were extremely high in Endomorphy. Even among world-class swimmers, Cureton noted that the sprint swimmers were higher on Mesomorphy, and the 400m and 1,500m men were higher on Endomorphy. John A. Faulkner (1966).

The result indicates that Backstroke (Balanced Endomorph), Breaststroke (Mesomorphic-Ectomorph), Butterfly (Balanced Endomorph, Mesomorphic-Endomorph) and Freestyle (Balanced Mesomorph) took less time than other somatotypes. For overall, the result reveals that the swimmers with Endomorphic and Mesomorphic characteristics have good swimming performance than the swimmers with other somatotypes. These findings are supported by the study conducted by Sonia, & Nigam, S. (2010). which also resulted in the conclusion that the swimmers with different swimming strokes have disparities in their body size and structure.

"Swimming is a water sports", So, the swimmers required more buoyancy. A study of swimming speeds and buoyancy published in the "Journal of Strength and Conditioning Research" found that muscle tissue is denser than adipose tissue. More fat means great buoyancy. Therefore, a competitive swimmer is gaining weight must adapt to a different swimming style with a more buoyant body. Likewise, losing weight may make less buoyant. A more buoyant swimmer will have faster swim times, but only to a certain extent. Since, too much fat will limit the endurance and range of motion, balancing any benefits the swimmer may get from greater buoyancy. Whitney, L. (2017, September 11).

The other related articles showed that Endomorphs are to be good at sports which require a combination of strength, endurance and lung capacity. Core, M. (2017, March 27). Swimming is a great muscle building resistance exercise. There are many muscles that can be strengthened through swimming. The constant pulling and pushing of and against

water build great muscle endurance and work capacity. Benjamin. (2017, June 21). Research shows that more mesomorphic body types are sprint swimmers with high power energy systems. Parry, V. (2004, August 5). To go along with all the other backside muscular awesomeness, swimmers are also gifted with bulging triceps. For everyone except for those weird breaststrokers, swimmers use their triceps to finish the stroke, meaning that over the course of their careers they do about 3.2 million triceps extensions (Book, T., & Posters, M. 2018).

5. Conclusions

Within the limitation of the present study and on the basis of the obtained result, the following conclusions were drawn.

1) The Freestyle remains the fastest stroke followed by Butterfly and Backstroke. Breaststroke is the slowest competitive stroke.
2) 39% (high percentage) of the swimmers have Endomorphic-Mesomorph somatotype Category. Endomorphic-Mesomorph somatotype was shown high in number also for different swimming strokes such as Backstroke, Breaststroke, Butterfly, and Freestyle.
3) The swimmers with Endomorphic and Mesomorphic characteristics have good swimming performance than swimmers with other somatotypes.

Recommendations

Competitive swimming includes sprint events as well as long distance events. Speed is the most affecting element for swimmers' performance. There are so many factors influencing the speed of an athlete especially genetics, muscle fibre type, and body composition etc. In sprint event (50m) mostly the swimmers' speed may be nearly the same and microseconds is determining the first, the second and the third positions. Naturally, the human body position is vertical. For swimming, it came to the horizontal position, so it is clear that the shape and size of the body are strictly influencing throughout the competition especially at the time finishing. So, while training swimmers, attention should be given for developing a suitable somatotype for each swimming stroke category.

References

[1] India at the 2017 World Aquatics Championships. (2018). Retrieved from https://en.wikipedia.org/wiki/India_at_the_2017_World_Aquatics_Championships
[2] India at the 2015 World Aquatics Championships. (2018). Retrieved from https://en.wikipedia.org/wiki/India_at_the_2015_World_Aquatics_Championships
[3] Rio 2016 Olympics: India swimmers Sajan Prakash, Shivani Kataria finish 41st and 28th in their events. (2018). Retrieved from https://indianexpress.com/sports/rio-2016-olympics/india-swimmers-sajan-prakash-shivani-kataria-finish-41st-and-28th-in-their-events-2962581/
[4] The Major Branches of Science. (2018). Retrieved from http://www.teach-nology.com/teachers/subject_matter/science/
[5] Guth, L. M., & Roth, M. S. (2014). Genetic influence on athletic performance. *Current opinion in Pediatrics*, 653-658.
[6] Landers, G., Blanksby, B., Ackland, T., & Smith, D. (2000). Morphology and performance of world championship triathletes. *Annals of Human Biology*, *27*(4), 387-400. doi: 10.1080/03014460050044865
[7] Gusic, M., Popovic, S., Molnar, S., Masanovic, B., & Radakovic, M. (2017). Sport-Specific Morphology Profile: Differences in Anthropometric Characteristics among Elite Soccer and Handball Players. Retrieved from http://oaji.net/articles/2017/1045-1502701667.pdf
[8] Parry, V. (2018). Body of evidence. Retrieved from https://www.theguardian.com/science/2004/aug/05/1
[9] *Teaching and Research Aptitude.* (2012). Agra: Upkar Prakasan.
[10] Thomas, J. R., Nelson, J. K., & Silverman, S. J. (2011). *Research Methods in Physical Activity.* United States: Human Kinetics.
[11] Difference Between Morphology And Physiology | Difference Between. (2018). Retrieved from http://www.differencebetween.net/science/difference-between-morphology-and-physiology/
[12] Stewart, A., Jones, M. M., Olds, T., & Ridder, H. d. (2011). *International Standars for Anthropometric Assessment.* New Zealand: National Library of Australia.
[13] Singh, A. K., & Narain, S. (2014). *Emotional Intelligence Scale.* Agra: National Psychological Corporation.
[14] M, R. (1999). *Menatal Imagery Questionnaire.* Agra: Rakhi Prakasahan.
[15] What Are The Factors That Determine An Athlete's Speed Potential?. (2018). Retrieved from https://www.streetdirectory.com/etoday/what-are-the-factors-that-determine-an-athletes-speed-potential-elfcao.html
[16] Porter, L. (2018). The Fastest Swimming Strokes. Retrieved from https://www.livestrong.com/article/350328-the-fastest-swimming-strokes/
[17] John A. Faulkner (1966) Physiology of Swimming, Research Quarterly. American Association for Health, Physical Education and Recreation, 37:1, 41-54, DOI: 10.1080/10671188.1966.10614734
[18] ttps://www.tandfonline.com/doi/abs/10.1080/10671188.1966.10614734?journalCode=urqe17
[19] Whitney, L. (2018). Does Losing Body Weight Make Me Swim Faster?. Retrieved from https://www.livestrong.com/article/551445-does-losing-body-weight-make-me-swim-faster/
[20] How is your athletic performance determined by your body (Somatotype)? / Össur Webshop Blog. (2018). Retrieved from https://www.ossurwebshop.co.uk/blog/athletic-performance-determined-body-somatotype
[21] Swimming and Building Muscle. (2018). Retrieved from https://caloriebee.com/workout-routines/Swimming-and-Building-Muscle

[22] Parry, V. (2018). Body of evidence. Retrieved from https://www.theguardian.com/science/2004/aug/05/1
[23] Book, T., & Posters, M. (2018). 9 Signs You Have a Swimmer's Body. Retrieved from https://www.yourswimlog.com/9-signs-you-have-a-swimmers-body/
[24] Core, M. (2017, March 27). Retrieved from https://www.ossurwebshop.co.uk/blog/athletic-performance-determined-body-somatotype
[25] Benjamin. (2017, June 21). Retrieved from www.google.com: https://caloriebee.com/workout-routines/Swimming-and-Building-Muscle