



## The Correlation Between Dietary Habits and Physical Activity with the Somatotype of Game Sports Athletes

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### Abstract

*One of the factors that support an athlete's success in a match includes the compatibility of somatotype with the sport. This study aimed to determine the correlation between dietary habits and physical activity with the somatotype of game sports athletes. The design is a cross-sectional study. The study was held from February 2019 until May 2020. Sampling is using comprehensive selection which the samples amounted to 37 athletes. Anthropometric measurements carried out research data collection, interviews using the SQ-FFQ form, and Baecke physical activity scale questionnaire. Data were analyzed by univariate and bivariate. The results showed that most soccer athletes (94.1%) and all takraw athletes (100%) have unsuitable somatotype categories, most soccer athletes (82.4%), and all takraw athletes (100%) have severe physical activity. Most soccer athletes (76.5%) and more than half of takraw athletes (55%) have poor dietary habits. The average somatotype of respondents is ectomorph, with the body's unique characteristics that tend to be thin. When intake is less than intake requirements, strenuous physical activity can cause the body to grow to be light. Respondents are advised to consume information as intake requirements to adjust the training scheme by adding weight training to the forming of athlete's muscle mass and to place nutritionists in PPLP.*

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## INTRODUCTION

Based on PPLP West Sumatra data, at the 2016 PPLP National Championship, the Sepak Takraw branch won 12 medals and was ranked first. In 2017, he won a gold medal and 15 medals and was ranked second. Meanwhile,

in 2018 only brought home one gold medal and two silver medals, and second place. As for the sport of football, West Sumatra PPLP athletes have not been satisfactory. In 2016, the sport of football did not get a medal; in

2017, it was ranked 13th, and in 2018 it was ranked 5th.

One of the factors that influence an athlete's performance is the body or what can be called the somatotype. The somatotype is a study of the typology of the human body (Qurun, 2016). Rahmawati et al., (2007) stated that athletes with somatotypes and body compositions that match their sport tend to show better sports performance. The athlete selection program is only determined by their achievements or competence in competing, whereas achieving maximum performance requires a player who has reasonable physical, technical, tactical abilities and is supported by right somatotopic conditions (Efendi, 2015).

The somatotype provides a quantitative description of the human body. The most commonly used somatotype method was introduced by Heath and Carter, which in three components, including endomorphy, mesomorphy, and ectomorphy, empirically defines the composition of body composition: the degree of obesity, musculoskeletal development, and body linearity (Adhikari & Sinha, 2016).

Research by Rahmawati et al., (2007) on soccer athletes obtained the results of the somatotype 2.7-4.9-3.0, namely Balanced Mesomorph. The body type of takraw athletes is almost the same as soccer, namely the balanced mesomorph.

According to Endriati (2009) in Wulansari et al., (2017), the somatotype is often referred to as the type of body shape that can change according to diet. The selection of

appropriate and balanced food and nutrition for athletes can help and even be needed in their efforts to pursue maximum sports achievement in addition to implementing training that is following the training dose and handled by qualified trainers to improve their abilities athletes in individual sports (Sudiana, 2010).

Tóth et al., (2014) stated that body type and quality are essential in doing physical activity. Body shape and quality will positively affect if it is adjusted to the activities undertaken to achieve maximum work results. Body type can be obtained from the frequency and intensity of physical activity to increase fitness levels.

The variables in this study were the somatotype, diet, and physical activity of athletes. The diet is determined by looking at three aspects: the amount of intake, meal schedule, and type of food. There is no specific research conducted to determine the relationship between these variables. Meanwhile, if you look again at the proper diet and activity, it can direct the body shape or somatotype according to the sport. This, of course, aims to maximize athlete performance and get an even better understanding.

Therefore this study aims to determine the relationship between diet and physical activity with sports athletes' somatotype at the West Sumatra Student Education and Training Center Dormitory in 2019.

## METHODS

This study used a cross-sectional study design. The research targets were athletes in sports games in the PPLP West Sumatra boarding school, including soccer and takraw. These two sports are taken because they are a sport that is much favored by the general public, especially football. The research sample was taken using total sampling, where the entire population was born into a selection of 37 athletes. This study's dependent variable is the somatotype, and the independent variables are diet and physical activity.

The somatotype category is obtained by taking anthropometric measurements that are calculated from ten measurements, namely weighing with a digital scale, measuring height with a microtome, measuring four thicknesses of subcutaneous fat (triceps, supraspinal, subscapular, and medial calf) using a skinfold caliper, measuring two widths bone (femur width and humerus width) using calipers and two limb circumference widths (upper arm and calf) using metallic. Then the measurement results were entered into the formula for determining the somatotype according to Heath-Carter. Then you will get three number combinations that represent endomorph, mesomorph, and ectomorph. The combination of these three numbers determines the naming of the respondent's somatotype. The results obtained will be categorized into two categories, namely, according to the sport if the athlete's somatotype is balanced mesomorph and not

according to sports if the athlete's somatotype is not a flat mesomorph.

Diet was determined by conducting interviews using the SQ-FFQ form. The diet consists of three components, each of which has a category, namely the total intake is categorized as useful if the consumption is 90% - 110% of the athlete's needs and is not good if the consumption is <90% and > 110% of the athlete's needs. The types of food consumed are categorized as useful if they consume staple foods, animal side dishes, vegetable side dishes, vegetables, fruit, sugar, and oil, and it is not good if someone does not eat staple foods, animal side dishes, vegetable side dishes, vegetables, fruit, sugar, and oil. The meal schedule is categorized as useful if the main meal is three times a day and two intervals and is not good if the main meal is less than three times a day and two breaks. From the three components, the diet is categorized as useful if the amount of intake is right, the type of food is suitable, and the eating schedule is good. The category is not good if the amount of input is not enough, the kind of food is not right, the eating schedule is not good.

Furthermore, physical activity is determined by conducting interviews using the Baecke physical activity scale questionnaire, where the intended action is the respondent's daily activities. After obtaining the total activity index, the physical activity is categorized into moderate activity if the entire index is  $\leq 7.9$  and strenuous if the complete index is  $> 7.9$ .

The results obtained were univariate analysis, namely general description, somatotype, physical activity, dietary patterns, and bivariate analysis, namely the relationship between physical activity and somatotype and the relationship between diet and somatotype.

## FINDINGS AND DISCUSSION

### Findings

The study was conducted on 37 athletes who are members of two sports in which 17 are soccer athletes, and 20 are takraw athletes. The frequency distribution of the general description of the respondents is seen in table 1:

Table 1. Frequency Distribution of Respondents Overview Based on Gender, Age, and Somatotype

Variabel	Soccer		Takraw	
	n	%	n	%
<b>Gender</b>				
Male	17	100	15	75
Female			5	25
<b>Age</b>				
14 years			2	10
15 years			6	30
16 years	11	64,7	6	30
17 years	6	35,3	6	30
<b>Somatotype</b>				
<i>Balanced Ectomorph</i>	7	41,2	3	15
<i>Balanced Endomorph</i>	1	5,9		
<i>Balanced Mesomorph</i>	1	5,9		
<i>Central</i>	1	5,9		
<i>Endomorph Ectomorph</i>	1	5,9	4	20
<i>Endomorphic Ectomorph</i>	2	11,8	2	10
<i>Mesomorph Endomorph</i>	2	11,8	1	5
<i>Mesomorphic Ectomorph</i>	1	5,9	8	40
<i>Mesomorphic Endomorph</i>	1	5,9	2	10
<b>JTotal</b>	<b>17</b>	<b>100</b>	<b>20</b>	<b>100</b>

Based on table 1, it can be seen that all soccer athletes (100%) and most of the takraw athletes (75%) are males, more than half of the soccer athletes (64.7%) are 16 years old, and the most age range is takraw athletes. (30%) aged 14 to 16 years, more soccer athletes

(41.2%) had a balanced ectomorph somatotype, and more takraw athletes (40%) had a mesomorphic ectomorph somatotype.

The frequency distribution of the respondent's somatotype is seen in table 2:

Table 2. Frequency Distribution of Respondents Based on Somatotype

Category	Soccer		Takraw	
	n	%	n	%
Corresponding	1	5,9	0	0
Not Available	16	94,1	20	100
<b>Total</b>	<b>17</b>	<b>100</b>	<b>20</b>	<b>100</b>

Based on table 2, it can be seen that most of the soccer athletes (94.1%) and all takraw athletes (100%) have unsuitable

somatotype categories. The distribution of the frequency of physical activity of soccer athletes is seen in table 3:

Tabel 3. Distribusi Frekuensi Responden Berdasarkan Aktivitas Fisik

Category	Soccer		Takraw	
	n	%	n	%
Moderate Weight	3	17,6	0	0
<b>Total</b>	<b>17</b>	<b>100</b>	<b>20</b>	<b>100</b>

Based on table 3, it can be seen that most of the soccer athletes (82.4%) and all takraw athletes (100%) have heavy category physical activity.

The frequency distribution of respondents based on the athlete's diet is determined by three components, which can be seen in table 4:

Table 4. Frequency Distribution of Respondents by Type, Number and Schedule of Meals

Variabel	Soccer		Takraw	
	n	%	n	%
Total Food				
Not Good	13	76,5	11	55
Good	4	23,5	9	45
Total Food				
Not Good	2	11,8	0	0
Good	15	88,2	20	100
Total Food				
Not Good	0	0	0	0
Good	17	100	20	100
<b>Total</b>	<b>17</b>	<b>100</b>	<b>20</b>	<b>100</b>

Based on table 4, it can be seen that most of the soccer athletes (76.5%) and more than half of the takraw athletes (55%) have an insufficient amount of food, most of the soccer athletes (88.2%), and all the takraw athletes (100%) ) have a right type of food and all respondents (100%) have a good eating schedule.

are in a suitable category, the diet is in a good variety. Conversely, if one or more components are in the wrong type, then the diet is in the wrong category. The frequency distribution can be seen in table 5:

A good diet, that is, if the intake is met as needed, the schedule and types of food consumed are balanced according to needs. Of the three components, then the respondent's diet is categorized into two. If the three parts

Table 5. Frequency Distribution of Respondents Based on Diet

Category	Soccer		Takraw	
	n	%	n	%
Not Good	13	76,5	11	55
Good	4	23,5	9	45
<b>Total</b>	<b>17</b>	<b>100</b>	<b>20</b>	<b>100</b>

Based on table 5, it can be seen that most of the soccer athletes (76.5%) and more than half of the takraw athletes (55%) have a

terrible diet. The relationship between physical activity and the respondent's somatotype can be seen in table 6:

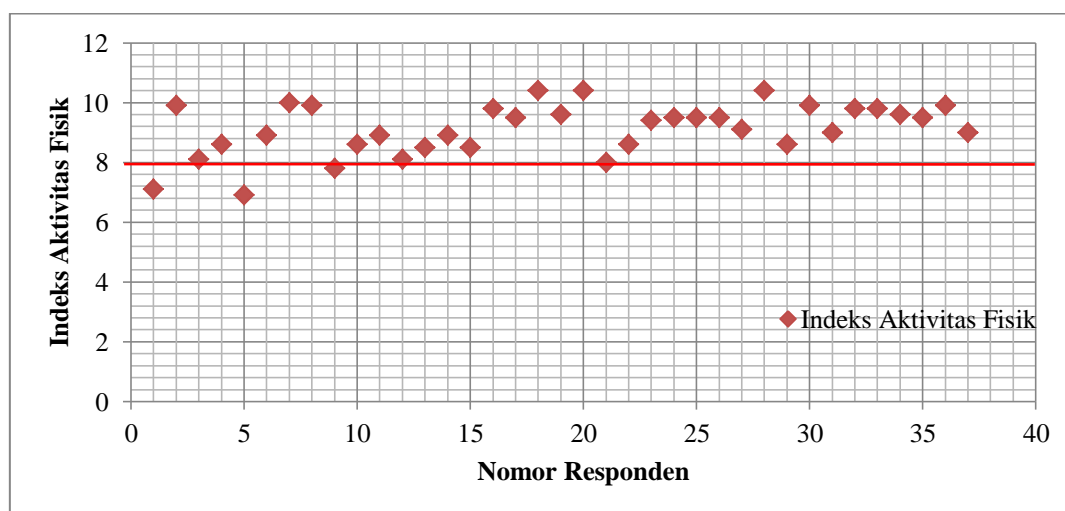
Table 6. Relationship between Physical Activity and Respondents' Somatotype

Category Somatotype	Soccer				Takraw				Total	P value	
	Physical Activity Category		Weight		Physical Activity Category		Weight				
	Moderate	Weight	Moderate	Weight	Moderate	Weight	Moderate	Weight			
	n	%	n	%	n	%	n	%			
Appropriate	0	0	1	100	0	0	0	0	1	100	<b>1,000</b>
Not Available	3	18,8	13	81,2	0	0	20	100	36	100	
Total	3	17,6	14	82,4	0	0	20	100	37	100	

Based on table 6, it can be seen that the tendency of athletes to be in strenuous activity and the somatotype is not appropriate, namely 81.2% of soccer athletes and 100% of takraw athletes. Meanwhile, the relationship between the two cannot be investigated.

The following is the distribution of the physical activity index of respondents in the West Sumatra Student Education and Training Center Dormitory in 2019:

Diagram 1. Distribution of Respondents Physical Activity Index



Based on diagram 1, it is known that most of the distribution of the physical activity index of the respondents is in heavy physical activity, namely with an index >7.9. Simultaneously, a small proportion of the rest

is in moderate physical activity, namely with an index of ≤7.9. The relationship between diet and respondent somatotype can be seen in table 7:

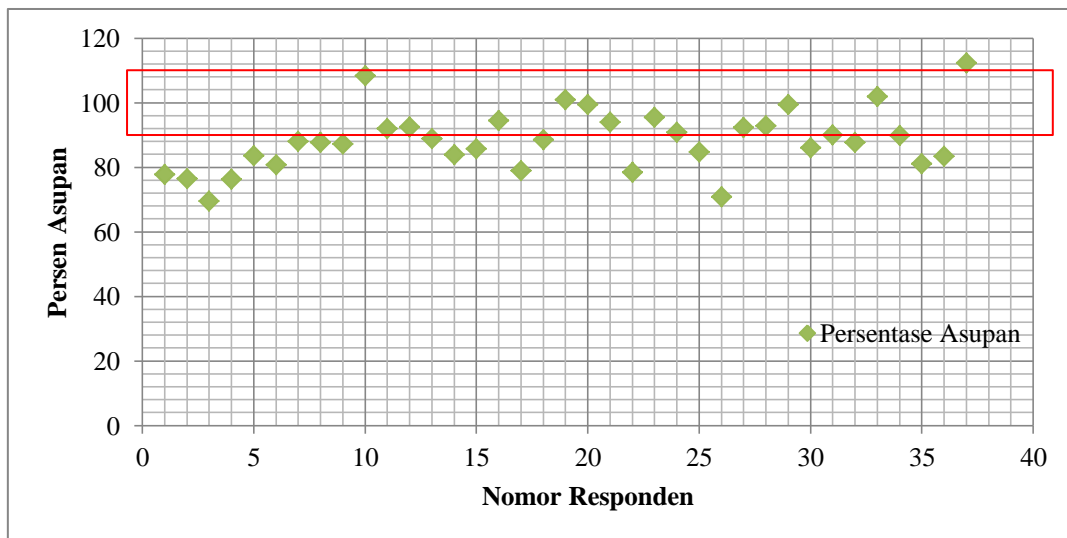
Table 7. The Relationship between Diet and Respondents' Somatotype

Category Somatotype	Soccer				Takraw				Total		P value
	Diet Category		Diet Category		Diet Category		Diet Category				
	Not Good	Good	Not Good	Good	Not Good	Good	Not Good	Good	n	%	
Appropriate	1	100	0	0	0	0	0	0	1	100	<b>1,000</b>
Not Available	12	75	4	25	11	55	9	45	36	100	
<b>Total</b>	13	76,5	4	23,5	11	55	9	45	37	100	

Based on table 7, it can be seen that athletes' tendency to have a lousy diet and unsuitable somatotype, namely 75% for soccer athletes and 55% for takraw athletes. Meanwhile, the relationship between the two

cannot be investigated. The following is the percentage distribution of respondents' intake at the West Sumatra Student Education and Training Center Dormitory in 2019:

Diagram 2. Distribution of Respondents' Intake Percentage



Based on diagram 2, it is known that more than half of the respondents' intake is under 90%. Meanwhile, there is one respondent with more input that is above 110%.

**Discussion**

The average somatotype of soccer athletes in this study is classified as a mesomorphic ectomorph, balanced ectomorph, and endomorphic ectomorph. This result

follows the research of Anggitasari et al., (2019), showing that soccer athletes' average somatotype results are Mesomorphic Ectomorph. The results are the same as the research conducted by Saputra (2014) entitled "Somatotype of SSB Boys, 14-16 Years Old Students and Its Relation to Shooting Accuracy Using the Back of the Foot" shows that 50% of soccer athletes have Mesomorphic Ectomorph body type and 25% with Balanced Ectomorph body type.

These results were not following the average somatotype measurement results of soccer athletes, Heath, in 2005, Saldago in 2009, and Hazir and Gil in 2010, which showed the somatotype results of soccer athletes, namely balanced mesomorph. (Penggali et al., 2016) Even though athletes' somatotype results in this study were still not following the literature, the athlete's body type could be changed for the better. This is because athletes are still in their infancy, which is still in the age range of 14-17. According to research in Florida in 2002, 13-18 years is a growth phase (Anggitasari et al., 2019).

Tóth et al., (2014) suggested that the balanced mesomorph is more dominant; endomorphy and ectomorph are the same. Mesomorphs are characterized by a square body, healthy and stiff muscles, large bones, and covered in thick muscles. People with this somatotype tend to be muscular. Whereas in this study, respondents tended to have the ectomorph somatotype. So we need the right

form of training and duration to increase muscle mass formation in athletes.

Exercises to build muscle mass are known as muscle hypertrophy (bodybuilding). Muscle hypertrophy increases muscle size or mass due to an increase in the number of actin and myosin filaments in each muscle fiber, which causes an increase in the size of the muscle fibers present. The primary type of training in building muscle mass is weight training (Bachtiar, 2015).

#### **a. *Physical Activity Relationship with Somatotype***

The results of the analysis that have been done show the tendency of the respondents' physical activity, namely strenuous activity. Researchers have not found similar studies regarding the relationship between somatotype and physical activity. However, these two things are mutually influencing each other. This physical activity is determined by conducting interviews using the Baecke physical activity scale questionnaire.

The result of the respondents' physical activity is more or less the same, namely physical activity in the heavy category. This is because the respondent is a student at a particular sports school, so that the PPLP's program is in the form of routine training every day except on Sundays, where movement is in the morning from 05.30 to 07.00 WIB and after school training at 14.00 WIB for soccer and 15.00 WIB for the Takraw sport. The usual forms of exercise are jogging,



push-ups, sit-ups, and activities according to each sport.

Following the results obtained, in general, the respondents have an ectomorph somatotype, where an ectomorph is a somatotype that tends to be thin. This could be because the respondent's heavy activity causes the respondent's body to lean towards ectomorphs. The respondents' actions, whose daily activities were busy with learning activities at school and routine daily exercises, caused the respondents' daily physical activities to be categorized as heavy. Strenuous physical activity certainly requires a healthy physical condition. People who have muscles tend to be in a more actual physical condition.

In this study, respondents tended to have a thin body type, while the activities they do daily are strenuous physical activities. Strenuous physical activity tends to deplete the athlete's energy or muscle reserves. This is certainly not balanced. Athletes should increase their muscle mass again so that their bodies can carry out strenuous physical activity. Nasrulloh (2012) explains that weight training is a form of training to increase muscle mass. Of course, this exercise must be balanced with adequate nutritional intake according to the needs of athletes.

#### **b. The Relationship between Diet and Somatotype**

The analysis results that have been carried out show a tendency that more than half the percentage of respondents' intake is still less than the need. Diet was determined by

conducting interviews using the SQ-FFQ form.

Athletes who are students in boarding schools are provided with food by the PPLP. The students took their food. Herein lies the difference between each athlete; some are eating enough according to their needs, some are not. Some eat types of food, including staple foods, animal side dishes, vegetable side dishes, vegetables, and fruit as needed, and some are not as needed. Several respondents stated that some did not want to eat at a mealtime set by the PPLP and preferred to buy snacks only.

To increase muscle mass, having a good diet is necessary to support muscle mass building. Bachtiar (2015) states that if the amount of intake consumed is insufficient or does not reach the need, it is not muscle building that will occur but a deficit (lack of) calories that can cause weight loss.

Following the results obtained, in general, the respondents have an ectomorph somatotype, where an ectomorph is a somatotype that tends to be thin. This could be related because the number of respondents' intake is less than their needs. When the amount of input is less than the market, it can cause the respondent's body to lead to ectomorphs.

When it is related to physical activity, the lack of intake coupled with strenuous physical activity causes the respondent's body to thin. When the physical activity carried out is not balanced with a good diet, and the somatotype that is owned is also not following

the sport, this will affect the achievements that the athlete can achieve.

## CONCLUSION

The results of this study can be seen that the respondents' physical activity tends to lead to strenuous exercise. In the diet component, the percentage of respondents' intake tends to be less than the need. The mean of the respondent's somatotype is an ectomorph. When physical activity is carried out strenuously plus an input that is less than what is needed, a person's body tends to be thin or leads to ectomorphs.

Meanwhile, the relationship between the two cannot be investigated. Suggestions in this study are that respondents are advised to consume the intake according to their needs to adjust the training pattern by adding weight training to build muscle mass for athletes and place nutritionists in PPLP.

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## REFERENCES

- Adhikari, A., & Sinha, N. (2016). Somatotype Characteristics of School Boys Aged Six to Eleven Years from Nepal. *American Journal of Sports Science*, 4(1), 1. <https://doi.org/10.11648/j.ajss.s.2016040101.11>
- Anggitasari, E. D., Dieny, F. F., & Candra, A. (2019). Hubungan Somatotype dengan

Kesegaran Jasmani Atlet Sepak Bola. *Jurnal Keolahragaan*, 7(1), 11–22. <https://doi.org/10.21831/jk.v7i1.21188>

Bachtiar, M. (2015). *Mesin Dan Manual Untuk Meningkatkan Pectoralis Pada Member Fitness Maroz Kudus*. Universitas Negeri Semarang.

Efendi, D. (2015). *Somatotype Pemain Bola Basket dan Bola Voli Unit Kegiatan Mahasiswa UNY Tahun Pelatihan 2014/2015* [Universitas Negeri Yogyakarta].

<https://docplayer.info/31599323-Somatotype-pemain-bola-basket-dan-bola-voli-unit-kegiatan-mahasiswa-uny-tahun-pelatihan-2014-2015-skripsi.html>

Nasrulloh, A. (2012). Program Latihan Body Building dapat Meningkatkan Massa Otot Mahasiswa IKORA FIK UNY. *Jurnal Media Ilmu Keolahragaan Indonesia*, 2.

Penggalih, M. H. S. T., Pratiwi, D., Fitria, F., Sari, M. D. P., Narruti, N. H., Winata, I. N., Fatimah, & Kusumawati, M. D. (2016). Identifikasi Somatotype, Status Gizi dan Dietary Atlet Remaja Stop and Go Sports. *Jurnal Kesehatan Masyarakat*, 4(1), 44–47. <https://doi.org/http://dx.doi.org/10.15294/kemas.v11i1.3521>

Qurun, D. K. (2016). Hubungan Somatotype dengan Kelincahan Atlet Sepak Takraw

- UPT SMA Negeri Olahraga Jawa Timur. *Departemen Antropologi, Fakultas Ilmu Sosial Dan Ilmu Politik Universitas Airlangga, Surabaya*, 5(2), 232–238.
- Rahmawati, N. T., Budiharjo, S., & Ashizawa, K. (2007). Somatotypes of young male athletes and non-athlete students in Yogyakarta, Indonesia. *Anthropological Science*, 115(1), 1–7. <https://doi.org/10.1537/ase.051008>
- Saputra, K. Y. (2014). Somatotype Siswa SSB Putra Taruna Kelompok Umur 14-16 Tahun dan Kaitannya dengan Akurasi Shooting Menggunakan Punggung Kaki. In *Universitas Negeri Yogyakarta. Universitas Negeri Yogyakarta*.
- Sudiana, I. K. (2010). Asupan Nutrisi Seimbang Sebagai Upaya Mencegah Kemerotan Prestasi Olah Raga. *Jurusan Ilmu Keolahragaan*, 41–55.
- Tóth, T., Michalíková, M., Bednarčíková, L., Živčák, J., & Kneppo, P. (2014). Somatotypes in sport. *Acta Mechanica et Automatica*, 8(1), 27–32. <https://doi.org/10.2478/ama-2014-0005>
- Wulansari, D. A., Kristiyanto, A., & Doewes, M. (2017). Identifikasi Minat dan Bakat Olahraga Di Surakarta (Studi Perbading Minat Dan Bakat Olahraga Pada Siswa Kelas VII SMP Muhammadiyah Se-Surakarta Usia 12 -13 Tahun Ditinjau Dari Jenis Kelamin Dan Tipe Tubuh). *PROSIDING SEMINAR NASIONAL PROFESIONALISME TENAGA PROFESI PJOK, Pendidikan Olahraga, Pascasarjana, Universitas Negeri Malang*, 345–351.