

**AN ANALYSIS OF PHYSICAL FITNESS, SOMATOTYPES, AND ANTHROPOMETRY OF THE ATHLETES AMONG SECONDARY SCHOOLS: AN EXPLANATORY STUDY**

**Author's Name:** Benson D. Rivera<sup>1</sup>

**Affiliation:**

1. Teacher III, Andres M. Luciano High School, San Pablo, Magalang, Pampanga, Philippines.

**Corresponding Author Name & E-Mail:** Benson D. Rivera,  
sirbensrivera@gmail.com

**ABSTRACT**

Physical fitness leads to better athletic performance and determined training will usually develop somatic ability. This study deals with the Physical Fitness, Somatotypes, and Anthropometry of athletes among Secondary Schools: An Explanatory Study for the Academic Year 2022-2023. It defined and measured the health-related fitness, skill-related fitness, the somatotypes and anthropometry of the athletes. The study utilized total number sampling of the respondents of fifteen (15) boys and fifteen (15) girls from the Pampanga track and field team. Mixed method-explanatory study was employed in the study. The data gathered were treated with the used of frequency distribution, weighted mean, and percentage. Pearson r correlation was also used in this study. Frequency and distribution were used on the data of the respondents. The physical fitness, somatotypes and anthropometry student-respondents were treated with weighted mean. To determine the significant relationship among physical fitness, somatotypes and anthropometry of the athletes, multiple correlation analyses were used. To determine the significant relationship of physical fitness and somatotype of the respondents, Pearson r product moment correlations were used. The result showed that there was no significant relationship between physical fitness to somatotype, somatotypes to anthropometry of the respondents. And from the result, there was a highly significant relationship between physical fitness and anthropometry in terms of health related and skill related fitness. And to enhance the athletic performance of athletes a proposed training program was developed.

**Keywords:** Physical fitness, Somatotypes and Anthropometry

## INTRODUCTION

The period has arisen to go beyond the status quo of who gets to participate in sport. The vision of every sport, recreation and physical activity program in the worldwide as an opportunity for inclusion, for involvement by those on the borders. Do that, and lives universally will be enhanced. Sport may be a form of performing and a developing industry, but we have not even reached the beginning of where sport can take us. So much more is yet to be recognized. Using never-ending ways to re-define, re-think and re-imagine sport can create and nurture community and bond people through an ethos of sport for all. Sport is considered as an essential human activity. Its origins stretch back into the depths of history and its contemporary practice reaches across cultures and continents. As stated by Reid, H. (2012), some people dedicate large portions of their lives to it, many people use it as an exercise on a regular basis, and most people at least watch it on television – especially when the Olympic Games come around. Physical education is an essential part of the overall education process, it is a field of endeavor that has as its aim the development of physically, mentally, emotionally and socially fit, people the medium of physical activities that have been selected with a view to appreciating these outcomes.

## RESEARCH PROBLEM

This study aims to investigate the physical fitness, somatotypes, and anthropometry among athletes of Secondary Schools in the Division of Pampanga during the curricular year 2022-2023. The result of this investigation will be the basis of the formulation of the proposed track and field program.

## OBJECTIVES:

- To assess if there is a significant relationship among the physical fitness, somatotypes, and anthropometry of the athletes to their athletic performance.
- To find out the implication of Physical Fitness, Somatotypes, and Anthropometry to the athletic performance of the athletes.
- To come up with a proposed program that may be developed to enhance the performance of the athletes.

## **MATERIAL AND METHODS**

This study made use of mixed method explanatory study. Descriptive correlational design to determine if the respondents' physical fitness, somatotypes, and anthropometry are associated with each other in achieving optimum athletic performance. In the circumstance of this study, the quantitative phase occurred first and helped to classify the appropriate questions for qualitative study. Explanatory studies are used when the determined is to conduct a qualitative phase of the study to help explain the previous quantitative results. Explanatory study allows the researcher to provide deep understanding into a specific subject, which gives genetic to more subjects and provides more openings for the researchers to study new things and questions new things (Yousaf, 2020).

**Part A: Physical fitness test categorized into health-related and skill-related fitness** (standardized tool by Mequi,2004)

**Part B: survey questionnaire was focus on the somatotypes; ectomorph, mesomorph, and endomorph** (adapted from Ben Creicos, 2018)

**Part III includes the anthropometry that was adapted from Bautista (2005)** that includes the Body mass index (BMI), standing and sitting height, chest, mid upper arm, shoulder, waist, hip, thigh, and calf circumference.

## RESULTS

### 1. Physical Fitness of the Respondent

#### 1.1 Respondents' Health-Related Fitness

Table 1

Descriptive Rating on the Health-Related Fitness of Athletes

Health-Related Fitness	Male		Female		Grand Mean	Descriptive Rating
	Weighted Mean	Descriptive Rating	Weighted Mean	Descriptive Rating		
Cardiovascular Endurance	2.60	Normal	2.67	Normal	2.63	Normal
Muscular Endurance	5.33	Excellent Performance	5.13	Very High Performance	5.23	Excellent Performance
Flexibility	3.47	Proficient	3.14	Approaching Proficient	3.31	Approaching Proficient
Muscular Strength	5.33	Excellent Performance	5.20	Excellent Performance	5.27	Excellent Performance

#### 1.2. Respondents' Skill-Related Fitness

Table 2

Descriptive Ratings on the Skill-Related Fitness of Athletes

Skill-Related Fitness	Male		Female		Grand Mean	Descriptive Rating
	Weighted Mean	Descriptive Rating	Weighted Mean	Descriptive Rating		
Agility	4.13	Approaching Proficient	3.07	Developing	3.60	Approaching Proficient
Balance	1.00	Needs Improvement	1.33	Needs Improvement	1.17	Needs Improvement
Coordination	5.47	Excellent	5.79	Excellent	5.62	Excellent
Power	5.27	Advanced	4.87	Proficient	5.07	Proficient
Reaction Time	3.73	Approaching Proficient	3.60	Approaching Proficient	3.67	Approaching Proficient
Speed	5.07	Proficient	3.20	Developing	4.13	Approaching Proficient

## 2. Respondents' Somatotypes

Table 3

### Somatotypes of Athletes

Somatotypes	Male		Female		Total	
	Frequency	Percentage	Frequency	Percentage	Frequency	Percentage
Ectomorph	4	26.67	2	13.33	6	20.00
Endomorph	3	20.00	1	6.67	4	13.33
Mesomorph	8	53.33	12	80.00	20	66.67
Total	15	100.00	15	100.00	30	100.00

## 3. Respondents' Anthropometry

Table 4

### Anthropometry of Athletes

Anthropometry	Male		Female		Grand Mean	
	Mean	Verbal Description	Mean	Verbal Description	Mean	Verbal Description
<b>Body mass index of the athletes</b>	20.66	Normal	19.48	Normal	20.07	Normal
Anthropometry	Weighted Mean		Weighted Mean		Grand	Mean
Standing height	1.70		1.56		1.63	
Sitting height	89.40		82.73		86.07	
Mid-upper Arm circumference	25.00		23.93		24.47	
Shoulder circumference	99.67		96.47		98.07	
Chest circumference	83.47		80.00		81.73	
Waist circumference	71.20		73.13		72.17	
Hip circumference	76.07		83.07		79.57	
Thigh circumference	48.60		50.40		49.50	
Calf circumference	35.33		33.73		34.53	

#### 4. Significant Relationship of Physical Fitness, Somatotypes, and Anthropometry

##### 4.1 Somatotype and Health-Related Fitness

Table 5

Significant Relationship between Somatotype and Health-Related Fitness

	Variables	Pearson r	p-value	Significance
Somatotype	Cardiovascular endurance	.04	.841	Insignificant
	Muscular endurance	-.15	.428	Insignificant
	Flexibility	-.06	.758	Insignificant
	Muscular strength	.01	.965	Insignificant

##### 4.2 Somatotype and Skill-Related Fitness

Table 6

Significant Relationship between Somatotype and Skill-Related Fitness

	Variables	Pearson r	p-value	Significance
Somatotype	Agility	-.337	.069	Insignificant
	Balance	.243	.195	Insignificant
	Coordination	.173	.369	Insignificant
	Power	.290	.120	Insignificant
	Reaction time	-.212	.260	Insignificant
	Speed	-.172	.362	Insignificant

### 4.3 Somatotype and Anthropometry of Athletes

Table 7

Significant Relationship between Somatotype and Anthropometry of Athletes

	Variables	Pearson r	p-value	Significance
<b>Somatotype</b>	Body mass index	0.05	.791	Insignificant
	Standing height	-.225	.232	Insignificant
	Sitting height	-.276	.139	Insignificant
	Mid-upper arm circumference	.142	.453	Insignificant
	Chest circumference	-.024	.901	Insignificant
	Shoulder circumference	.093	.625	Insignificant
	Waist circumference	.0203	.283	Insignificant
	Hip circumference	.213	.257	Insignificant
	Thigh circumference	.179	.344	Insignificant
	Calf circumference	.008	.967	Insignificant

### 4.4 Anthropometry and Health-Related Fitness of Athletes

Table 8

Significant Relationship between Anthropometry and Health-Related Fitness of Athletes

Variables	Cardiovascular Endurance		Muscular Endurance		Flexibility		Muscular Strength	
	P-value	Significance	P-value	Significance	P-value	Significance	P-value	Significance
Body mass index	.619	Insignificant	.240	Insignificant	.965	Insignificant	.004	Highly Significant
Standing height	.349	Insignificant	.030	Significant	.434	Insignificant	.402	Insignificant
Sitting height	.982	Insignificant	.083	Insignificant	.472	Insignificant	.395	Insignificant
Mid-upper arm circumference	.927	Insignificant	.614	Insignificant	.690	Insignificant	.005	Highly Significant
Chest circumference	.832	Insignificant	.532	Insignificant	.026	Insignificant	.001	Highly Significant
Shoulder circumference	.828	Insignificant	.934	Insignificant	.672	Insignificant	.026	Significant
Waist circumference	.425	Insignificant	.503	Insignificant	.662	Insignificant	.011	Significant
Hip circumference	.703	Insignificant	.294	Insignificant	.626	Insignificant	.008	Highly Significant
Thigh circumference	.351	Insignificant	.444	Insignificant	.312	Insignificant	.245	Insignificant
Calf circumference	.765	Insignificant	.315	Insignificant	.418	Insignificant	.021	Significant

#### 4.5 Anthropometry and Skill-Related Fitness of Athletes

Table 9

Significant Relationship between Anthropometry and Skill-Related Fitness of Athletes

Variables	Agility		Balance		Coordination	
	P-value	Significance	P-value	Significance	P-value	Significance
Body mass index	.386	Insignificant	.382	Insignificant	.324	Insignificant
Standing height	.000	Highly Significant	.016	Significant	.294	Insignificant
Sitting height	.000	Highly Significant	.017	Significant	.299	Insignificant
Mid-upper arm Circumference	.455	Insignificant	.183	Insignificant	.700	Insignificant
Chest circumference	.718	Insignificant	.177	Insignificant	.671	Insignificant
Shoulder circumference	.581	Insignificant	.073	Insignificant	.353	Insignificant
Waist circumference	.075	Insignificant	.576	Insignificant	.313	Insignificant
Hip circumference	.001	Highly Significant	.931	Insignificant	.970	Insignificant
Thigh circumference	.040	Significant	.567	Insignificant	.891	Insignificant
Calf circumference	.880	Insignificant	.227	Insignificant	.958	Insignificant

Table 9 (continued)

Significant Relationship between Anthropometry and Skill-Related Fitness of Athletes

Variables	Power		Reaction Time		Speed	
	p-value	Significance	p-value	Significance	p-value	Significance
Body mass index	.000	Highly Significant	.345	Insignificant	.110	Insignificant
Standing height	.151	Insignificant	.127	Insignificant	.000	Highly Significant
Sitting height	.243	Insignificant	.113	Insignificant	.002	Highly Significant
Mid-upper arm Circumference	.008	Highly Significant	.914	Insignificant	.162	Insignificant
Chest circumference	.001	Highly Significant	.647	Insignificant	.515	Insignificant
Shoulder circumference	.022	Significant	.964	Insignificant	.784	Insignificant
Waist circumference	.662	Insignificant	.549	Insignificant	.036	Significant
Hip circumference	.001	Highly Significant	.419	Insignificant	.003	Highly Significant
Thigh circumference	.038	Significant	.854	Insignificant	.278	Insignificant
Calf circumference	.003	Highly Significant	.585	Insignificant	.855	Insignificant



## **Proposed Track and Field Training Program to enhance the Performance of the Athletes**

### **Rationale**

Athletics is an individual sport that the Province of Pampanga produces National and Asian champion. Likewise, the Province also dominated the Central Luzon Regional Athletic Association (CLRAA) both elementary and secondary in 2011 and 2012. Though, the consistency of Pampanga team domination declines from 2013 to present, wherein the province finished as runner up in elementary girls, secondary girl, and secondary boys. Only elementary boys consistently remain triumphant at hand. The turndown of Pampanga's performance is the urgent concern of the track and field training staff. As part of the team, I believe that the physical fitness and Anthropometry characteristics affect the well-being of the athlete which significantly connected to their sports performance. This proposed program on track and field is intended to guide coaches, trainers, and athletes on the basic guide to remain healthy, fit and competing in sports events following the regimens herewith in this program.

The programs will be guided by the following objectives:

1. To provide training programs for the sprint, hurdles, middle distance, long- distance, throwing and jumping events.
2. To provide a time-table for effective implementation of the program
3. To provide a training program that will develop the health -related and skill -related fitness of the athletes

The contents of the program are the following:

- a. Time-table;
- b. Track and field training program

**Time Table**

Month	Activity
June-July	General Preparation
August	Intramural/Selection
September	Cluster Meet/ Pre-competition
October	Transition
November	PASDAM Meet/ Competition
December-January	Transition/Preparation
February	CLRAA/Competition
March-April	Transition/Preparation
May	Palarong Pambansa/Competition

Table 10  
 Proposed Track and Field Training Program to enhance the Performance of the Athletes

Month	Phase	Running Events		
		Resistance Training	Activity	Intensity
June - August	Preparatory	Endurance Training	Warm up Static and dynamic stretching Jog 3-12 laps(sprint middle) Jog 12-24 laps (long) Fartlek Leg Power	Low to Moderate
		Speed	Wind sprint using crouch position Core exercises	
		Power	Starting , 3 at ½ speed Check record Visit Gym (light)	
		Flexibility	Cool down	
		Strength Training		

September - November	Pre - Competition	Speed Reaction time Endurance Skills Fitness Maintenance	Warm up Static and dynamic stretching Jog 3-12 laps(sprint middle) Jog 12-24 laps (long) with time Fartlek Leg Power Core exercises Wind sprint Starting , 3/4 speed at last 50m Speed workout 100- 200 (25m,50m,75m,100m, 125m, 150m, 175m, and 200m) Speed workout at 400m -150m, 200m, 250m, 300m and 400m with time. Check Crouch start at 25m wind sprint Participate weekly relay Apply trials Check marks on relay baton	Moderate to High
September - November	Pre - Competition	Speed Reaction time Endurance Skills Fitness Maintenance	Visit Gym (light to heavy) Check performance record Visual aids Cool down Meeting with coach	Moderate to High
December – April	General Competition	Speed Endurance Fitness Maintenance Skill Maintenance	Warm up Static and dynamic stretching Jog 2-6 laps (sprint middle) Jog 8-12 laps (long) Maintain Endurance Fartlek Leg Power	Moderate to High

May	Transition	Recovery	Wind sprint Starting , 3/4 speed effort Speed workout Participate weekly relay and meet Record performance Cool down Meeting with coach Meeting Recreation Maintain fitness	Low
<b>Jumping Events</b>				
Month	Phase	Resistance Training	Activity	Intensity
June - August	Preparatory	Endurance	Warm up Static and dynamic stretching Jog 2-4 laps Fartlek Leg Power	Low to Moderate
		Flexibility	Starting , 3 at ½ speed Participate school	Low to Moderate
		Strength Training	Intramurals Visit Gym (light) Cool down Check personal records	
September - November	Pre – Competition	Speed	Warm up Static and dynamic stretching Jog 2-4 laps Fartlek Leg Power	Moderate to High
		Power	combination (check high knees and bouncing drills) Wind sprint using standing position Speed workout 100-200 (25m,50m,75m,100m, 125m, 150m, 175m, and 200m Check field and check marks Box drill exercises Visit Gym (light) Visual aids	
		Skills		
		Agility		
		Strength Training		
		Fitness maintenance		



September - November	Pre – Competition	Agility	Visit Gym (focus on muscular strength and endurance)	Moderate to High
		Strength Training	Speed at least 50m with ¾ effort Check techniques	
		Fitness Maintenance	-short and long approach	
		Strength	Throws -stand throws	
		Training	Follow throw with speed Participate weekly meets or	
		Fitness	relays Follow throw with speed	
December - April	General Competition	Maintenance	Participate weekly meets or relays Visual aids Practice with checkmarks Cool down Experiment Progress assessment (meet, trial, simulation and control test) Set personal records	Moderate to High
		Speed	Warm up	
		Power	Static and dynamic stretching	
		Skills	Jog 1-2 laps	
		Fitness Maintenance	Fartlek Leg Power (plain and combinations)	
		Skills Maintenance	Wind sprint (light) Visit check marks Check techniques -short and long approach	
May	Transition	Recovery	Throws -stand throws Record performances Talk with coach Recreation Maintain fitness Rest	Low

## DISCUSSION

The data gathered from the physical fitness of the respondents reveals that in Health-Related fitness it can be noted that both male and female athletes has a descriptive rating of Excellent Performance in muscular endurance and muscular strength. While, Approaching Proficient for flexibility, and Normal for cardiovascular endurance. On the other hand, for the athletes' Skill-Related fitness, the descriptive ratings were Excellent for coordination, Proficient for power, and Approaching Proficient for reaction time and agility. While, Needs Improvement for balance. The data revealed 66.7% of the respondents' somatotype were mesomorph, 20.0% were ectomorph and 13.3% were endomorph. Descriptive statistics for anthropometric variables were: for the Body Mass index of the athletes, it reveals that both male and female athletes were normal having a mean of 20.07. Furthermore, a weighted mean of 98.07 for shoulder circumference, 86.07 for sitting height, 81.73 for their chest circumference, 79.57 for hip circumference, followed by 72.17 for waist circumference, 49.50 for thigh circumference, 34.53 for calf circumference, then 24.47 for their mid-upper arm circumference, and lastly 1.63 for their standing height. Furthermore, there was no significant relationship between the somatotypes of the athletes and their Health-related fitness, athletes' somatotypes and their skill-related fitness, and between athletes' somatotypes and their anthropometry. The result can be gleaned that with the computed p-value of .030 for standing height, there is a significant relationship between standing height and muscular endurance. Moreover, with a computed p-value of .004 for body mass index, .005 for mid-upper circumference, .001 for chest circumference, and .008 for hip circumference resulted as highly significant to muscular strength. While, with a computed p-value of .026 for shoulder circumference, 0.21 for calf circumference, and .011 for waist circumference showed significant relationship with muscular strength. The result also shows that with the computed p-value of .000 for standing height and sitting height, and with .001 for hip circumference it reveals that there is a highly significant relationship between standing height, sitting height, and hip circumference and agility.

However, thigh circumference with a p-value of .040 shows that there is only a significant relationship with agility. On the other hand, there is a significant relationship with a p-value of .016 for standing height and .017 for sitting height to balance. In addition, with a computed p-value of 0.000 for body mass index, .008 for mid-upper arms circumference, .008 for chest circumference, .001 for hip-circumference and .003 for calf circumference reveals that there is a highly significant relationship among body mass index, mid upper arm circumference, chest circumference, hip circumference, and calf circumference to power. A significant relationship is evident for shoulder circumference with a p-value of .022 and .038

for thigh circumference to power. Furthermore, standing height got a p-value of .000, sitting height with a p-value of .002, and a p-value of .003 for hip circumference it shows that there is a highly significant relationship among standing height, sitting height and hip circumference to speed. Lastly, there was a significant relationship between waist circumference and speed with a p-value of .036 For the implications, the data gathered shows there is an implication for both identifications of those predisposed to perform well in sports containing better Anthropometry and physical fitness. To enhance the performance of the athletes, an annual track and field training program was developed. Moreso, the proposed training program can also be used by the training staff of the Schools Division of Pampanga for achieving the optimum performance of the students' s athletes.

## CONCLUSION

The proposed training program is organized for athletes to develop their weak areas as it relates to their endurance and strengths. In addition, getting them within the shape they should be can help them prepare for certain competitions, both mentally and physically.

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