

# Training Environment And Athlete Runners' Physical Development: Basis In Designing Cross Training Program

DONNAVIE F. RODAS

Teacher II Camflora National High School, Division of Quezon Quezon Province

## DARWIN D. OFRIN, Ed.D.

darwin.ofrin@lspu.edu.ph

*Abstract* — Cross-training is a popular method of designing a training schedule to boost competitive performance in a particular sport by engaging in a number of different activities. Few scientific research has looked into this specific form of training, despite a large number of anecdotal reports suggesting benefits.

Generally, this study aims to design a cross-training program for athlete runners based on their training environment and physical development. Purposive sampling was used since the study requires specific information from a particular subset of the population of interest. The study involves athlete runners in Camflora National High School that are currently enrolled for the SY 2021 - 2022. Based on the results of the study, training environments have significant impact depending on the Physical Development parameters. Cycling should be considered if the athlete is considering physical development in endurance, flexibility, power, agility, speed, and balance. Then swimming should be considered if the athlete is considering physical development in endurance.

## Keywords — Training environment, Cross Training, Cycling, Swimming, Athlete Runners

## I. Introduction

The early 2020 coronavirus outbreak exhibited the same hallmarks as previous pandemics. Its effects were vast and evident in many spheres, including the economy, politics, social life, and health.

The pandemic, being a virus based as it is, has caused dilemmas in the physical health of the people. It forced the global population to alter their daily routines, including their exercise habits. This unusual circumstance has ramifications for all individuals, including elite and recreational athletes. Life on lockdown has been challenging because everyone must maintain their safety and health while adhering to new norms. Now, overall mitigation strategies have been implemented to control the increasing spread of COVID-19. These measures include lockdown, social distancing, personal protective measures, and environmental and surface cleaning (Lim and Pranata, 2020). The COVID-19 pandemic has deranged organized sport in the community, as authorities have canceled, significantly modified, or postponed sporting events as part of a scheme



to contain the virus's spread. This profoundly affected young athletes and their respective families regarding psychosocial, physical, and career advancement concerns.

The Department of Education suspended organized sports events in the Philippines on May 5, 2020. Palarong Pambansa 2020 and other crowd-drawing events have been suspended to ensure the safety of athletes, coaches, technical officials, and others involved. Inter-school sports tournaments, which attract large crowds, have been suspended as a precautionary measure against the spread of the COVID-19. The young athlete is ecstatic at the prospect of training, honing their skills, and competing. To combat the spread of SARS-CoV-2, authorities have implemented lockdowns, closed sporting venues and schools, and limited public gatherings. The 18-month hiatus from the organized sport has been difficult for young athletes, coaches, and institutions as they adjust to new routines, uncertainty about training and competitions, and, for the most elite, the end of their professional sporting careers (Fitzgerald et al., 2021).

Sports training is an important part of the sports preparation process because it is a physical and educational process based on exercises to improve the physical preparation components necessary for achieving the highest level possible in sports, using a variety of training methods and load formation and rest intervals. It focuses on the physical and psychological aspects of sports. The athlete can continue training in the future during the transitive phase. When an athlete likes alternative hobbies, his or her body becomes stronger, his or her mind becomes clearer, and his or her motor performance improves in the upcoming training season. Getting in the way of training has a passive effect on training, particularly in competitive sports that need muscular strength, flexibility, response speed, agility, and power.

The researcher hopes to use the results of this study to create a cross-training program for novice runners that will help them improve their training environment and physical development. The researcher is a Physical Education teacher at Camflora National High School, she had the bravery to perform this research study. The goal of this research is to develop a sports program that is appropriate for the school and community setting, as well as to determine the extent to which the school's sports program is adequate or effective. The goal of this research is to improve the sports management of Camflora National High School sports program.

## **Literature Review**

Humans have participated in sports since the earliest day of existence. Perhaps not as sports are viewed currently but running during a hunting brigade or jumping over a stream involved motions that are still used today. With the introduction of competitive sports, most notably from the Greek and Romans, scientist began looking for ways to improve athletic performance and, ultimately factors that contribute to sports performance. In addition to these, external factors such as playing environment, proper diet, sleep, emotions, and the team environment may also influence sports performance. (Dabl, 2013)



In 1998, the Department of Education Culture and Sports (DECS) helped schools in promoting physical fitness in the youth. With this, it results different schools in the Philippines offered different sports programs in accordance with Executive order no.44, which stated that "the state shall promote physical education and encourage sports programs to foster self-discipline, teamwork, and excellence for the development of a healthy and alert citizenry. All education institutions shall undertake regular sports activities throughout the country in cooperation with athletic clubs and other sectors".

Moreover, creating a program that is localized is one way to promote sports and encourage high school students to join and participate in the sports program which the cross training program.

Cross-training is a great way to condition different muscle groups, develop a new set of skills, and reduce the boredom that creeps in after months of the same exercise routines. Cross-training also allows you the ability to vary the stress placed on specific muscles or even your cardiovascular system. After months of the same movements, your body becomes extremely efficient at performing those movements, and while that is great for competition, it limits the amount of overall fitness you possess and reduces the actual conditioning you get while training; rather than continuing to improve, you simply maintain a certain level of fitness. (Quinn, 2019)

"Swimming is a perfect complement to running and can be easily integrated into a runner's training plan," says Mineo. "Initially, swim sessions should follow long run days to serve as an active recovery, flushing out and shaking off yesterday's miles. While these swimming workouts won't be your key training sessions, they will provide a nice break in the week from time on your feet." (Nystrom, 2020)

Cycling has a lower impact compared to running. The continuous pounding on the firm pavement from running is non-existent as you pedal. After training with extended rides after your daily run, you can also increase your endurance and run further later in your training. It may be hard to find the time to run and cycle on the same day. However, if you are training for a long-distance running event it will lower your risk of becoming injured in your training. (Harry, 2022)

Cycling is an endurance activity. When we think of "endurance," we frequently just consider aerobic endurance, which is crucial but not the only aspect of cycling performance. Moreover, the increase in muscle strength also improves your speed and endurance during a run because you work on different muscle groups. The key factor that helps during the run is that the muscle groups in biking complement the muscles you use for running, which improves your performance over time. The key reason you want to add biking to your training routine is that you get the same results without the long-distance run that harms your knees, ankles, and hips. By transferring your cadence immediately from a bike to a run, you spike up your heart rate and you gain muscle strength. Riding a bike improves your performance as a runner by increasing your endurance, building up your muscles, and reducing the risk of injuries to your legs and hips. As you complete more brick workouts, you should notice a positive change in your running technique,



speed, and ability to keep going during a marathon or long-distance running event. (Nordictrack, 2020)

The importance of warm–up exercises should be considered by anybody who works out. Although warm-up is probably won't help much with burning calories or building muscle, they're crucial to the success of a workout. It will help to increase body and muscle temperature, reduce the athlete runner risk of injury, help the runners to mentally prepare, increase the flexibility, which will help with other exercise. (Cordier, 2018)

Cross training exercises that complement the muscular demands of running by relying on opposing muscles are also ideal because they can help correct muscle imbalances and make you a more resilient athlete. For example, cycle puts different demands on your quads, glutes, and hamstrings, so it can be a good adjunct to running. (Sayer, 2021)

Agility training is an essential component for improved athletic performance. Agility combines speed, balance, strength, coordination, and body control in one movement. Working up your agility will improve these areas of fitness. It improves balance and stability and improves coordination. Agility drills can develop. Performing agility drills repeatedly can develop an athlete's ability to move with less energy being exhausted. Agility training works out the mind to improve cognitive abilities, such as focus and concentration. ((Recovapro, 2020)

Speed Training is one of the most important aspects that should be incorporated for all athletes who serve to benefit from it. The benefits of Speed Training are many and can truly help athletes and sports teams increase in their athletic potential. Speed Training involves the increase in muscle power through both speed, technical guidance, and increased range of motion. As athletes enter each stage of Speed Training, the exercises and drills become easier with greater explosive force behind each repetition. raining for Speed — to improve running speed requires a training program that focuses on leg strength and power, with appropriate technique training to best utilize your strength and power development. (Barry, 2020)

When an athlete has good balance, they can improve their coordination, ease of movement, and stability. (Fletcher, 2022) "Running is, essentially, jumping from one leg to the other. So, if you aren't stable and have trouble just balancing on one leg, that is going to impact both how well you run and your risk of getting injured when you run," says Polly de Mille, C.S.C.S., a certified exercise physiologist and the clinical supervisor of the Tisch Sports Performance Center at the Hospital for Special Surgery in New York (Mackenzie, 2018)

According Burton et al, (2008) and Tenenbaun & Eklund, (2007) as cited by Kelly, A. (2020). The purpose of training is to improve the athlete's technique, skills, tactics, and self-development. Athletes will spend hours and hours, days and days, weeks, and weeks even years and years working on techniques, skills, and tactics.



Campbell et al (2018) said that "sport participation represents recreational and leisure activities which promote social, mental and physical fitness". The sport should be one in which they show an interest as it has been shown that individuals are more likely to take part in an activity that they enjoy. Often the young athletes may be participating in an activity not because they have an interest but because their parent wants them to. The disinterest on the part of the athlete may lead to them not participating at the highest level even if they have the passion for the sports.

According to Saleh (2014) "Effect of using cross-training on some physical abilities and single and composite skill performance level " stated that training program using cross-training led to development of some special physical abilities (speed, agility, muscle ability, flexibility) within research sample, development of some composite within football juniors research sample and clear improvement rates.

According to Jacques (2018) "Analysis of current fitness expectations and the effects of cross-training implementation on collegiate Athlete" stated that specific training may lead to overuse injuries without the supplementation of a full body conditioning program. If athlete participate in a cross-training program designed to include all the components of fitness (strength, endurance, power, body composition, balance, agility, and flexibility), with emphasis on balancing muscular strength, this may result in a reduction of common overuse injuries as well as improve performance and physical ability.

# II. Methodology

This study used descriptive comparative design. The study also employed the experimental research. This study is experimental design because the researcher measured the effect of cross training which is the swimming and cycling for athlete runners. Athlete Runners were involved in gathering information using measuring before and after the physical development.

## **Respondents of the Study**

The study, titled "Training Environment and Physical Development of Athlete Runners: Basis for Designing a Cross-Training Program," was conducted at Camflora National High School in San Andres, Quezon. The respondent population consisted of 80 high school student-athlete runners. The primary reason for selecting high school student-athletes as respondents are that they are the ones who receive physical training and development to perform at a level physically and athletically. The study's objective is to develop a cross-training program tailored to the athlete's environment and physical development. The respondents were strictly limited to Camflora National High School athlete runners, as they are the primary variable in the study.

## **Sampling Techniques**

The research sample comprised of athlete runners who undergo physical training in San Andres, Quezon. The researcher used purposive sampling since the study requires specific



information from a particular subset of the population of interest. Purposive sampling is a nonprobability sampling technique where the researcher relies on their discretion to choose variables for the sample population. The study involved the athlete runners in Camflora National High School that are currently enrolled for the SY 2021 - 2022. The number of respondents were 80athlete runners.

#### **Research Instrument**

The researcher used the two-group measurement before and after the training design involves three steps: (1) measuring the physical development before the training or the dependent variable; (2) applying the experimental treatment to the athlete runners; (3) administering a physical development after the training, again measuring the dependent variable. Differences attributed to application of the experimental treatment are then evaluated by comparing the before and after measurement/score.

#### **Research Procedure**

The following procedures were followed in the gathering data relative to the conduct of the study. The researcher secured request letter and ensured permission to conduct the study from the San Andres district supervisor. Upon approval, the researcher sent letter to the principal for the collection of data of the athlete runners' physical development before the training program and present the training program. The researcher also seek permission from the school sports program coordinator for the training program. After giving the instruction, coaches and physical education teachers help the researcher to administer and measure the warm-up, technical drives, and time duration, and collect the result of physical development measurement. After applying the experimental treatment, the coaches and physical education teachers help the researcher to administering the result of physical development after the training. The data in this study were collected through their physical education teacher which also serve as the main instrument. Lastly, was tabulated and computed with the help of a statistician for presentation, analysis, and interpretation of data. Throughout the study, the researchers done gathering of data for all the above variables themselves for the purpose of the security and confidentiality of the results.

## **Statistical Data**

After gathering all the profiles and answers from the questionnaires provided; the following statistical tools were used for the interpretation of results relative to the sub problems. To answer descriptive question frequency, percentage, mean standard deviation were use. Frequency/Percentage to indicates the level of the respondents in performing the cross training.

Weighted Mean to shows the typicality of respondents in terms of the respondent's perception/ training program and physical development of athlete runners. To measure the significant difference between the measurement before and after attending the training



environment, t-test was employed. For test of significant difference between physical development of the runners after attending the training environment t-test was employed.

## III. Results and Discussion

T This chapter deals with the presentation, analysis, and interpretation of data used by the researcher in this study.

## Frequency and Percentage level of Athlete Runners as to Training Environment

Score	Warm-up		Technique		Time		Interpretation
			Drills		Duration		
	f	%	F	%	f	%	
25-30	19	47.5	16	40.00	16	40.00	Very Highly Observed
19-24	15	37.5	13	32.5	15	37.5	Highly Observed
13-18	5	12.5	7	17.5	7	17.5	Moderately Observed
7-12	1	2.5	4	10.00	2	5.00	Slightly Observed
0-6							Not Observed
Total	40	100%	40	100%	40	100%	

**Table 1.** Distribution of Respondent as to Training Environment (Cycling)

## Legend:

0-6 Not Observed (NO) 7-12 Slightly Observed (SO) 13-18 Moderately Observed (MO) 19-24 Highly Observed (HO) 25-30 Very Highly Observed (VHO)

As shown in Table 1, Respondents as to Training Environment in Cycling, 19 got the highest percentage that is equal to 47.5 % of the athlete runners' warm-up, 16 or 40.00 % technical drives and 16 or 40.00 % time duration obtained scores ranging from 25-30 interpreted as very highly observed. However, there were 1 or 2.5 % of athlete runners warm-up, 4 or 10.00% technical drives and 2 or 5.00 % who got scores ranging from 7-12 interpreted as slightly observed.



Score	Warm-up		Technique Drills		Time		Interpretation
					Duration		
	f	%	F	%	f	%	
25-30	18	45.00	17	42.5	17	42.5	Very Highly Observed
19-24	16	40.00	15	37.5	15	37.5	Highly Observed
13-18	5	12.5	5	12,5	7	17.5	Moderately Observed
7-12	1	2.5	3	7.5	1	2.5	Slightly Observed
0-6							Not Observed
Total	40	100%	40	100%	40	100%	

Table 2. Distribution of R	espondent as to Training	<i>Environment (Swimming)</i>
----------------------------	--------------------------	-------------------------------

#### Legend:

0-6 Not Observed (NO)

7-12 Slightly Observed (SO)

19-24 Highly Observed (HO) 25-30 Very Highly Observed (VHO)

13-18 Moderately Observed (MO)

As shown in Table 2, Respondents as to Training Environment in Swimming, 18 got the highest percentage that is equal to 45.00 % of the athlete runners' warm-up, 42.5 % technical drives and 42.5 % time duration obtained scores ranging from 25-30 interpreted as very highly observed. However, there were 2.5 % of athlete runners warm-up, 7.5% technical drives and 2.05 % who got scores ranging from 7-12 interpreted as slightly observed.

## Frequency and Percentage level of Runners Before Exposing to Training Environment

In this study, the following presents the frequency and percentage for the measurement of runners before exposing to cycling and swimming training environments in terms of endurance, flexibility, power, agility, speed, and balance.

In this study, the following presents the measurement of runners before being exposed to a cycling and swimming training environment in terms of endurance, flexibility, power, agility, speed, and balance.

Table 3. Athlete runners' physical development before exposing to training environment



	Training Environment										
Athlata	Cycling			Swimmi	Swimming						
Runners	Mean	Standard Deviation	Verbal Interpreta	ation Mean	Standard Deviation	Verbal Interpretatio n					
Endurance	22.13	4.56	Good	19.95	3.89	Good					
Flexibility	50.43	7.81	Very Good	d 51.12	8.18	Very Good					
Power	wer 144.73 12.26		Good	138.9 5	10.89	Good					
Agility	12.70	2.92 Good		12.90	3.64	Good					
Speed	6.81	0.40	Good	6.61	0.52	Good					
Balance	Balance 78.58 17.61 Fair		Fair	82.03	22.40	Good					
Legend:					-						
Muscula	r		Flexibili	ty	Po	Power					
33 and above	Excellent	61 and al	61 and above E		201 and a	above Excellent					
25-32	Very Good	46-6	0.9	Very Good	151-200	Very Good					
17-24	Good	31-4	15.9	Good	126-150	Good					
9.6	Fair	16-3	30.9	Fair	101-121	Fair					
1-8 Needs	Improvement	0-15	.9 0.	Needs Improvement	55-10	Needs improvement					
Cannot Execute	Poor										
Agility			Spee	d	Balance						
5 and below Excellent Below		elow 5.5		Excellent	161-180	Excellent					
6-10	LO Very Good		5.6-6.1	Very Good	121-160	Very Good					
11-15	Good		6.2-7.2	Good	81-120	Good					
16-20	Fair		7.3-8.5	Fair	41-80	Fair					
21-25	Needs Impro	vement	8.6 above	Needs Improvement	1-40	Needs Improvement					
Over 25	Poor										

Table 3 displays the mean distribution of the measurement of runners before exposure to cycling and swimming training environments. From the obtained data in table n, in terms of the body composition under the cycling and swimming training environment, it was interpreted as "normal" with a mean of 19.28 and 19.43 wherein it implies that high school student athletes have a good body composition. Moreover, the results further support the study of Suwalska (2012) that young people who study physical education are a priority regarded as having proper body structure and body composition.

In terms of endurance, it displays that the mean of the training environment is equal to 22.13 and 19.95, interpreted as "good" implying that student – athlete runners have a great physical strength. Furthermore, cross training exercises that complement the muscular demands of running by relying on opposing muscles are also ideal because they can help correct muscle imbalances and make you a more resilient athlete. In addition, under the flexibility, the mean obtained is equal to 50.43 and 51.12 which is interpreted as "very good"

whereas it means that it has a positive effect in the high school athlete runner's body. Being flexible allows your muscles to remain mobile. As stated by Paul (2016), boosting your upper body strength and core help maintain good running form, especially over long miles, so it's good to concentrate on these areas. In addition, flexibility exercises will keep them supple. And alternative endurance activities will help heal existing injuries while preventing future ones. (Fitzgerald, 2018)



Moreover, in terms of power, agility, and speed with a mean of 12.26, 2.92, and 0.40 respectively interpreted as "good" implying that the athlete runners focus on the ability to overcome resistance. Moreover, activities and exercises must be set according to their strengths, weaknesses, abilities, and potentials so that the training plan can become attainable and successful for the athletes. Thus, a good training plan also means a plan that can be easily and smoothly implemented to different types of athletes.

Lastly, the mean obtained in terms of balance under the cycling training environment has a mean of 78.58 and a standard deviation of 17.61 which is interpreted as "fair" implying that high school athlete runners have a poor balancing skill. In addition, Nattapon Kumyaito et. al, (2018) states that. a poorly developed and executed training plan may result in injury and other possible negative impacts to the athletes. Hence, good training plans normally require group or expert input, which may have taken a lot of time, efforts, and support particularly to beginner athletes.

Therefore, the results for the measurement of runners before exposure to the training environment in terms of body composition, muscular, flexibility, power, agility, speed and balance has a positive physical strength and abilities for the high school student athletes.

## Athlete runners' physical development after attending to training environment

In this study, the following presents the measurement of runners after attending a cycling and swimming training environment in terms of body composition, muscular, flexibility, power, agility, speed, and balance.

		Training E				
Athlete	Cycling			Swimm	ing	
Runners	Mean	Standard Deviation	Verbal Interpretation	Mean	Standard Deviation	Verbal Interpretation
Endurance	25.10	4.47	Very Good	21.00	3.93	Good
Flexibility	56.06	7.59	Very Good	52.39	8.02	Very Good
Power	147.18	12.72	Good	140.5 5	12.55	Good
Agility	9.28	3.29	Very Good	10.98	4.10	Very Good
Speed	6.54	0.42	Very Good	6.56	0.52	Very Good
Balance	85.35	17.36	Good	83.33	22.40	Good

Table 4. Athlete runners' physical development after exposing to training environment

Table 4 shows the result for the endurance has a mean of 25.10 for the cycling training environment interpreted as "Very Good" and 21.00 for the swimming training environment which is interpreted as "Good". It indicates that the high school student athletes develop a more efficient skill. According to Abbate (2020), increases in muscular strength improve performance measures in running. It has been shown that runners who undergo a strength training protocol. Not only are



there benefits to the performance properties of running, but to the two (2) mechanical aspects as well. Strength training has been shown to enhance running gait mechanics in ways to potentially reduce risk of injury.

For the flexibility of the high school student athletes, the table shows that it has a mean of 56.06 and 52.30 in terms of both cycling and swimming training environments which are interpreted as "Very Good". It implies that the student athletes have a greater flexibility which also means a greater range of motion around your joints, which helps you further the full potential of your muscles. As stated by Paul (2016), if you want to focus on improving muscle strength and/or muscle flexibility, then look at adopting weight training, Pilates, yoga, or other exercise classes. It also doesn't hurt to incorporate one day of cardio cross-training and one day of muscular strength and flexibility training. However, there are many benefits to all forms of cross-training, so it's hard to say that one is better than another.

Furthermore, the measurement of the runners after attending in terms of power and balance which has a mean 147.18 and 18.25 for the cycling training environment is interpreted as "Good". On the other hand, for the swimming environment, it has a mean value of 140.55 and 83.33 which are interpreted as "Good". Thus, the result indicates that the runners have the ability to retain the center of mass above the base of support when stationary or moving and the ability to perform strength-based movements quickly. In addition, when developing a cross-training routine, the possibilities are endless. Cardiovascular exercise while cardio primarily works your heart and lungs, these exercises all work on various muscle groups. It is also consider adding speed, <u>agility</u>, and <u>balance drills</u> to your regular cardio workout. Strength Training, flexibility and balance training and lastly determining cross-training frequency (Quinn, 2019).

Lastly, the measurement after attending a training environment in terms of speed, it has a mean of 6.54 and 6.56 and for agility it has a mean of 9.28 and 10.98 which is interpreted as "Very Good" for both cycling and swimming. The result indicates that the high school student athlete has the ability to move the body in one direction as fast as possible and the ability to accelerate, decelerate, stabilize, and quickly change directions with proper posture. Moreover, improving movement economy through better mobility and running drills is a form of "free speed". In addition, the ability to move smoothly and efficiently decreases the incidence of overuse injuries due to compensations. (Falk, 2018)

Hence, this study can conclude that the measurements of high school athlete students after being exposed to a swimming and cycling training environment may lead to an improvement in individual performance. As per the study of Jacques (2018), if athletes engage in a cross-training program made to incorporate all the elements of fitness (strength, endurance, power, body composition, balance, agility, and flexibility), with an emphasis on balancing muscular strength, this may reduce the risk of overuse injuries while also enhancing performance and physical capability.



Furthermore, Saleh's (2014) study titled "Effect of using cross-training on some physical abilities and single and composite skill performance level," found that cross-training programs helped athletes to develop some composite skills as well as some special physical abilities (speed, agility, muscle ability, flexibility).

**Table 5** Test of Difference on the physical development of the runners before and after attending the training environment

Training	Physical	Paired		Т	Interpretation	Sig. (2-tailed)
Environment	Development	Differences			*Significant	
	in terms of	Mean SD			at 0.05	
		Diff				
	Muscular	-2.98	1.89	-9.967	Significant	0.000
Cycling	Flexibility	-5.63	4.01	-8.873	Significant	0.000
	Power	-2.45	2.28	-6.810	Significant	0.000
	Agility	3.43	1.99	10.909	Significant	0.000
	Speed	0.26	0.24	6.937	Significant	0.000
	Balance	-6.77	3.03	-14.163	Significant	0.000
Swimming	Body	0.07	0.18	2.440	Significant	0.019
	Muscular	-1.05	1.77	-3.756	Significant	0.001
	Flexibility	-1.27	1.53	-5.224	Significant	0.000
	Power	-1.60	5.12	-1.975	Not	0.055
					Significant	
	Agility	1.93	2.02	6.034	Significant	0.000
	Speed	0.06	0.09	3.908	Significant	0.000
	Balance	-1.30	1.65	-4.978	Significant	0.000

Based on the result of the study under the training environment Cycling, it was revealed that in terms of the physical development in terms of body; there is no significant difference between the physical development before and after attending the training environment. On the contrary, under the physical development in terms of muscular, flexibility, power, agility, speed, and balance; the absolute t-values are greater than t = 2.02. With this, we can reject the null hypothesis and confirm that there is a significant relationship between the before and after training on the measurement of the covered variables. Similarly for the training environment Swimming. It was also revealed that in terms of physical development in terms of power; there is no significant difference between the physical development before and after attending the training environment. On the contrary, under the physical development in terms of endurance, flexibility, agility, speed, and balance; the absolute t-values are greater than t = 2.02. With this, we can reject the null hypothesis and confirm that there is a significant relationship between the physical development of the runners of endurance, flexibility, agility, speed, and balance; the absolute t-values are greater than t = 2.02. With this, we can reject the null hypothesis and confirm that there is a significant relationship on the physical development of the runners before and after attending the training environment of the runners before and after attending the training environment of the runners before and after attending the training environment of the runners before and after attending the training environment of the runners before and after attending the training environment of the runners before and after attending the training environment of the runners before and after attending the training environment.



The study of Vaara (2020) had emphasized in his research that cycling as an alternative to commuting may have shown further improvements in terms of endurance; there is similarly no significant change between the body composition or physique of the result.

Meanwhile, cycling promotes relevant improvements to almost every aspect of physical developments (Bourne, Sauchelli, and Perry, 2018) which is supported further by this study. The training associated with cycling is often promoted due to the health benefits it impacts especially to inactive individuals. Cycling can be often associated with other activities in daily routines as an alternative to walking and running, which can be a challenge in extracting cycling-specific health outcomes (Oja, 2021). However, through the results of this study; we can conclude that cycling as a training environment is a strong program to recommend especially for those who are aiming for physical development in terms of muscular, flexibility, power, agility, speed, and balance.

With regards to a training environment under swimming; it can be interpreted that it can be promoted as well for physical developments in terms of, endurance, flexibility, agility, speed, and balance. This is complementary with another study (Chase, Sui & Blair, 2020) that showed that swimming produces healthy improvements with regards to flexibility, endurance, aerobic capacity, muscle mass, body composition and quality of life. It has been shown that the improvements with swimming are highly similar with exercises focused on running as well; thus, we can associate the results to similar training.

Swimming is often eyed on as an activity of athletes as an effective exercise to improve multiple body muscles however it has a significant downtime in comparison to other exercise (Paul, 2016). As power focuses more on the effective and fast utilization of strength, swimming is much more particular with muscle endurances. This is supported by another study (Ji, Yoon & Oh) which shows that for elite adolescent swimmers, the exercise has a significant difference for coremuscular functions but no significant differences between Anaerobic and Core Power. With this; we can conclude that swimming as a training environment is a solid program to endorse especially for those who are aiming for physical development in terms of muscular, flexibility, agility, speed, and balance.

Through the findings of this study; cycling and swimming are both recommendable as a training environment for athletes. An effective training plan should consider the aspects the athlete wants to be improved on (Nattapon Kumyaito et. al, 2018); which requires careful setting and identification of goals to complement the athlete needs. The results indicate only one factor difference between both training environments; Cycling should be considered if the athlete is considering physical development in muscular, flexibility, power, agility, speed, and balance. Then swimming should be considered if the athlete is considering physical development in endurance, flexibility, agility, speed, and balance.



		Mean	SD	t	df	Sig. (2-
						tailed)
ENDURANCE	Swimming	25.10	4.47	4.360	78	0.000
	Cycling	21.00	3.93			
FLEXIBILITY	Swimming	56.06	7.59	2.104	78	0.039
	Cycling	52.39	8.02			
POWER	Swimming	147.18	12.72	2.344	78	0.022
	Cycling	140.55	12.55			
AGILITY	Swimming	9.29	3.29	-2.044	78	0.044
	Cycling	10.98	4.10			
SPEED	Swimming	6.54	0.42	-0.118	78	0.906
	Cycling	6.56	0.52			
BALANCE	Swimming	85.35	17.36	0.452	78	0.653
	Cycling	83.33	22.40			

**Table 6.** Test of difference on the physical development of the runners after attending the<br/>training environment

Based on the result of the study after training environment Cycling, it was revealed that in terms of the physical development in terms of speed and balance; there is no significant difference between physical development of the runners after attending the training environment. On the contrary, under the physical development in terms of endurance, flexibility, power, agility, and speed the training environment; there is a significant difference between physical development of the runners after attending the training environment of the runners after attending the training environment.

## IV. Conclusion

Based on the results of the study, the training environment has a significant impact depending on the Physical Development parameters. The initial good physical measurement of the student runners in Camflora National High School was further improved when they were exposed to both cycling and biking environments. With this, cycling and swimming are both recommendable as a training environment for athletes. Both training environments have a positive impact across all Physical Development and should be integrated once a training plan is considered for the runners. Cycling should be considered if the athlete is considering physical development in endurance, flexibility, power, agility, speed, and balance.



#### REFERENCES

- [1] Abbate, E. (2020). Distance Running. 24 Life, 7.
- [2] Ali, A. R. (2012). Effect of Using Cross-Training on Improving Power Endurance,. World Journal of Sport Sciences , 467.
- [3] Alvar, R. (2018). Training Tips. Journal strenght and Conditioning Training, 25.
- [4] Andrew, S. (2020). TRAINNINGPEAKS. Cross-Training for Runners: Mix Up Your Marathon Training, 21.
- [5] Bailey, M. (2019). India Today. India: India Today Web Desk.
- [6] Barry, C. C. (2020, July 26). The Benefits of Speed Training for All Athletes. Retrieved from<br/>EclipseEclipseTrackandFieldClub:https://www.eclipsetrackandfieldclub.ca/profile/axelleschadskaya/profile
- [7] Bellis, M. (2019). A Brief History of Sports. ThouhtCo., 2.
- [8] Blog, N. (2022). NordicTrack Blog. Retrieved from How Biking Can Make You Run Faster: https://www.nordictrack.com/learn/how-biking-can-make-you-run-faster/
- [9] Buckingham, M. (n.d.). The Benefits of Power To the Runner. Retrieved from www.realbuzz.com: https://www.realbuzz.com/articles-interests/running/article/the-benefits-of-power-to-the-runner/
- [10] Carpenter, H. (2019). Born to Run: Why Do East Africans Dominate Long Distance Runnning Events? Training and Performances, 2.
- [11] Coaching, W. (2007, October 19). Health, Recovery, Training. Retrieved from Flexibility is Key to Performance: https://www.wenzelcoaching.com/ blog/flexibility-is-key-toperformance/
- [12] Connel, G. (2021). Trail Runnning. Athletic Journal, 24.
- [13] Cordier, A. (2018, February 9). FIT ATHLETIC SAN DIEGO BEST GYM. Retrieved from 5 REASONS WHY WARM UP EXERCISES ARE IMPORTANT: https://fitathletic.com/5-reasons-warm-exercises-important/
- [14] Crowley, T. (2020). Components to a Successful Training Plan. Training Peaks, 51.
- [15] Dahab, G. (2020). Off-road Training. Training Peaks, 27.
- [16] Dahab, M. (2020). Strenght Training in Children and adolescents. Sports Health, 25.
- [17] Deelen Sef.(2019)."A cross-sectional study on physical environmental characteristics and runners' motives and attitudes, in relation to the experience of the running environment" c.2019, vol.14, p. 164-178. Retrieved from https://vblsu.it/elaba:53896492/
- [18] Eduardo V. Cipriano, M. K.-H.-S.-L. (2018). The 21st Century MAPEH in Action. 84-86 Florentino St., Sta. Mesa Heights, Quezon City: Rex Bookstore, Inc.
- [19] Falk, F. (2018). Strength training . Exercise Sports, 86.
- [20] Fisher, M. (2019). the Atlantic. Why Kenyans Make Such Great Runners: A Story of Genes and Cultures, 10.
- [21] Fitzgerald, M. (2018). Runner's World Guide to Cross-Training. In M. Fitzgerald, Runner's World Guide to Cross-Training. 117: Rodale Books.
- [22] Fletcher, J. (2022, July 8). What are the best balance exercises for different ages and fitness levels? Retrieved from Medical News Today: https://www.medicalnewstoday.com/articles/balance-exercises
- [23] Friel, J. (2018, October 12). joefrieltraining.com. Retrieved from Duration and Intensity in Training: https://joefrieltraining.com/duration-and-intensity-in-training/



- [24] Gerstacke, D. (2015, April 02). The Active Times . Retrieved from The Active Times: https://www.theactivetimes.com/why-all-athletes-should-cross-train
- [25] Hamilton, A. (2022). Sports Performance Bulletin. Retrieved from Cycling training improves sports performance: https://www.sportsperformancebulletin.com/endurance-training/techniques/cycling-training-improves-sports-performance/#:~:text=George%20Dintiman%20(4)%20is%20one,speeds%20achievable%20 under%20normal%20conditions.
- [26] Harry. (2022, August 4). The Cycling Point. Retrieved from Can Indoor Cycling Help Improve My Running?: https://www.thecyclingpoint.com/can-indoor-cycling-help-improvemy-running/
- [27] Holt, L.(2008). Flexibility A Concise Guide To Conditioning, Performance Enhancement, Injury Prevention, and Rehabilitation ,72-73.
- [28] Honea Costa.(2018). "The Impact of Replacing Run Training with Cross-training on Performance of Trained Runners" c. 2020, vol. 16, p. 161-171. Retrieved from https://vb.lsu.lt/object/elaba:72060534/
- [29] Jaani Vaara (2019). "Cycling but not walkiung to work or study is associated with physical fitness, body composition and clustered cardiometabolic risks in young men", DOI: 10.1136-2019-00668
- [30] Jacques Sergio.(2018). "Analysis of current fitness expectations and the effects of cross-training implementation on collegiate Athlete", 609–618.
- [31] Johansson, R. (2020). Reasons You Should Get a Training Plan. TrainingPeaks, 21.
- [32] Jolton, O. (2020). Sports as a regular activity. Sports Journal, 8.
- [33] Karen, M. (n.d.). Ten Ways You Can Get a Fast Marathon Time . Retrieved from Trainingpeaks: https://www.trainingpeaks.com/blog/ten-tips-for-a-faster-marathon/
- [34] Kaspar, K. M. (2019). Sports Training Principles . Current Sports Medicine Volume 18, 95.
- [35] Leicht, L. (2019). Born to Run: Why Do East Africans Dominate Long Distance Runnning Events? Daily Burn, 5.
- [36] Lobby, M. (2021). Born to Run: Why Do East Africans Dominate Long Distance Running Events? Active , 4.
- [37] Luff, C. (2020, April 01). Dotdash publishing. Retrieved from verywellfit: https://www.verywellfit.com/cross-training-for-runners-2911952
- [38] Mackenzie, M. (2018, October 07). Why All Runners Need Balance and Stability Training. Retrieved from Shape: https://www.shape.com/fitness/tips/why-runners-need-balancestability-training
- [39] Magazine, W. R. (2019, June 21). Women's Running. Retrieved from Why all runners should be swimming: https://www.womensrunning.co.uk/training/why-all-runners-should-beswimming/
- [40] Maragay, D. P. (2019). Ed Buenavista : A barrio kid's journey to marathon glory. Taguig City: Philippine Global Corporation.
- [41] Masood, F. A. (2020, May). Pakistan Journal of Medical Sciences. Retrieved from US National Library of Medicine: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7306972/
- [42] Matošević, M. (2022). Olyrun. Retrieved from Why Running Drills Are Important? (9 Benefits For Runners): https://www.olyrun.com/why-running-drills-are-important/
- [43] Meadows, K. (2020). Ten Ways You Can Get a Faster Marathon Time. Training Peaks, 29.
- [44] Musumeci, G. M. (2020). The impact of physical activity on psychological health during Covid-19 pandemic in Italy. Heliyon.



- [45] Nancy Chase. "Comparison of the Health Aspects of swimming with other types of physical activity and sedentary lifestyle habits", DOI: 10.25035/ijare.02.02.07
- [46] NASE. (2014, MAY 8). NASE. Retrieved from NASE: https://www.naseinc.com/blog/body-composition-impact-on-performance/
- [47] Nolledo Veda.(1995). as cited by Andress (2018) The development of the sport is the development of the youth. Retrieved from https://www.researchgate. net/ publication/341646520\_Development\_ofthe\_Sports
- [48] Norris, L. (n.d.). Why do runners should do speed work. Retrieved from lauranorrisrunning.com: https://lauranorrisrunning.com/why-runners-should-do-speed-work/
- [49] Nystrom, M. (2020, April 8). Polar.com. Retrieved from HOW SWIMMING WORKOUTS CAN MAKE YOU A BETTER RUNNER: https://www.polar.com/blog/how-swimmingworkouts-make-you-betterrunner/#:~:text=The%20full%2Dbody%20movements%20required,wear%20and%20tear%2
- Ofrom%20running.
  [50] Oja. P, Titze. O, de Geus, B. (2018). Health Benefits of cycling: a systematic review. DOI: 10.111/j.1600-0838.2011.01299.x
- [51] Oliver, M. (2019). The Long Term Athlete Developmental model. Journal of Sports Science, 389.
- [52] OneCare Media, LLC. (2020). Sleep Guidelines During the COVID-19 Pandemic. Retrieved from Sleepfoundation.org: https://www.sleepfoundation.org/sleep-guidelines-covid-19isolation
- [53] Padilla, I. M. (2020). Detraining: Loss of Training-Induced Physiological and Performance Adaptations. . Sports Medicine, 79 87.
- [54] Paul, S. (2016, JULY 11). Runners World. Retrieved from Runners World: https://www.runnersworld.com/beginner/a20808794/whats-the-benefit-of-cross-training/
- [55] Paul, S. (2016, July 11). What's the Benefit of Cross-Training? Retrieved from Runner's World: https://www.runnersworld.com/beginner/a20808794/whats-the-benefit-of-crosstraining/
- [56] Perri Klass, M. (2020, August 17). How Children's Sleep Habits Have Changed in the Pandemic. Retrieved from The New York Times: https://www.nytimes.com/2020/08/17/well/family/children-sleep-pandemic.html
- [57] Porto, Jerome (2018). Fitness for Life Health-Optimizing Physical Education for Senior High . 91-92. C & E Publishing, Inc.
- [58] Pranata, M. A. (2020). Sports activities during any pandemic lockdown. Irish Journal of Medical Science.
- [59] Pritchard, J. (2021). The Importance of Training Age. Training, Young Athletes, 3.
- [60] Quinn, E. (2019, December 11). The Benefits of Cross-Training. Retrieved from Verywellfit: https://www.verywellfit.com/cross-training-improves-fitness-and-reduces-injury-3120769
- [61] Quinn, E. (2019, December 12). The Benefits of Cross-Training. Retrieved from verywellfit: https://www.verywellfit.com/cross-training-improves-fitness-and-reduces-injury-3120769
- [62] Recovapro. (2020, November 24). WHY IS AGILITY TRAINING IMPORTANT IN ATHLETES: A Look at Some of the Overlooked Effects of Agility Training. Retrieved from Recovapro: https://recovapro.co.uk/blogs/news/why-is-agility-training-important-in-athletesa-look-at-some-of-the-overlooked-effects-of-agility-training
- [63] Rymal, G. (2020). Why Every Runner Needs Trails in their Training Plan. Training Peak, 23.



- [64] Saleh Cheda (2014). "Effect of using cross-training on some physical abilities and single and composite skill performance level "Retrieved from Research Gate:https:/www.researchgate.net/publication/34164678\_Composite\_Skill\_of\_ Skill performance\_level
- [65] Sayer, A. (2021, November 5). Cross-Training For Runners: The Do's and Don't's. Retrieved from Women's Running: https://www.womensrunning.com/training/cross-training/dos-and-donts-of-cross-training-for-runners/
- [66] Simmons, A. (n.d.). Training Peaks. Retrieved from Cross-Training for Runners: Mix Up Your Marathon Training: https://www.trainingpeaks.com/blog/cross-training-for-runnersmarathon-training/
- [67] Technologym. (n.d.). Everything your need to know about strength endurance training. Retrieved from https://www.technogym.com/gb/newsroom/training-endurance-strength/
- [68] Traininh Peaks . (2020). Preventing Injuries, 29.
- [69] Trimble, T. (2020). Populous. Born to Run: Why Do East Africans Dominate Long Distance Runnning Events?, 8.
- [70] Wood, D. D. (2018). Sports-Training-Adviser. Retrieved from Sports-Training-Adviser: https://www.sports-training-adviser.com/variationprinciple.html
- [71] World, R. (2019, September 13). Runner's World. Retrieved from Can swimming help you run faster?: https://www.runnersworld.com/uk/training/cross-training/a775670/swap-pavements-for-pools-5-reasons-why-every-runner-should-be-swimming/
- [72] Yair, C. (2018). Sports and Health . Sports Joournal, 5.