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## Research Article

# Analysis of physiological fitness among Vietnamese elite female road cyclists

Pham Thanh Tu<sup>1</sup>, Vo Quoc Thang<sup>2</sup>, Bui Trong Toai<sup>2</sup>, Nguyen Thanh Le Tram<sup>2</sup>, Vo Chau Tuong<sup>1</sup>

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### ABSTRACT

**Introduction:** The present study aimed to evaluate the endurance physiological characteristics of four national-level female road cyclists ( $n = 4$ , age  $26.2 \pm 1.7$ , experience  $12.5 \pm 1.1$  years). The assessment was conducted at the end of the preparation phase, during the second phase of the 2021 annual training plan. Various aerobic and anaerobic physiological indicators were measured to provide insights into their performance capabilities. **Results:** Aerobic physiological indicators were examined, including lactate threshold 1 (LT1) at  $2.88 \pm 0.4$  mmol, power at LT1 at  $2.83 \pm 0.21$  W/kg, and HR at LT1 at  $146.25 \pm 10.36$  bpm. In addition, lactate threshold 2 (LT2) was determined at  $4.70 \pm 0.51$  mmol, power at LT2 at  $4.29 \pm 0.14$  W/kg, and HR at LT2 at  $164 \pm 3.37$  bpm. The maximal oxygen consumption ( $VO_2$  max) was found to be  $67.41 \pm 2.31$  mL/kg/ph. The resting heart rate and maximum heart rate were  $49.25 \pm 0.96$  bpm and  $182.5 \pm 6.86$  bpm, respectively. Furthermore, the study explored anaerobic physiological indicators, including maximum lactate accumulation at  $13.69 \pm 1.89$  mmol, fatigue index at  $56.37 \pm 2.51\%$ , 5 s peak power at  $16.68 \pm 2.88$  W/kg, and 30 s peak power at  $9.5 \pm 1.23$  W/kg. **Conclusion:** The evaluation of endurance physiological characteristics in a group of four national-level female road cyclists has provided valuable insights into their performance capabilities and training needs. The results highlight their well-developed aerobic capacities, as evidenced by lactate thresholds (LT1 and LT2), peak power outputs at these thresholds, and their  $VO_2$  max values. These indicators collectively suggest efficient energy utilization and a strong aerobic foundation, critical for sustained performance during long-distance road cycling events.

**Keywords:** Cycling, Determinants, Performance, Physiological fitness, Power meter, Predictors

## INTRODUCTION

Coyle *et al.* (1991) evaluate the physiological and biomechanical responses of “elite-national class” (i.e., group 1;  $n = 9$ ) and “good-state class” (i.e., group 2;  $n = 6$ ) cyclists while they simulated a 40 km time trial in the laboratory by cycling on an ergometer for 1 h at their highest power output. Several studies have recently shown that pro-cyclists exhibit some remarkable physiological responses and adaptations, such as an efficient respiratory system (i.e., lack of “tachypneic shift” at high exercise intensities), a considerable reliance on fat metabolism even at high-power outputs, or several neuromuscular adaptations (i.e., a great resistance to fatigue of slow motor units).<sup>[1]</sup> Lucia *et al.*, (2001) review the different responses and adaptations (cardiopulmonary system, metabolism, neuromuscular factors, or endocrine system) to this sport.<sup>[2]</sup> Impellizzeri *et al.*, (2005) studied correlations between physiological variables and performance in high-level cross-country road cyclists. 12 internationally competitive mountain bikers completed the study.<sup>[3]</sup> Impellizzeri *et al.*, (2008)

compare the morphological and physiological characteristics of elite female mountain bikers with road cyclists of different specialties and competitive levels.<sup>[4]</sup> The subject of Jobson *et al.*, (2008) was to compare the physiological demands of laboratory- and road-based time-trial cycling and to examine the importance of body position during laboratory cycling. Bertucci *et al.*, (2012) designed to examine the biomechanical and physiological responses between cycling on the Axiom stationary ergometer (Axiom, Elite, Fontaniva, Italy) versus field conditions for both uphill and level ground cycling.<sup>[5]</sup> Bell *et al.*, (2017) report a range of physiological characteristics in a two-time Tour de France champion.<sup>[6]</sup> Receiver-operating-characteristic analysis showed that placing at national championships at age 18 had good accuracy in predicting whether the athlete would later reach the World Tour level (area under the curve = 0.882) Svendsen *et al.*, (2018).<sup>[7]</sup> Other influential works include Paton and Hopkins (2001) and Izquierdo *et al.*, (2004).<sup>[8,9]</sup> Overall, these findings contribute to tailoring training programs to further enhance the athletes’ strengths and address potential areas for improvement. The

assessment conducted during the specific training phase provides a targeted understanding of their physiological responses under conditions closely resembling race scenarios. Fine-tuning their training protocols based on these results can lead to optimized performance outcomes, ensuring these elite female road cyclists remain at the forefront of national-level competition. Furthermore, the methodology used in this study can serve as a reference for similar assessments in the field of endurance sports, aiding both athletes and coaches in refining training strategies and maximizing potential.

Few published data describe female cyclists and the studies available are difficult to interpret because of the classification of athletes. Martin *et al.* (2001) Professional women's road cycling is growing in both the numbers of participants and the number of competitions, and although the demands of competition for professional male cyclists have been documented, such data are not readily available for female cyclists.<sup>[10]</sup> Very few published studies have shown the physiological responses of female road cyclists across various competition events, even including performance-related metrics such as power output during the competition. Road cycling competition for women at the international level incorporates a wide range of formats. The shortest races for women are prologue time trials lasting <15 min, which normally precede the first stage of multi-day tours. Criterion and circuit races typically last between 30 and 120 min and are popular in the US. At the prestigious World Championships (held every year) and the Summer Olympics (held every 4 years), the road cycling program includes a 1-day road race that is between 110 and 130 km long and a time trial between 25 and 30 km long. The most competitive female cyclists will complete the road course in  $\approx 3$  h, and depending on the distance, the time trial course will take between 32 and 42 min. The other popular racing format that attracts the most competitive female road cyclists is stage racing.

Ebert *et al.* (2006) determined that cyclists spend the most time ( $\sim 80\%$ ) at low-to-moderate power outputs ( $2\text{--}4.9 \text{ W}\cdot\text{kg}^{-1}$ ) and the least time at highest power outputs ( $>8 \text{ W}\cdot\text{kg}^{-1}$ ) during flat, hilly, and criterium races.<sup>[11]</sup> Furthermore, Ebert *et al.* (2006) reported that for all race types, there are numerous (20–70) short-duration bursts (3–30 s) at power greater than the power output associated with maximal oxygen uptake. Others have described cycling events by reporting the typical heart rate (HR) response to cycling competitions.<sup>[11]</sup> Padilla *et al.* (2001), Vogt *et al.* (2007), and Vogt *et al.* (2007) showed that although the HR response may vary depending on the type and terrain of an event, mean HRs for competitive road cycling races are  $\sim 135$  beats per minute (bpm), with higher values ( $>140$  bpm) for time trials or hilly events.<sup>[12–14]</sup> Cycling cadence and speed, like HR, are largely affected by the type and terrain of a race.

Vietnamese national-level road cycling athletes participate in similar competition distances as athletes worldwide. The assessment of physiological responses to exercise or adaptive responses is mostly recognized through training experience. The purpose of our investigation was to determine the most informative physiological characteristics to monitor the training effect in highly qualified road cyclists.

### Purpose

The present study aimed to evaluate the endurance and physiological characteristics of four national-level female road cyclists. Specifically, the study aims to analyze some physiological variables: rest HR, max HR, lactate threshold, HR at lactate threshold, power output, and fatigue index (FI).

## MATERIALS AND METHODS

### Participants

Four female road cyclists are at the national level: Age (years):  $26.2 \pm 1.7$ ; experience (years):  $12.5 \pm 1.1$ ; height (cm):  $164.25 \pm 3.86$ ; and weight (kg):  $56.75 \pm 2.22$ . Characteristics of the experimental group are presented in Table 1.

The participants volunteered to participate in the study. To participate in the study, cyclists had to be free of musculoskeletal injuries or other conditions that could hinder their participation. Participants were informed of the potential risks and benefits of the study and signed a consent form to participate in this study.

### Design

The study followed a cross-sectional design. Participants visited the laboratory on two different days interspersed by 48 h. All tests were performed at approximately the same time of the day and under the same conditions (temperature of  $29 \pm 3^\circ\text{C}$ ). The first laboratory visit was a maximal incremental cycling test. During their second visit, the subjects completed the Wingate test.

The assessment was conducted at the end of the preparation phase, during the second phase of the 2021 annual training plan. All experimental procedures were approved by the Ho Chi Minh City National Sports Training Center, Vietnam, and adhered to the principles outlined in the Declaration of Helsinki.

**Table 1: Characteristics of an experimental group participating in the study**

No. of Players	experience (years)	Age (years)	Height (cm)	weight (kg)
04	$12.5 \pm 1.1$	$26.2 \pm 1.7$	$164.25 \pm 3.86$	$56.75 \pm 2.22$

### Procedures

The study involved four female road cyclists at the national level. Physiological indicators such as rest HR, max HR, lactate threshold 1 (LT1) and 2, HR at lactate threshold 1 and 2, and max lactate were measured using step test standard testing protocols. Performance indicators such as power output and FI were also measured using standard testing protocols (Wingate test). The study performed the Pearson correlation (*r*) of aerobic and anaerobic endurance physiological variables for some indicators on the WKO5+ monitoring load software from Training Peak Companies.

The research uses the blood lactate transition thresholds of high-performance cyclists using a long-graded exercise test protocol. The cyclist warms up at 75–100W in 5 min, the starting workload at 125W, the step increment is 25W, the cadence range selection (rpm) is 95–105, and the step duration is 3 min. The tester records HR during the last 15 s of each workload and HR at the end of the test. The ergometer bike—Wattbike Pro 2019 from England is used for the step test procedure and Wingate test. Devices Lactate Scouts from the USA. Weight is 80g. Results are within 10 s. Size: 3.6 × 2.2 × 0.9.

### Statistical Analyses

We used Excel and SPSS software to process the data. Data are reported as mean, standard deviation (SD), with a 95% confidence interval. The research uses Lactate E (Newell *et al.*, 2007) to determine and calculate blood lactate endurance markers.<sup>[15]</sup> The study performed the Pearson correlation (*r*) of aerobic and anaerobic endurance physiological variables for some indicators on the WKO5+ monitoring load software.

## RESULTS

The descriptive statistics of aerobic and anaerobic physiological indicators are shown in Tables 1 and 2, respectively.

The descriptive statistics presented in Table 1 offer insights into various aerobic physiological indicators. LT1 exhibited a mean value of 2.88 mmol with a relatively low SD of 0.40, indicating a moderate level of consistency among the observed values. Power output at LT1, expressed in watts per kilogram (W/kg), displayed a mean of 2.83 with a SD of 0.21, suggesting a relatively narrow range of variability around the mean. HR at LT1 displayed a mean of 146.25 beats per minute (bpm) with a SD of 10.36, indicating some variability among individuals. Moving to Lactate Threshold 2 (LT2), the mean lactate value was 4.70 mmol, accompanied by a SD of 0.51. Power output at LT2, similar to LT1, demonstrated limited dispersion around its mean (*M* = 4.29, *SD* = 0.14). HR at LT2, however, displayed less variability compared to LT1, with a mean of 164 bpm and a SD of 3.37. The maximal oxygen consumption (VO2 max), a crucial aerobic capacity measure, presented a mean

**Table 2: The aerobic physiological indicators load on the bicycle ergometer**

Variables	Descriptive statistics	
	$\bar{X}$	SD
The aerobic physiological indicators		
LT1 (mmol)	2.88	0.4
Power @ LT1 (W/kg)	2.83	0.21
HR @ LT1 (bpm)	146.25	10.36
LT2 (mmol)	4.70	0.51
Power @ LT2 (W/kg)	4.29	0.14
HR @ LT2 (bpm)	164	3.37
VO <sub>2</sub> max (mL/kg/ph)	67.41	2.31
Resting HR (bpm)	49.25	0.96
Max HR (bpm)	182.5	6.86

of 67.41 mL/kg/min with a SD of 2.31, indicating a moderate level of consistency among individuals' performance. Resting heart rate (RHR) displayed a relatively low mean of 49.25 bpm, and maximal heart rate exhibited a higher mean of 182.5 bpm, with SDs of 0.96 and 6.86, respectively. These statistics provide a comprehensive overview of the variability and central tendencies of the examined aerobic physiological indicators, contributing to a better understanding of the participant's physiological responses.

The anaerobic physiological indicators, as detailed in Table 2, offer valuable insights into the participants' performance in short-duration, high-intensity activities. The maximum blood lactate accumulation (Max LA) demonstrated a mean value of 13.69 mmol, accompanied by an SD of 1.89. This relatively moderate SD suggests some variability in individuals' anaerobic capacity responses. FI, a measure reflecting the ability to sustain high power outputs, exhibited a mean of 56.37% with a SD of 2.51. This relatively low SD implies a relatively consistent performance across participants in this metric. Power output during a 5-s burst of activity, expressed in watts per kilogram (W/kg), displayed a mean of 16.68 W/kg with a SD of 2.88, suggesting some variability in short-duration maximal efforts. Similarly, the power output during a 30-s effort showed a mean of 9.5 W/kg with a SD of 1.23. This lower SD suggests a higher level of consistency in power output during the 30-s activity. In summary, these descriptive statistics provide insights into the variation and central tendencies of the anaerobic physiological indicators, contributing to a comprehensive understanding of participants' capabilities in short-term, high-intensity activities.

The comprehensive analysis of both aerobic and anaerobic physiological variables, as assessed through the WKO5+ monitoring load software, has revealed valuable insights into the multifaceted nature of endurance performance. Table 3

**Table 3: The Pearson correlation coefficients relationships between aerobic and anaerobic endurance physiological variables as measured by the WKO5+monitoring load software**

Variables	WKO5+Indices		
	mFTP (30 km) (W/kg)	Pmax (W/kg)	FRC (kJ)
Power @ LT2 (W/kg)	0.987		
VO <sub>2</sub> max (ml/kg/ph)	0.635		
5 seconds (W/kg)		0.99	0.504
FI (%)		-0.394	-0.977
Max Lactate (mmol)		0.284	0.974

below shows the Pearson correlation coefficient relationships between aerobic and anaerobic endurance physiological variables and indices as measured by the WKO5+ monitoring load software. The Pearson correlation coefficient quantifies the strength and direction of the linear relationship between aerobic and anaerobic endurance physiological variables as measured by the WKO5+ monitoring load software. Closely correlated results can be used to predict future performance.

The Pearson correlation coefficients presented in Table 4 offer valuable insights into the relationships between aerobic and anaerobic endurance physiological variables, as assessed using the WKO5+ monitoring load software. The power output at LT2 displayed a remarkably strong positive correlation with mean functional threshold power over a 30 km effort (mFTP 30 km) ( $r = 0.987$ ). This compelling correlation suggests that individuals with higher power output at LT2 tend to exhibit greater mFTP at 30 km, indicating a relationship between sustained power output and anaerobic threshold performance. Furthermore, the correlation coefficient between VO<sub>2</sub> max and mFTP at 30km was found to be moderate but significant ( $r = 0.635$ ). This correlation implies that a higher aerobic capacity, as represented by VO<sub>2</sub> max, is associated with an increased capacity for sustaining power over a 30-km effort. This finding aligns with the notion that enhanced aerobic fitness contributes to improved endurance performance.

The power output during a 5-s maximal effort showed a remarkably strong positive correlation with both maximal power output (Pmax) ( $r = 0.99$ ) and the energy reservoir (FRC) ( $r = 0.504$ ). This suggests that individuals with greater power output during short-duration efforts tend to exhibit higher maximal power output and have a relatively larger anaerobic energy reservoir. Conversely, the FI, representing the ability to sustain high power outputs, displayed significant negative

**Table 4: The anaerobic physiological indicators load on the bicycle ergometer**

Variables	Descriptive statistics	
	$\bar{X}$	SD2
The anaerobic physiological indicators		
Max LA (mmol)	13.69	1.89
FI (%)	56.37	2.51
5 s (W/kg)	16.68	2.88
30 s (W/kg)	9.5	1.23

correlations with both Pmax ( $r = -0.977$ ) and 5-second power output ( $r = -0.394$ ). This indicates that individuals with a higher FI tend to have lower maximal and short-duration power outputs. In addition, the correlation coefficients between Max LA and Pmax ( $r = 0.974$ ), as well as 5-s power output ( $r = 0.284$ ), suggest that those with greater maximal LA tend to exhibit higher maximal and short-duration power outputs.

## DISCUSSION

Much research encompasses various aspects of physiological and performance evaluations in endurance athletes. Coyle *et al.* (1991) investigated the responses of elite and good-state cyclists during a simulated 40 km time trial, revealing differences between the groups.<sup>[1]</sup> Lucía *et al.* (1998) compared the physiological responses of professional and elite road cyclists during an incremental cycle ergometer test. Highlighting unique characteristics, Lucía *et al.* (2001) reviewed diverse adaptations seen in professional cyclists, including efficient respiratory systems, reliance on fat metabolism, and neuromuscular adaptations.<sup>[2,16]</sup> Baron (2001) explored the relationship between anaerobic and aerobic power in off-road cyclists and sports students. Laursen and Jenkins (2002) reported improved endurance performance without corresponding changes in oxidative or glycolytic enzyme activity.<sup>[17]</sup>

Research by Alejo *et al.* (2022) shows that the performance of endurance athletes, such as road cyclists, depends on many aerobic and anaerobic physiological variables.<sup>[18]</sup> In particular, some indicators have a strong correlation to the performance of several different events. The study indicated that factors like endurance (specifically time-trial performance, peak power out, and ventilatory threshold) and body composition (both fat and muscle mass) were the most distinguishing features among cyclists of different age categories. Conversely, no consistent distinctions were found for muscle strength and power. These findings are pertinent for predicting performance, identifying talent, and guiding coaches in the formulation of training programs aimed at improving the crucial variables that contribute significantly to cyclists' performance and development. The results of the study show that the indicators

of aerobic and anaerobic capacity of Vietnamese athletes are similar to those of published studies. However, it is difficult to compare the indicators in this study with other studies due to the homogeneity of test methods and different conditions. Research has in common that improving performance in a road cyclist requires coaches and cyclists to assess the development of aerobic and anaerobic capacity through different training programs.

The descriptive statistics provided insights into the central tendencies and variabilities of key physiological indicators, illuminating the diverse responses within each cyclist. These indicators, ranging from lactate thresholds and power outputs to HRs and  $\text{VO}_2$  max, collectively paint a detailed picture of participants' physiological characteristics.

Moreover, the Pearson correlation coefficients unveiled significant associations among the studied variables, highlighting the interplay between aerobic and anaerobic capabilities. The correlations demonstrated how power output at Lactate Threshold 2 (LT2) is positively linked to both maximal power output (Pmax) and short-duration power output, emphasizing the role of LT2 in dictating both sustained and peak power performance. Similarly, the correlation between  $\text{VO}_2$  max and mean functional threshold power over a 30-km effort (mFTP 30 km) underscores the synergy between aerobic fitness and sustained power output.

Furthermore, the negative correlations observed between the FI and maximal/short-duration power outputs underscore the delicate balance between the ability to sustain high power and achieving peak power performance. The correlations involving Max LA provide insights into the relationship between lactate dynamics and power outputs, further highlighting the complex interplay between anaerobic capacity and performance. In tandem, these findings emphasize that endurance performance is a multifaceted outcome stemming from the synergy between aerobic and anaerobic physiological indicators. The integration of data from descriptive statistics and correlation analysis through the WKO5+ monitoring load software enhances our understanding of the physiological underpinnings of endurance capabilities. This holistic view offers practical implications for training strategies, performance optimization, and the overall development of athletes. Ultimately, this comprehensive approach paves the way for more informed decision-making by coaches, athletes, and researchers, contributing to advancements in the field of endurance training and performance enhancement.

## CONCLUSION

The present study offers a comprehensive assessment of endurance physiological characteristics in four national-level female road cyclists. The evaluation, conducted at a specific

point in their annual training plan, captured both aerobic and anaerobic performance metrics. Key findings include well-defined lactate thresholds (LT1 and LT2) and corresponding power outputs, indicating a strong aerobic capacity that is vital for prolonged performance in road cycling. The athletes also displayed significant  $\text{VO}_2$  max values, underscoring their ability for efficient oxygen utilization. Furthermore, anaerobic indicators, such as maximum LA and FI, contribute to our understanding of their high-intensity, short-duration performance capabilities. Overall, the study's findings provide crucial insights for fine-tuning training programs, aiming to further optimize these athletes' performance in both aerobic and anaerobic domains.

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## Research Article

# A study on body mass index level of South Zone Inter-University Male Kho-Kho players of Karnataka state

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### ABSTRACT

Sports have a vital role in present-day society. It is critical to an individual, a group, a country, and surely the world. Physical wellness is the state that describes how much the individual can work. The purpose of this study was to examine and analyze the body mass index (BMI) level of South Zone Inter-University Male Kho-Kho players in Karnataka State. To fulfill the above purpose, I have drawn few important objectives to know the study on the BMI level of South Zone Inter-University Male Kho-Kho players who participated in the South Zone Inter-University Tournament and represented Mangalore University, Bangalore University, University of Mysore, Kuvempu University, V.S.K. University, Karnataka University, U.A.H.S. University Shivamogga, Rani Channamma University, Gulbarga University, and Davangere University during the academic year 2022-23. All analysis and interpretation of the responses received from the respondents with regard to the questions relating to general information and different factors pertaining to the study have been presented in this study. The data were collected through various tests from the selected university Kho-Kho players. Scores obtained on BMI by subjects were added separately, and score sheets were evaluated in accordance with the instructions laid down in the manual of the test. The collected data were analyzed by employed mean, standard deviation, and “t” test statistical techniques for further analysis. The results and findings have been presented in four sections. Further levels and comparisons on the variables, like BMI, of selected male Kho-Kho players of Karnataka State were discussed as per the findings of the study as follows: The BMI level among selected South Zone Inter-University Male Kho-Kho players of Karnataka State. University-wise comparisons in height, weight, and BMI between South Zone Inter-University Male Kho-Kho players have been presented in the tables, and their mean scores have also been depicted in figures.

**Keywords:** Body mass index, Inter-University, Karnataka state, Kho-Kho players

### INTRODUCTION

Physical wellness as a goal of physical instruction has dependably been an essential concern; however, the accentuation given to it in physical training programs has changed from time to time. Human performance depends on physical wellness, which is a positive and dynamic quality on a continuum from inexhaustible life to death. It is imperative for an entire individual to keep up neuromuscular, cardiovascular, and other natural systems by enhancement of physical wellness through exercise. Sports have a vital role in present-day society. It is critical to an individual, a group, a country, and surely the world. Physical wellness is the state that describes how much the individual can work. It is an individual issue and suggests the capacity of every individual to live most viably to his

potential. Keeping these aspects ahead, the present study aims to find the body mass index (BMI) level of South Zone Inter-University Male Kho-Kho players in Karnataka State. The BMI is a statistical measurement derived from height and weight. Although it is considered to be a useful way to estimate healthy body weight, it does not measure the percentage of body fat. The BMI measurement can sometimes be misleading; a muscleman may have a high BMI but have much less fat than an unfit person whose BMI is lower. BMI is perhaps the most common anthropometric measure used to predict relative overweight. The natural course of growth and maturation in children, plus the individual variability during the same period mean that indices of weight for height, including the BMI ( $W/H^2$ ) are not very good indices of adiposity. The major purpose of this research is “A Study on BMI level of South Zone Inter-University Male Kho-Kho Players of Karnataka State.” The

study is conducted on selected Karnataka State Kho-Kho players from different universities.

### Significance of the Study

The study would be used as a reference to formulate a specific training program for the South Zone Inter-University Male Kho-Kho players of Karnataka State to improve their level of physical performance and also provide insight into the developmental trends in the BMI. The norms on BMI developed in the study could be used as a reference point by physical educationists and coaches to evaluate the BMI and physical performance of their players. The promotion and development of rural games like Kho-Kho is a primary need in the Karnataka region because most of the players in this region play Kho-Kho games without adequate facilities, training, coaching, and support with a lot of enthusiasm.

Research methodology is a way to analyze and evaluate research problems very systematically. It is a scientific description of how a particular study has been carried out. Here is the procedure for the selection of subjects, selection of variables, reliability of data, collection of data, administration of tests, and along with the procedures for the collection of data and statistical techniques employed for the study have been presented.

### Selection of Subjects

To achieve the purpose of the study, 120 Kho-Kho players from 10 different universities in Karnataka State were selected randomly. The sample design is presented in the following table.

### Selection of Variables

#### Tools

The BMI of the subjects was determined using the following formula:  $\text{Weight (Kg) BMI} = \text{Height (meters)}^2$ . The standard instruments were used for the collection of data, namely a vertical scale for height and a Miller's weighing machine for body weight.

#### Collection of data

The BMI data were collected by measuring height and weight. The above-mentioned data were collected from the participants of the South Zone Inter-University Male Kho-Kho players of

Karnataka State. The data were collected with the help of test assistants who were adequately trained to conduct the tests. The tests were administered under the close supervision of the investigator in a group situation. The standard procedure for data collection was followed throughout the testing program.

#### Administration of tests

The investigator collected the data related to the present study in the following procedure was used to collect data on the selected variables.

#### Weight

For measuring the body weight, the subject was asked to stand on the weighing machine with minimum clothing and without footwear, gently in the middle of the machine in a straight position. The pointer of the machine was set to zero every time before taking the measurement. The body weight of the subject was recorded to the nearest half a kilogram. The test score was the digit on the eyepiece of the weighing machine, and it was recorded in kilograms.

#### Height

Height was measured against a vertical scale marked on the wall. The subject was asked to stand straight without shoes, and a horizontal board was kept on his head to locate the reading on the scale. The height was recorded in centimeters.

### Statistical Procedures

After the collection of data on the BMI of South Zone Inter-University Male Kho-Kho players in Karnataka State, statistical analysis was carried out. Data were analyzed by applying the "t" test to examine the significance of mean differences if anyone BMI. An Analysis of variance was also computed to find the differences in BMI, which was followed by a significant "F" ratio. The level of confidence was set at 0.05.

Percentile norms of and BMI were also developed for South Zone Inter-University Male Kho-Kho players in Karnataka State. The analyses of the data and the obtained results have been graphically presented in the following chapter. The data were collected through various tests from the selected university Kho-Kho players. Scores obtained on BMI by subjects were added separately, and score sheets were evaluated in accordance with the instructions laid down in the manual

S. No	Name of the University	Total players	S. No	Name of the University	Total players
01	Mangalore University	12	06	Davangere University	12
02	Bangalore University	12	07	Gulbarga University	12
03	Mysore University	12	08	Rani Channamma University	12
04	Kuvempu University	12	09	Karnataka University	12
05	V.A.H.S University Shivamogga	12	10	V.S.K University	12

Body mass index calculation of BMI			
S. No	Tests	Tools be used	Recorded
1	Weight	Weighing Machine	Kilogram
2	Height	Vertical Scale	Centimeters
Measurement units	Formula and calculation		
Kilograms and Meters or Centimeters	Formula: $\text{Weight (kg)} / (\text{height (m)})^2$ With the metric system, the formula for BMI is weight in kilograms divided by height in meters squared. Since height is commonly measured in centimeters, divide height in centimeters by 100 to obtain height in meters. Example: Weight=68 kg, Height=165 cm (1.65 m) Calculation: $68 \div (1.65)^2 = 24.98$		

Mass index standard norms categories				
BMI	Below 18.5	18.5–24.9	25.0–29.9	30.0 and Above
Weight status	Underweight	Normal	Overweight	Obese

of the test. The collected data were analyzed by employing mean, standard deviation, and “t” test statistical techniques for further analysis. The results and findings have been presented in four sections. The analysis of the data and interpretation are done based on the statistical results and findings of the present study. Further levels and comparisons on variables like BMI of selected South Zone Inter-University Male Kho-Kho players of Karnataka State were discussed as per the findings of the study in the following steps.

The above Graph 1 represents the significance of the mean difference between Kho-Kho players regarding their weight. The mean values of Kho-Kho players regarding weight were Mangalore University 58.33, Bangalore University 56.00, University of Mysore 56.93, Kuvempu University 54.50, V.A.H.S. University Shivamogga 54.83, Davangere University 57.24, Gulbarga University 53.83, Rani Channamma University 55.66, Karnataka University 54.17, and V.S.K. University 49.33, respectively. The calculated “t” value is 4.83, which is significant at the 0.01 level of significance. Hence, there is a significant difference in weight between Kho-Kho players. The weight of Kho-Kho players is much higher at Mangalore University and Davangere University in comparison to other universities.

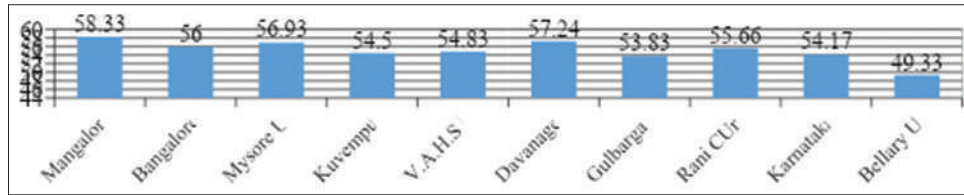
The above Graph 2 represents the significance of the mean difference between Kho-Kho players regarding their height. The mean values of Kho-Kho players regarding height were Mangalore University 169.25, Bangalore University 170.25, University of Mysore 170.75, Kuvempu University 165.16, V.A.H.S. University Shivamogga 168.50, Davangere University 166.66, Gulbarga University 163.16, Rani Channamma University 164.75, Karnataka University 166.50, and V.S.K. University 165.83, respectively. The calculated “t” value is 6.14, which is significant at the 0.01 level of

significance. Hence, there is a significant difference in height between Kho-Kho players. The height of Kho-Kho players is much higher at the University of Mysore and Bangalore University in comparison to other universities.

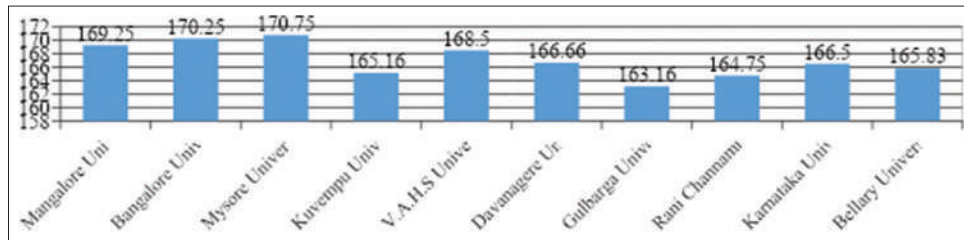
Graph 3 represents the values of Mangalore University (21.38), Bangalore University (21.86), University of Mysore (21.84), Kuvempu University (21.90), Rani Channamma University (19.81), and V.S.K. University (19.93). Kho-Kho players fall under the “Normal Weight” category according to standard norms. Similarly, the mean values of V.A.H.S. University Shivamogga (18.65), Davangere University (18.59), Gulbarga University (18.41), and Karnataka University (18.63), Kho-Kho players fall in the “Under Weight” category according to standard norms. Thus, it can be concluded that the average value of Inter-University Kho-Kho players is 20.10, which falls under the “Normal Weight” category according to standard norms. Graph 3 also reveals the same.

## SUMMARY

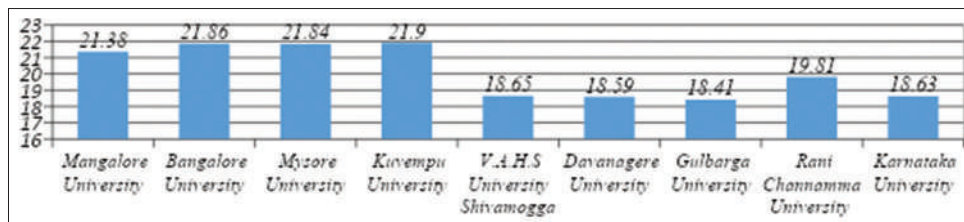
Studying the BMI level of South Zone Inter-University Male Kho-Kho players is a very vast topic. Karnataka as a state is huge in size. Based on the knowledge of modern sports sciences, scientific principles of training and coaching, and the application of sophisticated modern scientific testing and measuring techniques, it has now become possible to predict the performance of athletes at different levels of competition. The BMI is a statistical measurement derived from height and weight. Although it is considered to be a useful way to estimate healthy body weight, it does not measure the percentage of body fat. We can find the BMI using the formula:  $\text{BMI} = \text{Weight (in kilograms)} / \text{Height (in centimeters)}$ . For this, players aged between 18 and 28 from the top 10 universities in Karnataka



**Graph 1:** Mean values of South Zone Inter-University Kho-Kho player's weight



**Graph 2:** Mean values of South Zone Inter-University Kho-Kho player's height



**Graph 3:** South Zone Inter-University Kho-Kho player's body mass index level

state represented in the South Zone Inter-University Kho-Kho competition were selected. For this research work, informative statistical analysis was done on 120 male Kho-Kho players. Body composition variables (weight, height, and BMI) were taken into consideration for the study. The data analysis for the present research was done quantitatively with the help of descriptive statistics. Descriptive statistical techniques such as mean, standard deviation, and t-test were used to find significant differences between the variables during data analysis.

## CONCLUSIONS

The body composition variable of Inter-University Kho-Kho players in the BMI test was very good for most of the university players. There is a significant difference in the weight of Kho-Kho players. The weight of Kho-Kho players is much higher at Mangalore University and Davangere University in comparison to other universities. There is a significant difference in height between the Kho-Kho players. The height of the Kho-Kho players is much higher at the University of Mysore and Bangalore University in comparison to other universities. There is a significant difference between and within universities on BMI among Kho-Kho players.

## RECOMMENDATIONS

It is recommended that, based on the study, coaches and trainers prepare scientific training schedules for various Kho-Kho players for better performance. The data and results can be used by the concerned Department of Physical Education at Mangalore University for the improvement of performances in the respective games. The data and results can be used by the Department of Youth Empowerment and Sports, Karnataka, for the development of Kho-Kho games in the Karnataka region. The study helps to prepare the physiological profile of each Kho-Kho player in the Karnataka region, which will be utilized for training and coaching purposes in the future. This type of study can be conducted on different university-level students. It is recommended that this study should also be conducted on national and international players.

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## Research Article

# Program evaluation of the bachelor of science in exercise and sports science: A development plan

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### ABSTRACT

This study evaluated the program goals and outcomes of the Bachelor of Science in Exercise and Sports Science (BSESS) in reference to the criteria from CHED Memorandum Order (CMO) No. 81, series of 2017. Using a sequential mixed method of online survey and interviews, the study collected the perception of selected faculty members and students from three state Higher Education Institutions from Regions II, IV-A, and the NCR. The data included the description of the challenges encountered, the responses to the challenges encountered, and the best practices achieved. Initially, findings reveal that there is no significant relationship between teacher-respondents' demographic characteristics and their assessment of the program's implementation and management. However, results from the student respondents show a significant relationship between the two variables. The BSESS program is becoming popular among students whose learning interests are beyond the basic knowledge and skills of Physical Education. Overall, both faculty members and students assessed the program as "very good." Nevertheless, they identified four categories of challenges: The availability of facilities, the online mode of instructional delivery, the collaboration and cooperation among faculty members and school administration, and other non-academic concerns (such as physical health). Despite the present challenges brought by the pandemic, respondents remain hopeful, committed to continuous professional development, and keeping themselves physically and academically active. As a response, a Development Plan for BSESS Program is proposed.

**Keywords:** BSESS evaluation, Challenges, Development plan, Program goals and objectives, Program implementation

## INTRODUCTION

Education is one of man's best realizations about his existence, which happens to be the major key for change and progress. From a general idea, humans creatively discover new and associated ideas. From learning the basic parts and functions of the physical body, the inquisitive minds of some people have discovered the importance of all the parts and functions of the body in responding to various stimuli, whether in synchronous or asynchronous manner.

Sport Science is a new area of discipline. In the discussion on "Why Study Sport and Exercise Science?" (2021), Sport Science draws on many different disciplines, including physiology, biochemistry, biomechanics, motor control, psychology, and sports management. The course will definitely

be helpful in understanding and solving some of the biggest challenges of society while working out how our body responds to the challenges of physical activity and psychological experience.

Sport and exercise scientists assist with the selection, preparation, protection, and retention of these workers, and ensure that they can do their jobs safely. Relatively, the Bachelor of Science in Exercise and Sports Science (BSc) of Manipal College of Health Profession (2021) reports that there is an increasing demand for professionals in exercise and sports science around the globe. Completion of qualified graduates will provide the knowledge, skills, and abilities to work in occupational health and corporate fitness/wellness organizations, specifically in sports medicine centers and professional sports groups, such as trainers/health fitness specialists, exercise specialists, exercise and sports physiologists, movement analysts/bio-mechanists, sports science faculty and administrators, and scientists involved in research relative to health and human performance. Boyce's

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(2021) discussion on Physical Education (PE) and the Preparation of Teachers described PE as the study, practice, and appreciation of the art and science of human movement. Movement, as in physical fitness, is distinctive as well as important to the student's physical wellness and development.

The researcher decided to conduct a formative evaluation of the program delivery of BSESS from these three higher education institutions (HEIs). Formative evaluation is seen as necessary by the researcher for the 4<sup>th</sup> year (graduating) students because its output would be helpful to the succeeding batches and additional enhancement activities (to be included in the plan) can still be provided to the graduating class before graduation. Since the program is new, there might be some areas of its delivery that need to be improved and/or developed. Since there seems to be no similar study conducted yet locally, the output of this research, which is the identification of a possible, existing gap in the delivery of the new program in sports science and the proposed model to fill the gap, would be the contribution of the researcher in the field.

Hence, the study aimed to find out how the students and faculty members assess the BSESS in terms of program goals and outcomes and program implementation based on their 3-year academic experience and involvement in the course. Consequently, a program development plan will be proposed based on the findings of the study.

## CONCEPTUAL FRAMEWORK

This study employed the Context, Input, Process, Product (CIPP) model (CIPP Model, 2021) in describing the conceptual framework of the study. The CIPP model, which was proposed by Daniel Stufflebeam in the 1960s, is seen as a solution-based framework that gathers data and information systematically to a designed program to identify its strengths, weaknesses and/or limitations in its context (delivery), and to improve the usefulness of the program and plan for future use (Stufflebeam, 2003). The emphasis is on constant development focused on the four areas: the general goals of the program (Context Evaluation), the strategies and material resources (Input Evaluation), the tasks or elements (Process Evaluation), and the output or objectives (Product Evaluation).

Specifically, for this study, evaluation was done holistically (not basically in stages) since the objective of the study is to come up with a general assessment of the whole curricular program of the BSESS based on its goals and outcomes as well as its implementation. Unlike the typical application of CIPP model in a long-term program evaluation, the model was employed in this study using the two major sets of variables.

Figure 1 presents the variables measured in the study and the corresponding process involved in the context of the CIPP

model as the best-fit model in program evaluation. The use of the CIPP model is practically based on the objectives and goals of the concluded research. Following the CIPP model, the first box initially describes the context of the study with the BSESS program's goals and objectives. Under this variable is the Program Goals and Outcomes, Disciplinary Knowledge, Professional Competence, Professional Accountability and Responsibility, and Communication. The second box contains the Input which contains the other set of variables measured. This is the implementation of the BSESS program based on Curriculum and Instructional Delivery, Faculty Qualifications and Performance, Administrative Support, Laboratory and Physical Facilities, and Networking/Partnerships.

The third box is the Process which evaluated the existence of influence between the two sets of variables from the Context and the Input. The Process variables are the combination of the BSESS' Program Goals and Objectives and its Implementation based on the cited criteria and characteristics. Influences were measured by finding significant relationships among the criteria and characteristics of the two sets of variables. The fourth and last box is the Product which represents the results of the finding for influences between the two sets of variables. By finding significant relationships, BSESS program goals and objectives and its implementation as shown through the process has brought effectiveness in the delivery of the program. From this output, the researcher came up with a program enhancement plan for the BSESS curriculum.

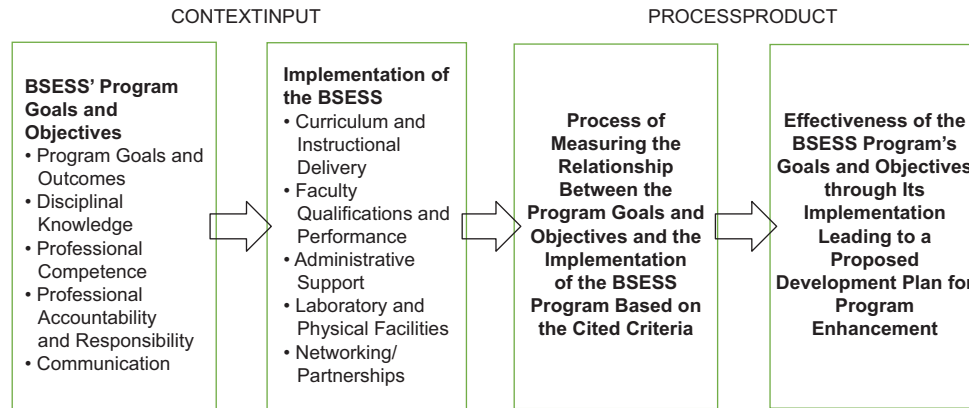
Finally, the fourth box describes the output of the study as it corresponds to the product that the study tried to achieve. This is the proposed development plan for the enhancement of the BSESS program. Overall, the CIPP model is deemed applicable in the conduct of the study where the BSESS program was evaluated based on the variables shown and described in the various parts of the model.

### Statement of Purpose

This study aimed to assess the Bachelor of Science in Exercise and Sport Science (BSESS) program of selected public HEIs in Luzon using the CIPP model, for the academic year 2021-2022. Specifically, the study sought answers to the following:

1. Extent to the faculty members and students assess the BSESS program based on the Context variables (Goals and Objectives) in terms of Program Goals and Outcomes; Disciplinary Knowledge; Professional Competence; Professional Accountability and Responsibility; and Communication;
2. Extent to the faculty members and students assess the implementation of the BSESS program based on the Input variables (Program Implementation) in terms of Curriculum and Instructional Delivery; Faculty Qualifications and Performance; Administrative Support; Laboratory and Physical Facilities; and Networking/Partnership;





**Figure 1:** Schematic diagram of the conceptual framework

3. Significant relationship in the assessments of the respondents between the Context variables (Program Goals and Objectives) and the Input variables (Program Implementation);
4. Challenges encountered by the respondents in the implementation of the BSESS program and how they responded to the challenges;
5. Best practices of the respondents of the HEIs in the implementation of the BSESS program; and
6. Development plan proposed to enhance the implementation of the BSESS program.

## DESIGN AND METHODOLOGY

This study on the assessment of BSESS program implementation utilized a sequential mixed method of research. It is quantitative research because it particularly employed the descriptive-correlational design. Meanwhile, it is also qualitative research because it particularly used descriptive-exploratory in finding out other issues and concerns of the respondents toward the implementation of the BSESS program.

The descriptive-correlational research design was used to find the existence of a significant relationship between the BSESS' program goals and objectives and its implementation. Descriptive-exploratory was used to explore the experiences of the respondents in relation to the challenges encountered, their responses to the challenges, and the best practices they have from their experiences in the program.

## RESULTS AND DISCUSSION

### Assessment on the BSESS Program Based on the Context Variables (Goals and Objectives)

#### Program goals

As presented in Table 1, both groups of respondents assessed the program goals and outcomes of the BSESS program with "Very Good Performance" as shown in the composite

mean of 4.50 from the faculty respondents and 3.85 from the student respondents. Having a higher composite mean, faculty respondents specifically have always observed that their students can advocate for a lifestyle that is more fit and active through role-modeling to others.

#### Disciplinary knowledge

As shown in Table 2, most of the teachers assessed the BSESS program goals and outcomes in terms of disciplinary knowledge with "Excellent" rating as revealed with the composite mean of 4.51. From their assessment, their students can continuously and consistently analyze the distinction between PE and Sports from a socio-anthropological perspective and can create and adapt appropriate programs and interventions in exercise, sports, and recreation. On the other hand, students assessed this variable with "Very Good Performance" having the composite mean of 3.76.

#### Professional competence

Table 3 presents the assessment of faculty members for this variable is "Excellent Performance" with the composite mean of 4.56 while students' assessment "Very Good Performance" with 3.83 composite mean. A discrepancy in the evaluation between the two groups of respondents is maybe due to a very high level of assessment on the third indicator by the faculty members. They believe that students can consistently and continuously demonstrate coaching and/or management capabilities in different contexts: coaching/managing oneself, coaching/managing organizational life, and coaching/managing others.

#### Professional accountability and responsibility

As revealed in Table 4, both groups assessed the goals and outcomes of the BSESS program in terms of professional accountability and responsibility with "Very Good Performance" rating, though faculty respondents have a higher composite mean assessment of 4.50 than their students' composite mean of 3.77. It can be noticed that indicators 5 and 7 obtained the

**Table 1: Faculty members' and students' assessment toward the BSESS program based on context variables (Goals and Outcomes) in terms of program goals**

No.	Indicators	Faculty Members		Students	
		Mean	Verbal Interpretation	Mean	Verbal Interpretation
1	Understand the key concepts, processes and theories related to fitness and sports coaching or management.	4.44	Very Good Performance	3.88	Very Good Performance
2	Can plan and design appropriate fitness and sports programs in various industry settings	4.50	Very Good Performance	3.78	Very Good Performance
3	Can manage and execute effective fitness and sports programs in various industry settings	4.44	Very Good Performance	3.76	Very Good Performance
4	Can describe and choose the appropriate methods of research or inquiry to be used based on the available evidences and data sources, and to analyze and evaluate the findings of the research or inquiry	4.19	Very Good Performance	3.74	Very Good Performance
5	Can recognize the moral and ethical responsibilities by acting with integrity and with high degree of professionalism	4.63	Excellent Performance	3.95	Very Good Performance
6	Can engage in reflective practice by identifying personal learning goals and professional development goals	4.56	Excellent Performance	3.85	Very Good Performance
7	Can advocate for a healthy and active lifestyle by striving to be a role model to others	4.75	Excellent Performance	3.96	Very Good Performance
	<b>Composite</b>	<b>4.50</b>	<b>Very Good Performance</b>	<b>3.85</b>	<b>Very Good Performance</b>

**Table 2: Faculty members' and students' assessment towards the BSESS program based on context variables (Goals and Objectives) in terms of disciplinal knowledge**

No.	Indicators	Faculty Members		Students	
		Mean	Verbal Interpretation	Mean	Verbal Interpretation
1	Can create and adapt appropriate programs and interventions in exercise, sports and recreation	4.63	Excellent Performance	3.78	Very Good Performance
2	Can analyze movements based on body parts and how the body responds and adapts to exercise	4.50	Very Good Performance	3.85	Very Good Performance
3	Can analyze exercise responses and adaptations to the environment and among at-risk populations	4.50	Very Good Performance	3.72	Very Good Performance
4	Can apply mechanical principles in the analysis of human movements	4.50	Very Good Performance	3.72	Very Good Performance
5	Can discuss how PE and sports converge from a philosophical perspective	4.56	Excellent Performance	3.80	Very Good Performance
6	Can analyze the distinction between PE and sports from a socio-anthropological perspective	4.63	Excellent Performance	3.73	Very Good Performance
7	Can critique programs and interventions in fitness, sports and recreation with the necessary facilities to be used	4.25	Very Good Performance	3.74	Very Good Performance
	<b>Composite</b>	<b>4.51</b>	<b>Excellent Performance</b>	<b>3.76</b>	<b>Very Good</b>

highest mean evaluation from the faculty respondents. They believe that students can always exhibit ethical behaviors in coaching/managing fitness, sports and recreational activities, and professional accountability and responsibility as a sports science major. On the other hand, students believe that they can exhibit ethical behaviors in coaching/managing fitness, sports and recreational activities.

### **Communication**

Table 5 presents the respondents' assessment of the BSESS program as to Context variables (Goals and Objectives) based on Communication. Both groups of respondents have

the same evaluation of the program goals and outcomes of the BSESS program in terms of communication. They both assessed it with "Very Good Performance" gaining the composite mean of 4.24 from the faculty members and 3.78 from the students. Faculty members are confident that their students can justify a program proposal to audiences of varied types and can effectively communicate the bases of useful body exercise and sports activities to fitness enthusiasts, sports professionals, and other related practitioners. On the other hand, students' highest mean of assessment is on the use of appropriate language in oral and written communication. Said output shows that Faculty members and students of

**Table 3: Faculty members' and students' assessment towards the BSESS program based on context variables (Goals and Outcomes) in terms of professional competence**

No.	Indicators	Faculty Members		Students	
		Mean	Verbal Interpretation	Mean	Verbal Interpretation
1	Can organize, administer and evaluate fitness, sports and recreational programs and activities	4.63	Excellent Performance	3.74	Very Good Performance
2	Can apply concepts, processes and theories in planning, administration and evaluation of evidence-based interventions in fitness, sports performance and recreation and/or management of resources and operations to exercise, sports, and recreational programs and facilities	4.63	Excellent Performance	3.73	Very Good Performance
3	Can demonstrate coaching and/or management capabilities in different contexts: coaching/managing oneself, coaching/managing organizational life, and coaching/managing others	4.69	Excellent Performance	3.81	Very Good Performance
4	Can work effectively and independently in multi-disciplinary and multi-cultural teams	4.63	Excellent Performance	3.84	Very Good Performance
5	Can select and administer appropriate assessments for fitness and sports performance or management capabilities and techniques	4.44	Very Good Performance	3.87	Very Good Performance
6	Can develop and implement strategies and techniques to modify behavior in sports and exercise or to learn/enhance sports management skills	4.44	Very Good Performance	3.93	Very Good Performance
7	Can participate in development activities and public discourses particularly in response to the needs of the community they serve	4.50	Very Good Performance	3.92	Very Good Performance
	<b>Composite</b>	<b>4.56</b>	<b>Excellent Performance</b>	<b>3.83</b>	<b>Very Good</b>

**Table 4: Faculty members' and students' assessment towards the BSESS program based on context variables (Goals and Objectives) in terms of professional accountability and responsibility**

No.	Indicators	Faculty Members		Students	
		Mean	Verbal Interpretation	Mean	Verbal Interpretation
1	Have the ability to promote the advancement of the profession through scientific research and lifelong learning	4.50	Very Good	3.73	Very Good
2	Can analyze, synthesize and evaluate information from research literatures in sports science	4.44	Very Good	3.68	Very Good
3	Can defend research findings in a chosen topic related to sports, exercise and recreation	4.38	Very Good	3.79	Very Good
4	Can examine current and future prospects in sports and exercise	4.50	Very Good	3.77	Very Good
5	Can exhibit ethical behaviors in coaching/managing fitness, sports and recreational activities	4.63	Excellent Performance	3.84	Very Good
6	Have developed professional integrity and discerning boundaries of competence	4.50	Very Good	3.81	Very Good
7	Can exhibit professional accountability and responsibility as a sports science major	4.56	Excellent Performance	3.77	Very Good
	<b>Composite</b>	<b>4.50</b>	<b>Very Good</b>	<b>3.77</b>	<b>Very Good</b>

BSESS share the same observations on the students' effective communication skills.

It is shown in the summary that among the context variables or the goals and objectives of the BSESS program, the highest assessment was given by the faculty respondents to professional competence, while student respondents gave their highest assessment to program goals. Evidently, faculty members have a higher evaluation in all indicators than that of student respondents. They seemed to have more confidence than their students toward their abilities and skills in the discipline.

### **Assessment on the BSESS Program Based on the Input Variables (Program Implementation)**

This section presents the extent of faculty members' and students' assessment on the BSESS program in five aspects: Curriculum and Instructional Delivery, Faculty Qualifications and Performance, Administrative Support, Laboratory and Physical Facilities, and Networking and Partnerships.

#### **Curriculum and instructional delivery**

Table 7 presents the respondents' assessment on the BSESS program as to Input variables (Program Implementation) based on Curriculum and Instruction. As presented in the table, the

**Table 5: Faculty members' and students' assessment toward the BSESS program based on context variables (Goals and Outcomes) in terms of communication**

No.	Indicators	Faculty Members		Students	
		Mean	Verbal Interpretation	Mean	Verbal Interpretation
1	Can communicate effectively through oral, written, and technological format with stakeholders, allied professionals, and various practitioners.	4.19	Very Good Performance	3.82	Very Good Performance
2	Can synthesize evidence from a variety of sources to shed light to current issues in the field.	4.25	Very Good Performance	3.74	Very Good Performance
3	Have developed evidence-based arguments within the context of the discipline.	4.25	Very Good Performance	3.78	Very Good Performance
4	Can justify a program proposal to diverse audiences.	4.31	Very Good Performance	3.75	Very Good Performance
5	Can use appropriate language in oral and written communication.	4.19	Very Good Performance	3.85	Very Good Performance
6	Can communicate effectively the foundations of applied exercise and sports sciences to stakeholders, other professionals and practitioners.	4.31	Very Good Performance	3.77	Very Good Performance
7	Can articulate and discuss the latest developments in exercise and sports science.	4.19	Very Good Performance	3.75	Very Good Performance
	<b>Composite</b>	<b>4.24</b>	<b>Very Good Performance</b>	<b>3.78</b>	<b>Very Good Performance</b>

**Table 6: Summary of faculty members' and students' assessment toward the context variables (Goals and Objectives) of the BSESS program**

Variables	Faculty Members		Students	
	Mean	Verbal Interpretation	Mean	Verbal Interpretation
Program Goals and Outcomes	4.50	Very Good Performance	3.85	Very Good
Disciplinary Knowledge	4.51	Excellent Performance	3.76	Very Good
Professional Competence	4.56	Excellent Performance	3.83	Very Good
Professional Accountability and Responsibility	4.50	Very Good Performance	3.77	Very Good
Communication	<b>4.24</b>	<b>Very Good Performance</b>	<b>3.78</b>	<b>Very Good</b>

**Table 7: Faculty members' and students' assessment toward the implementation of the BSESS program in terms of curriculum and instructional delivery**

No.	Indicators	Faculty Members		Students	
		Mean	Verbal Interpretation	Mean	Verbal Interpretation
1	Has appropriate and relevant goals and objectives as reflected in the syllabi for all its major courses	4.88	Excellent Implementation	3.91	Very Good Implementation
2	Has appropriate and effective teaching-learning modules for classroom instructions	4.75	Excellent Implementation	3.92	Very Good Implementation
3	Employs OBE in the delivery of instructions to all its major courses	4.81	Excellent Implementation	3.93	Very Good Implementation
4	Has helped students to develop the relevant knowledge and skills in sports science	4.75	Excellent Implementation	4.02	Very Good Implementation
5	Provides reliable learning/resource materials that help students in their academic compliance	4.75	Excellent Implementation	3.93	Very Good Implementation
6	Provides reliable assessment tests/tools in measuring students' performance	4.75	Excellent Implementation	3.99	Very Good Implementation
7	Provides practical activities that support students' interests and skills	4.75	Excellent Implementation	3.96	Very Good Implementation
	<b>Composite</b>	<b>4.78</b>	<b>Excellent Implementation</b>	<b>3.95</b>	<b>Very Good Implementation</b>

two groups of respondents differ in their assessment toward the implementation of the BSESS in terms of curriculum and instructional delivery. Faculty members' assessment shows

“Excellent Implementation” with the composite mean of 4.78 while the student respondents assessed it with “Very Good Implementation” based on the composite mean of 3.95. Faculty

members consider the BSESS program with appropriate and relevant goals and objectives as reflected in the syllabi for all its major courses. For student respondents, they believed that their program has helped them to develop relevant knowledge and skills in sports science.

#### *Faculty qualifications and performance*

Table 8 presents the respondents' assessment of the BSESS program as to Input variables (Program Implementation) based on Faculty Qualifications and Performance. Faculty members believed that the BSESS program implementation, in terms of faculty qualifications and performance, is with "Excellent Implementation" as revealed by the composite mean of 4.52. On the other hand, student respondents believe that it is within "Very Good Implementation" based on the composite mean of 3.99. This output reiterates that faculty members are confident that they observe fairness and maintain professional relationships among their students despite having lower assessment on their academic qualifications to teach and having training in the field of sports science.

#### *Administrative support*

Table 9 presents the respondents' assessment on the BSESS program as to input variables (Program Implementation) based on administrative support. The two groups of respondents have different assessments as to the administrative support given to the BSESS program. Faculty members assessed it with "Excellent Implementation" as shown in the composite mean of 4.59 while students assessed it with "Very Good Implementation" as revealed by the composite mean of 3.91. Faculty members truly believe that the school administration is always capable of resolving problems and issues that concern the students and faculty members in the program, have the appropriate leadership skills relevant to the BSESS program, and are capable to lead and initiate suitable projects and activities.

#### *Laboratory and physical facilities*

Table 10 shows that both Faculty members and students as respondents have the same verbal interpretation of "Very Good Implementation" with composite means of 4.07 for the teachers

**Table 8: Faculty members' and students' assessment toward the implementation of the BSESS program in terms of faculty qualifications and performance**

No.	Indicators	Faculty Members		Students	
		Mean	Verbal Interpretation	Mean	Verbal Interpretation
1	Are academically qualified to teach in the field of sports science	4.38	Very Good Implementation	4.03	Very Good Implementation
2	Have the relevant training and skills in the field	4.44	Very Good Implementation	3.98	Very Good Implementation
3	Provide effective teaching-learning strategies	4.56	Excellent Implementation	3.96	Very Good Implementation
4	Are creative and enthusiastic in teaching and facilitating the students	4.56	Excellent Implementation	3.94	Very Good Implementation
5	Promote outcomes-based learning in the delivery of instruction	4.56	Excellent Implementation	4.00	Very Good Implementation
6	Observe fairness and maintain professional relationship among their students.	4.63	Excellent Implementation	4.00	Very Good Implementation
	<b>Composite</b>	<b>4.52</b>	<b>Excellent Implementation</b>	<b>3.99</b>	<b>Very Good Implementation</b>

**Table 9: Faculty members' and students' assessment toward the implementation of the BSESS program in terms of administrative support**

No.	Indicators	Faculty Members		Students	
		Mean	Verbal Interpretation	Mean	Verbal Interpretation
1	Are supportive to the needs of the students in the BSESS program	4.56	Excellent Implementation	3.89	Very Good Implementation
2	Have the relevant academic qualifications and experiences in supervising the program	4.56	Excellent Implementation	3.92	Very Good Implementation
3	Are capable of resolving problems and issues that concern the students and faculty members in the program	4.63	Excellent Implementation	3.88	Very Good Implementation
4	Have the appropriate leadership skills relevant to the BSESS program	4.63	Excellent Implementation	3.89	Very Good Implementation
5	Are accountable and responsible in performing their jobs as administrators	4.56	Excellent Implementation	3.94	Very Good Implementation
6	Promote fairness and are objective in dealing with the students and faculty members	4.56	Excellent Implementation	3.91	Very Good Implementation
7	Are capable to lead and initiate suitable projects and activities	4.63	Excellent Implementation	3.95	Very Good Implementation
	<b>Composite</b>	<b>4.59</b>	<b>Excellent Implementation</b>	<b>3.91</b>	<b>Very Good Implementation</b>

and 3.27 for the student respondents on their assessment of the implementation of the BSESS in terms of laboratory and physical facilities. Both groups opined that their institutions need exercise and sports science laboratory, as described by their assessment on the indicators with the lowest mean. However, they all recognized the presence of a gymnasium in their schools. Since the BSESS program rely heavily on the availability of exercise and sports' clinic/laboratory, both faculty members and students expressed the need for these facilities in the performance of their tasks.

### *Networking and partnerships*

Table 11 presents the output from the two groups of respondents having similar verbal description of "Very Good Implementation" as to the networking and partnerships implemented in their BSESS program. Teachers and students alike are confident that their institutions promote partnership and linkages in the local community where the school is located and is using its industry linkages to promote/recommend their graduating students.

It is evident in Table 12 that faculty members have a higher evaluation on the Input variables or the implementation of

BSESS program with the composite mean of 4.46 in all the sub-variables when compared to the evaluation of the students with the composite mean of 3.77. However, results of their responses are both within the verbal description of "Very Good Implementation." Curriculum and instructional delivery obtained the highest composite mean evaluation from the faculty-respondents while teacher qualifications and performance have the highest mean evaluation from the student respondents. On the other hand, both groups have their lowest composite mean evaluation on laboratory and physical facilities.

### **Results of Correlation on the Assessment of the Faculty Members and Students between the Context Variables (Goals and Objectives) and Input Variables (Program Implementation) of the BSESS Program**

This section presents the relationship between the assessment on the Goals and Objectives and the actual Program Implementation of the BSESS program by the faculty members and students.

Table 13 presents the results of the correlation on the assessment of respondents between the Context variable on

**Table 10: Faculty members' and students' assessment toward the implementation of the BSESS program in terms of laboratory and physical facilities**

No.	Indicators	Faculty Members		Students	
		Mean	Verbal Interpretation	Mean	Verbal Interpretation
1	Has appropriate laboratories for courses in General Education	3.69	Very Good Implementation	3.56	Very Good Implementation
2	Has Exercise and Sports Science Laboratory	3.38	Very Good Implementation	3.48	Very Good Implementation
3	Has Fitness and Sports Performance Laboratory	3.56	Very Good Implementation	3.59	Very Good Implementation
4	Has a gymnasium	4.94	Always	4.00	Very Good Implementation
5	Provide fitness and sports equipment	4.38	Very Good Implementation	3.81	Very Good Implementation
6	Has swimming pool and its amenities	4.00	Very Good Implementation	3.64	Very Good Implementation
7	Has a school clinic with regular attending medical personnel	4.56	Excellent Implementation	3.96	Very Good Implementation
	<b>Composite</b>	<b>4.07</b>	<b>Very Good Implementation</b>	<b>3.72</b>	<b>Very Good Implementation</b>

**Table 11: Faculty members' and students' assessment toward the implementation of the BSESS program in terms of networking and partnerships**

No.	Indicators	Faculty Members		Students	
		Mean	Verbal Interpretation	Mean	Verbal Interpretation
1	Has engaged with industry partnership	4.38	Very Good Implementation	3.75	Very Good Implementation
2	Has established connection with some industries for students' internship program	4.31	Very Good Implementation	3.78	Very Good Implementation
3	Is engaging its students in community and industry immersion	4.50	Very Good Implementation	3.76	Very Good Implementation
4	Promotes partnership and linkages in the local community where the school is located	4.56	Excellent Implementation	3.82	Very Good Implementation
5	Is using its industry linkages to promote/recommend their graduating students	4.56	Excellent Implementation	3.75	Very Good Implementation
	<b>Composite</b>	<b>4.46</b>	<b>Very Good Implementation</b>	<b>3.77</b>	<b>Very Good Implementation</b>

Program Goals and Outcomes and Input variables or the BSESS' Program Implementation. It reveals that there is no significant relationship in the assessment of faculty members toward BSESS program's goals and outcomes in terms of goals and its criteria of implementation such as curriculum and instructional delivery, faculty qualification and performance, administrative support, laboratory and physical facilities, and networking and partnerships. On the other hand, there exists a significant relationship in the assessment of students toward BSESS program between its goals and the cited criteria of the program implementation.

Table 14 reveals that there is no significant relationship in the assessment of faculty members toward BSESS program between its goals and outcomes in terms of disciplinal knowledge and its implementation. On the other hand, there exists a significant relationship in the evaluation of students toward BSESS program between its goals and outcomes in terms of disciplinal knowledge and its implementation. The same with the program goals, faculty members' assessment describe that their students' knowledge about the discipline is not affected by the program implementation of the BSESS program. In contrast, students' assessments show agreement

**Table 12: Summary of faculty members' and students' assessment toward the input variables (Implementation) of the BSESS program**

Variables	Teachers		Students	
	Mean	Verbal Interpretation	Mean	Verbal Interpretation
Curriculum and Instructional Delivery	4.78	Excellent Implementation	3.95	Very Good Implementation
Faculty Qualifications and Performance	4.52	Excellent Implementation	3.99	Very Good Implementation
Administrative Support	4.59	Excellent Implementation	3.91	Very Good Implementation
Laboratory and Physical Facilities	4.07	Very Good Implementation	3.72	Very Good Implementation
Networking and Partnerships	4.46	Excellent Implementation	3.77	Very Good Implementation

**Table 13: Correlation on the assessment of respondents between the context variable on goals and outcomes and input variables (Implementation) of BSESS program**

Variables	Faculty Members				Students			
	Correlation Coefficient	Sig	Decision	Interpretation	Correlation Coefficient	Sig	Decision	Interpretation
Curriculum & Instructional Delivery	.275	.303	Accept Ho	Not Significant	.765	.000	Reject Ho	Significant
Faculty Qualification & Performance	-.051	.850	Accept Ho	Not Significant	.683	.000	Reject Ho	Significant
Administrative Support	.084	.758	Accept Ho	Not Significant	.687	.000	Reject Ho	Significant
Laboratory & Physical Facilities	.368	.161	Accept Ho	Not Significant	.675	.000	Reject Ho	Significant
Networking & Partnership	.176	.513	Accept Ho	Not Significant	.685	.000	Reject Ho	Significant

Significant at 0.05

**Table 14: Correlation on the assessment of respondents between the context variable on disciplinal knowledge and input variables (Implementation) of BSESS program**

Variables	Faculty Members				Students			
	Correlation Coefficient	Sig	Decision	Interpretation	Correlation Coefficient	Sig	Decision	Interpretation
Curriculum & Instructional Delivery	.253	.345	Accept Ho	Not Significant	.722	.000	Reject Ho	Significant
Faculty Qualification & Performance	.020	.942	Accept Ho	Not Significant	.665	.000	Reject Ho	Significant
Administrative Support	-.009	.973	Accept Ho	Not Significant	.689	.000	Reject Ho	Significant
Laboratory & Physical Facilities	.391	.134	Accept Ho	Not Significant	.611	.000	Reject Ho	Significant
Networking & Partnership	.162	.549	Accept Ho	Not Significant	.668	.000	Reject Ho	Significant

Significant at 0.05

that the program goals and outcomes of the BSESS program in terms of disciplinal knowledge are associated with its implementation.

Table 15 reveals that there is a significant relationship in the assessment of faculty members toward BSESS program between its goals and outcomes in terms of professional competence and its implementation in terms of curriculum and instructional delivery. Consequently, there is no significant relationship between its goals and outcomes in terms of professional competence and its implementation such as faculty qualification and performance, administrative support, laboratory and physical facilities, and networking and partnerships. On the other hand, students' assessments are consistent in showing a significant relationship toward BSESS program's goals and outcomes in terms of professional competence and its implementation. The two sets of results explain that faculty respondents and student respondents do not share the same observation on the program goals and outcomes in terms of professional competencies and the implementation of BSESS program.

Table 16 presents the results of correlation on the assessment of respondents between the Context variable on Program Goals and Objectives in terms of Professional Accountability and Responsibility and the Input variables of the BSESS' Program Implementation. It enumerates the result of the relationship between goals and outcomes in terms of professional accountability and responsibility and program implementation of BSESS as assessed by the two groups of respondents. Faculty members' assessment shows that there is no significant relationship between the two major variables in terms of the sub-variables involved. However, student respondents' assessment reveals the opposite. It shows that there is a significant relationship between the goals and outcomes of professional accountability and professionalism and program implementation of the BSESS.

Table 17 reveals that there is no significant relationship in the assessment of faculty member-respondents toward BSESS program between its goals and outcomes in terms of communication and its implementation. On the other hand, there exists a significant relationship in the assessment

**Table 15: Correlation on the assessment of respondents between the context variable on professional competence and input variables (Implementation) of BSESS program**

Variables	Faculty Members				Students			
	Correlation Coefficient	Sig	Decision	Interpretation	Correlation Coefficient	Sig	Decision	Interpretation
Curriculum & Instructional Delivery	.525	.037	Reject Ho	Significant	.775	.000	Reject Ho	Significant
Faculty Qualification & Performance	.044	.872	Accept Ho	Not Significant	.714	.000	Reject Ho	Significant
Administrative Support	.148	.583	Accept Ho	Not Significant	.725	.000	Reject Ho	Significant
Laboratory & Physical Facilities	.464	.070	Accept Ho	Not Significant	.674	.000	Reject Ho	Significant
Networking & Partnership	.296	.266	Accept Ho	Not Significant	.689	.000	Reject Ho	Significant

Significant at 0.05

**Table 16: Correlation on the assessment of respondents between the context variable on professional accountability and responsibility and input variables (Implementation) of BSESS program**

Variables	Faculty Members				Students			
	Correlation Coefficient	Sig	Decision	Interpretation	Correlation Coefficient	Sig	Decision	Interpretation
Curriculum & Instructional Delivery	.479	.060	Accept Ho	Not Significant	.732	.000	Reject Ho	Significant
Faculty Qualification & Performance	.041	.880	Accept Ho	Not Significant	.647	.000	Reject Ho	Significant
Administrative Support	.091	.739	Accept Ho	Not Significant	.659	.000	Reject Ho	Significant
Laboratory & Physical Facilities	.475	.063	Accept Ho	Not Significant	.625	.000	Reject Ho	Significant
Networking & Partnership	.273	.306	Accept Ho	Not Significant	.647	.000	Reject Ho	Significant

Significant at 0.05



**Table 17: Correlation on the assessment of respondents between the context variable on communication and input variables (Implementation) of BSESS program**

Variables	Faculty Members				Students			
	Correlation Coefficient	Sig	Decision	Interpretation	Correlation Coefficient	Sig	Decision	Interpretation
Curriculum & Instructional Delivery	.208	.439	Accept Ho	Not Significant	.767	.000	Reject Ho	Significant
Faculty Qualification & Performance	-.109	.688	Accept Ho	Not Significant	.649	.000	Reject Ho	Significant
Administrative Support	-.086	.751	Accept Ho	Not Significant	.681	.000	Reject Ho	Significant
Laboratory & Physical Facilities	.288	.279	Accept Ho	Not Significant	.648	.000	Reject Ho	Significant
Networking & Partnership	.164	.543	Accept Ho	Not Significant	.651	.000	Reject Ho	Significant

Significant at 0.05

of student respondents toward BSESS program between its goals and outcomes in terms of communication and its implementation. Said output reveals that faculty members constantly prove that goals and outcomes and implementation of the BSESS program are not associated at all in regards to their students' performance while their students believed otherwise.

### Challenges Encountered by the Respondents in the Implementation of BSESS Program

From the data gathered using the open-ended questions for the respondents, the categories are drawn from the information provided, there are similar and repetitive information based on their observations and experiences.

#### *Availability of facilities*

Lack of equipment, laboratory, facilities, and conducive classrooms are the main challenges encountered by both faculty members and students during the face-to-face or actual classes' meetings/sessions. This issue is evident and supported by the result of the assessment given by both groups of respondents when compared to the other subvariables on the implementation of BSESS program.

#### *Synchronous and asynchronous modes of instructional delivery*

The new normal way of teaching and learning is another big challenge. Both faculty members and students experienced difficulties relative to internet connection and availability of gadgets and devices. In relation to this, students' additional concerns are on understanding the instructions clearly and the objectives of every lesson, which are important for them to gain more knowledge, skills better job placement after finishing the program.

#### *Cooperation and collaboration among school personnel*

Faculty members are concerned that the new setup in the teaching-learning system has affected the coordination, collaboration, and communication among school administrators, other school authorities, faculty members, and staff. Virtual

meetings, though conducted often, are seemed not effective enough to make clear and comprehensive plans, to monitor, and assess the implementation of the program.

#### *Other academic and non-academic challenges*

For students, some other challenges include the practical application of their lessons and performing the required activities in their courses since they are restricted to go out and cannot have access to relevant facilities and equipment. Limited options in performing their courses' tasks which affect the submission of their academic requirements are also parts of the students' struggles.

#### Responses to the Challenges Encountered by the Respondents in the Implementation of BSESS Program

From the challenges encountered, respondents cited the following as their responses or way to cope:

#### *Creativity and improvisation skills*

Faculty members improvised and became creative in looking for alternatives in the preparation of the module and other instructional materials to be used for their classes and students. Students become pro-active. They also look for ways on how they will learn despite this difficult situation of having little space and not so enough time in doing program's tasks.

#### *Positive attitude and strong faith in god*

In terms of how the respondent's response to the challenges they encountered, both groups have positive outlook on the situation. They have their strong faith in God that this pandemic will end and everything will be back to normal again.

#### *Behavior of gratitude*

Some students are grateful to their teachers for being considerate and understanding of their shortcomings. They are likewise thankful to their helpful and supportive classmates and groupmates who are willing to assist them in times of crisis and difficulties. This implies that there is a lack of sports/games facilities and equipment as perceived by the faculty.

Table 18: Proposed development plan for BSESS program

Areas of Concerns	Objectives	Suggested Activities	Implementation Strategies	Persons Involved	Budget (in Philippine peso)	Expected Output
<b>Curriculum and Instruction</b>	In order to assist faculty members and students to improve and overcome the challenges encountered, the school administration shall come up with plans and programs that would provide alternative delivery system of instruction of the BSESS program. It could likewise deepen and internalize the goals of the BSESS program.	Using the 21 <sup>st</sup> Century Competency Framework (21CC), design activities that would help students explore more on their knowledge and skills on a) Civic Literacy, Global Awareness and Cross-Cultural Skills; b) Critical and Inventive Thinking; and c) Communication, Collaboration and Information Skills to enable students to tap into rich opportunities in the emerging digital age (Exercise and Sports Science Syllabus, 2018)	Invite curriculum experts and practitioners in the field to facilitate training and seminars on the contextualization of the 21 <sup>st</sup> Century Competency Framework into the topics / lessons in the BSESS curriculum. Look for best practices in the delivery of instructions of the BSESS program from other HEIs, local and abroad. Procurement of new resource materials for instruction.	School Administrator (Academic and Administrative) Faculty Members Partner Agencies	500,000 per year	More equipped faculty members with diverse knowledge and skills in instructional delivery More profound understanding of the knowledge, application of skills and with appropriate work values for students about exercise and sports sciences
<b>Faculty Development</b>	Provide and/or allow faculty members to attend relevant trainings, seminars and workshops, local and abroad Support faculty members pursue advance education (graduate program) with the assistance of the school administrators Establish a research development program for faculty and support them in doing research work	Attendance to national and international seminars/webinars and trainings. Membership to established professional organizations for exercise and sports science Continue updating on new information, research output on exercise and sports sciences. Facilitate faculty members' research writing activity and assist them in the presentation and/or publication in national and/or international research fora	Networking, reading, and inquiry for seminars and trainings, and membership or affiliation to professional organizations Enrollment to graduate school programs of Faculty with the assistance of the school administrators Conduct of school research forum fora for Faculty and submit for membership/ affiliation to academic research organizations	School Administrator (Academic and Administrative) Faculty Members Partner Agencies	500,000 per year	Faculty members with advanced knowledge and in classroom instructions and application of appropriate skills in facilitating BSESS lessons using new methods based on research output about the field
<b>Facilities and Equipment</b>	Provide and accommodate students to various facilities for exercise and sports sciences for actual experience through the utilization of the various equipment relevant for their training Partner with established fitness centers/clinics where students can observe and practice their skills in exercise and sports sciences	Provision of the relevant tools, equipment and facilities for students' training Visit to some fitness and therapy centers / clinics for exposure and orientation Hands-on experience on the necessary equipment, tools and facilities	Support from school administrators through purchase/renting of the relevant facilities Partner with established centers and clinics for school affiliation and students' orientation and exposure	School Administrator (Academic and Administrative) Faculty Members Partner Agencies	3,000,000 to 5,000,000 a year	Students will be more confident in gaining more knowledge and skills through the utilization of the relevant tools, equipment and facilities for exercise and sports sciences.
<b>Industry Partnership and Community Linkages</b>	Facilitate students' enhancement by applying their knowledge and skills in exercise and sports sciences through industry partnerships and community linkages	Attendance to trainings and seminars conducted by industry leaders in sports Internships Community Immersion Volunteer work	Participation to trainings and seminars offered by some industry in the field of exercise and sports sciences Attendance to OTJ / Internship Volunteering to community projects in their barangays Conduct of Outreach Programs	School Administrator (Academic and Administrative) Faculty Members Partner Agencies	300,000 a year	Students with advanced knowledge and skills in the field of exercise and sports sciences.
<b>Promotion and Implementation of Mental Health Awareness Program for the School Community</b>	Conduct data-based profile of faculty members, administrative personnel and students' mental health state and well-being Promote mental health awareness and self-care practices among the members of the school community Attend and facilitate any members of the school community who need support assistance in their mental health/ psychological condition	Data collection of school personnel and students' mental psychological state Conduct of seminars and workshops by some professionals in the field of Psychology Strengthening of the Guidance and Counseling programs for students and the Human Resource Dept for the school personnel	The use of survey to collect data from the school personnel and students using the appropriate, standardized psychological tools Addressing the needs/ providing assistance to personnel and students identified of having issues based on the survey and do some referrals, if necessary. Inviting mental health professionals to talk about mental health and share some physical and mind exercises that would help members of the school community cope Reviewing and improving the Guidance and Counseling center's program by looking for some best practices of other schools Providing school personnel of various activities like "Kasaysayan" where they meet once a month to share and give updates to promote social interaction	School Administrators (Academic and Administrative) Faculty Members Partner Agencies	200,000	School personnel and students with high level of self-awareness and who support each other in dealing with problems and issues in life.

### Best Practices Achieved by the Respondents of the HEIs in the Implementation of BSESS Program

From the challenges encountered by the respondents, coping and responding to the challenges is a must. Hence, responding and coping have brought them useful and helpful practices which could also be helpful to others.

#### *Being hopeful*

Having a positive outlook in life is the best practice shared by most of the respondents. They become flexible in overcoming challenges and concerns they encounter. They learn how to manage their time and emotions effectively.

#### *Continuous professional development*

Most of the teachers attended webinars and workshops for them to be equipped with the skills and strategies for teaching in the new normal. Some of them engaged in research collaboration and module preparation.

#### *Keeping oneself physically and academically active*

Most of the students engaged in different physical and social activities in order not to overthink and get worried about the present situation. They continue doing physical exercises at home and sometimes outside their homes with their friends. They also keep learning by looking for materials and videos

to equip and update themselves with the necessary knowledge, skills, and competencies that they need in the program.

## CONCLUSION

BSESS as a very new curricular program offered by some government-funded HEIs is becoming popular among students whose learning interest is beyond the basic knowledge and skills of PE. The program has supportive teachers who are seen by their students to be capable of understanding and applying the program goals, disciplinary knowledge, professional competence, professional accountability and responsibility, and the needed communication after finishing the 4-year course degree. BSESS program implementation in terms of curriculum and instructional delivery, faculty qualifications and performance, administrative support, laboratory and physical facilities, and networking and partnerships is seen to be effective based on the assessment of the teachers and students.

However, faculty members' and students' observations and experiences in the implementation of the BSESS program do not concur with one another. Faculty members measure on the various criteria related to the program goals and outcomes and its implementation are not in consonance with the students' measures of the included criteria.

Despite the present challenges encountered by the teachers and students in the implementation of the program with the prevalence of the pandemic, they remain hopeful in God, managed to be optimistic, creative, and grateful to the people who have helped them. As a result, respondents have shown confidence, are motivated, in pursuit of more professional advancement, maintain physical wellness, and are academically enthusiastic.

## RECOMMENDATION

Based on the findings, the researcher draws the following recommendations from the proposed development plan of the BSESS program. Students of BSESS shall maintain their high motivation and positive attitude toward their career choice and keep themselves abreast with the new information and innovation in their field of specialization. On the other hand, faculty members shall carry on being supportive of their students and the actualization of the goals and objectives of the BSESS program. They shall likewise continue to look for ways and means in improving their professional skills particularly on exercise and sports sciences. Academic administrators and other school personnel shall be more supportive and committed in the implementation of the BSESS program in their institutions. They shall conduct a formative evaluation of the program which can be used as a basis for plans and various

activities that would enhance and/or develop their students' abilities in exercise and sports sciences.

The program committee officials of the Commission on Higher Education (CHED) shall monitor the implementation of the BSESS program HEIs and assist them, particularly those government-funded HEIs for evaluation purposes and later on for possible revisions or modifications of the program suitable to the needs of the students. The work industry (sector) particularly those in the wellness and sports management business shall accommodate qualified students for internships and assist them by providing additional training so they will be more than ready to work with them later after graduation. Future researchers may do similar studies and could use the instrument utilized by this research. They may likewise conduct similar studies in other groups of respondents and types of schools like the private universities that offer the BSESS program. As examples for future research, a comparative study on the delivery of BSESS program between government and private HEIs, relationships of faculty members' demographic profile and instructional delivery of the BSESS program, and a qualitative study on effective strategies and techniques in the delivery of BSESS program will be tremendously useful.

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## Research Article

# Impact of circuit training on playing abilities of elite Kho-Kho players

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### ABSTRACT

The present investigation is conducted to find out the impact of circuit training of elite Kho-Kho players of Osmania University affiliated colleges. For this purpose, the research selected 20 subject randomly and their ages ranged from 18 to 23 years. No training was given to control group and 6 weeks circuit training was given to experimental group. The t values of control group Kho-Kho players for agility, flexibility, endurance, and reaction time was 0.058, 0.058, 0.633, and 0.952, respectively, and correspondingly the experimental group t values was 4.428, 17.514, 59.132, and 7.935, respectively, after circuit training. From this, it is observed that there is a significant difference in the values of four variables after necessary circuit training. It is concluded that the 6 weeks circuit training was effective in performance of playing abilities among elite Kho-Kho players.

**Keywords:** Agility, Circuit training, Endurance, Flexibility, Reaction time

## INTRODUCTION

Kho Kho is a traditional Indian game. The game of Kho Kho is mainly played in rural and urban areas. The game has become popular in other states as well. Every state also has its own Kho-Kho Association, which is affiliated with the Kho-Kho Federation of India. The game of Kho Kho, which originated in India, has a fairly long tradition. The Kho Kho game is now very popular in indigenous physical education activities in India and neighboring countries in South Asia. In our country, Kho Kho competitions are held at school, college, and inter-university levels as well as at inter-university level across India. Attempts are made from time to time to incorporate the Kho Kho game into the realm of competitive sport at the international level. "Co-games are played by Indians because they have fewer economic requirements and smaller playing fields." In additionally, many participants can play the sport together as a team sport, thereby improving health and fitness can be improved.

This game requires high levels of physical fitness, endurance, strength, speed, technique, and self-control.

This is considered to be a very aggressive game, especially at the competitive level, as it involves dodging, feints, and controlled bursts of speed, making it very exciting and thrilling. The key to Koko is chasing and catching, which means chasing rather than just running. This game fosters qualities such as obedience, discipline, sportsmanship, and loyalty among team members and encourages and promotes team spirit.

Circuit training is a type of body conditioning that, like high intensity interval training, combines strength training, high-intensity aerobics, endurance training, and exercises done in a circuit. It focuses on developing abdominal endurance and strength. When every predetermined activity in the program is completed, it forms an exercise "circuit." One starts the first exercise over for the subsequent circuit after finishing the previous one. In circuit training, the intervals between exercises are often brief, and the next exercise is generally performed quickly.

### Significance of the Study

The present study will be helpful to the coaches and physical education teachers on training athletes to improve their agility, flexibility, endurance, and reaction time.

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It also helps in formulating suitable circuit training in a conditioning schedule for Kho-Kho players to improve their performance in track and field events.

This training program may be used as a motivational factor other than interval training and for the concerned with improving playing abilities.

## REVIEW OF LITERATURE

Sharma (2023) determined the effects of Kho-Kho play on physiological adaptations and skill-related physical fitness. A total of 44 female participants aged 15–19 were chosen randomly. All participants were accustomed to the battery of tests, which included both in-the-field and in-lab evaluations. The participants were gathered together and given an explanation of the experiment's goals. They were to finish the examinations in accordance with established protocol. The incentive to perform well was high. The tests were administered twice, once before the experiment began and once after it ended. The study concluded that participating in Kho-Kho greatly improves players' speed, agility, and explosive strength; hence, coaches must pay close attention to developing each component of SRPF in their players. Given the parameters we have covered, it might potentially be a major factor in choosing which players to recruit. The physiological benefits of Kho Kho are numerous, including increased aerobic capacity and endurance, decreased resting and peak heart rates, and enhanced cardiorespiratory fitness.

Princy and Mahaboobjan (2022) found the effect of circuit training on selected physiological components among 30 women Kho-Kho players, whose age ranges between 21 and 23 years of Bharathidasan University, Tiruchirappalli. The selected subjects randomly divided in to two equal groups, Group I experimental group, Group II control group. Each group consists of 15 subjects. Experimental Group I undergone to circuit training for 6 weeks, 6 days per week under training in the morning secessions only. Group II control group does not have any specific training other than the regular routine activities. The physiological variables such as resting pulse rate, breath holding time, Vo<sub>2</sub> max have been selected and pre and post test data has collected for analysis. The collected data were statistically analyzed by analysis of covariance (ANCOVA). The level of significance was fixed at 0.05 of confidence for all the cases. The experimental groups had significant improvement on all the selected physiological components when comparing to the control group.

Raghuwashi (2019) determined the effect of 6 weeks circuit training on selected motor abilities of the male Kho-Kho players. The researcher has selected forty inter collegiate Kho-Kho men players at random, their age ranged from 18 to 20 years. The subjects selected for the study were divided into two equal groups and designated as experimental group "A"

(N<sub>1</sub>=20) and control group "B" (N<sub>2</sub>=20). The subjects from Group-A were subjected to 6 week of circuit training program. Group-B acted as control who did not contribute any particular training separately from the normal curricular activities. The statistical analysis and interpretation were done on the basis of data collection. The data were analyzed and interpreted by using ANCOVA method. The level of significance was kept at 0.05 to test the hypotheses.

Parmila (2018) investigated the effect of a 4 week circuit training program on the motor abilities of Kho-Kho players. 30 male Kho-Kho players b/w 14–17 years of age who had participated at least in zonal level tournaments of district Bhiwani schools were selected as the subjects for the study. AAPHER youth physical fitness test was administered to collect the data. Descriptive statistics and "t" test were employed to analyze the data. Significant differences were found between Pre-test and Post-test for standing broad jump 600 m, Shuttle Run, sit ups, and 50 m Dash of Kho-Kho players.

Sumathi (2017) found the effect of circuit training on selected strength parameters among Kho-Kho players ranged from 18 to 25 years of Sri Sarada College of Physical Education for Women, Salem, Tamil Nadu. The subjects were tested prior to and after the experimentation on shoulder strength, upper body strength, explosive power, and anaerobic power. The variable to be used in the present study was collected from all subjects before they have to treat with the respective treatments. It was assumed as pre-test. After completion of treatment they were tested again as it was in the pre-test on all variables used in the present study. This test was assumed as post-test. The following statistical techniques were adopted to treat the collected data in connection with established hypothesis and objectives of this study. ANCOVA was used to test the treatment effect of the training programs on all the variables used in the study. It was observed that the 6 weeks of circuit training have significantly improved the selected strength parameters of Kho-Kho players.

## METHODOLOGY

The purpose of the present study is to investigate the effects of circuit training on specific physiological factors in male Kho-Kho players. To achieve the objective of the study, 20 male Kho-Kho players were selected from various colleges affiliated to Osmania University. The selected subjects are between the ages of 18 and 23. The selected subjects were randomly divided into her two equal groups, with Group I designated as the control group and Group II as experimental group. Each group consists of 20 subjects. The control group (Group I) received no special training other than normal daily activities. The experimental (Group II) completed 6 weeks of circuit training. The training only in the morning 6 days a week. Physiological factors such as agility, flexibility, cardio respiratory endurance, and reaction time were selected.

## DATA ANALYSIS AND INTERPRETATION

The descriptive measures and the results of *t*-test values on the circuit training are given in Tables 1-4.

The above table shows the mean values, standard deviation values and *t*-value between pre-test and post-test with respect to agility of elite Kho-Kho players (control group and experimental group). The mean agility of pre-test for control group is 7.63, standard deviation value is 1.23, correspondingly the mean agility of post-test is 7.61 and standard deviation value is 1.23. The calculated *t*-value (0.058) is lower than the tabulated *t*-value (1.980) at ( $P = 0.05$ ) at 38 degrees of

freedom. The mean agility of pre-test for experimental group is 7.62, standard deviation value is 1.26, correspondingly the mean agility of post-test is 9.46, and standard deviation value is 1.36. The calculated *t*-value (4.428\*\*) which is higher than the tabulated *t*-value (2.617) at ( $P = 0.01$ ) at 38 degrees of freedom. On the basis of this evidence it is concluded that there is a significant difference in the agility of elite Kho-Kho players after experimental time period as they were involved in circuit training.

Table 2 shows the mean values, standard deviation values, and *t*-value between pre-test and post-test with respect to flexibility of elite Kho-Kho players (control group and experimental

**Table 1: Mean, standard deviation, and *t*-values of agility of elite Kho-Kho players (control group and experimental group)**

Agility	Test	N	Mean	SD	Df	Tested <i>t</i> -value	<i>P</i> -value
Control Group	Pre-test	20	7.63	1.23	38	0.058	0.954
	Post-test	20	7.61	1.23			
Experimental Group	Pre-test	20	7.62	1.26	38	4.428	0.000
	Post-test	20	9.46	1.36			

Level of Significance at 0.05 is 1.980 and at 0.01 is 2.617

**Table 2: Mean, standard deviation, and *t*-values of flexibility of elite Kho-Kho players (control group and experimental group)**

Flexibility	Test	N	Mean	SD	Df	Tested <i>t</i> -value	<i>P</i> -value
Control Group	Pre-test	20	41.22	2.49	38	0.058	0.954
	Post-test	20	41.17	2.95			
Experimental Group	Pre-test	20	41.42	2.88	38	17.514	0.000
	Post-test	20	56.76	2.64			

Level of significance at 0.05 is 1.980 and at 0.01 is 2.617

**Table 3: Mean, standard deviation, and *t*-values of endurance of elite Kho-Kho players (control group and experimental group)**

Endurance	Test	N	Mean	SD	Df	Tested <i>t</i> -value	<i>P</i> -value
Control Group	Pre-test	20	2723.05	73.10	38	0.633	0.531
	Post-test	20	2736.45	60.23			
Experimental Group	Pre-test	20	2730.55	55.90	38	59.132	0.000
	Post-test	20	3516.45	20.19			

Level of significance at 0.05 is 1.980 and at 0.01 is 2.617

**Table 4: Mean, standard deviation, and *t*-values of reaction time of elite Kho-Kho players (control group and experimental group)**

Reaction time	Test	N	Mean	SD	Df	Tested <i>t</i> -value	<i>P</i> -value
Control group	Pre-test	20	0.33	0.02	38	0.952	0.347
	Post-test	20	0.32	0.03			
Experimental group	Pre-test	20	0.33	0.03	38	7.935	0.000
	Post-test	20	0.25	0.03			

Level of significance at 0.05 is 1.980 and at 0.01 is 2.617



group). The mean flexibility of pre-test for control group is 41.223, standard deviation value is 2.49, correspondingly the mean flexibility of post-test is 41.17 and standard deviation value is 2.95. The calculated  $t$ -value (0.058) is lower than the tabulated  $t$ -value (1.980) at ( $P = 0.05$ ) at  $38^\circ$  of freedom. The mean flexibility of pre-test for experimental group is 41.42, standard deviation value is 2.88, correspondingly the mean flexibility of post-test is 56.76 and standard deviation value is 2.64. The calculated  $t$ -value (17.154\*\*) which is higher than the tabulated  $t$ -value (2.617) at ( $P = 0.01$ ) at  $38^\circ$  of freedom. On the basis of this evidence it is concluded that there is a significant difference in the flexibility of elite Kho-Kho players after experimental time period as they were involved in circuit training.

It is observed from the table the mean values, standard deviation values and  $t$ -value between pre-test and post-test with respect to endurance of elite Kho-Kho players (control group and experimental group). The mean endurance values of pre-test for control group is 2723.05, standard deviation value is 73.10, correspondingly the mean endurance of post-test is 2736.45 and standard deviation value is 60.23. The calculated  $t$ -value (0.633) is lower than the tabulated  $t$ -value (1.980) at ( $P = 0.05$ ) at  $38^\circ$  of freedom. The mean endurance of pre-test for experimental group is 2730.55, standard deviation value is 55.90, correspondingly the mean endurance of post-test is 3516.45 and standard deviation value is 20.19. The calculated  $t$ -value (58.132\*\*) which is higher than the tabulated  $t$ -value (2.617) at ( $P = 0.01$ ) at  $38^\circ$  of freedom. On the basis of this evidence it is concluded that there is a significant difference in the endurance of elite Kho-Kho players after experimental time period as they were involved in circuit training.

The table evidences the mean values, standard deviation values and  $t$ -value between pre-test and post-test with respect to reaction time of elite Kho-Kho players (control group and experimental group). The mean reaction time values of pre-test for control group is 0.33, standard deviation value is 0.02, correspondingly the mean reaction time values of post-test is 0.32 and standard deviation value is 0.03.

The calculated  $t$ -value (0.952) is lower than the tabulated  $t$ -value (1.980) at ( $P = 0.05$ ) at  $38^\circ$  of freedom. The mean reaction time value of pre-test for experimental group is 0.33, standard deviation value is 0.03, correspondingly the mean experimental group value of post-test is 0.25, and standard deviation value is 0.03. The calculated  $t$ -value (7.935\*\*) which is higher than the tabulated  $t$ -value (2.617) at ( $P = 0.01$ ) at  $38^\circ$  of freedom. On the basis of this evidence it is concluded that there is a significant difference in the reaction time of elite

Kho-Kho players after experimental time period as they were involved in circuit training.

## FINDINGS

There will be a significant impact of circuit training on the motor abilities among Kho-Kho elite players. The post-test performance of Kho-Kho elite players is significantly higher than the pre-test performance of the same group on circuit training which shows that the training has positive impact on the elite Kho-Kho players.

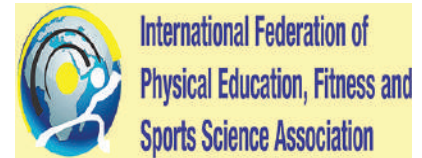
There was a significant improvement in the agility, flexibility, cardio respiratory endurance, and reaction time after practicing in circuit training zig-zag run, sit, and reach test, cooper test improved the strength of abdominal, trunk muscles, and cardio vascular endurance of the players. The flexibility and endurance of Kho-Kho players have significantly improved by practicing harm strings and VO2 max, respectively.

## CONCLUSION

This research study concluded based on the results that the 6 weeks circuit training was effective in bringing about significant improvement in performance of playing abilities among elite Kho-Kho players of Osmania University affiliated college athletes.

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## Research Article

# A assessment on sports injuries among sprinters and long jumpers of Hyderabad district

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### ABSTRACT

The purpose of the study was to assess the sports injuries among male sprinters and male long jumpers in Hyderabad district. The sample for the study was confined to 20 sprinters and 20 long jumpers from Hyderabad district between the age group of 20–22 years. The questionnaire is used to assess the sports injuries among male sprinters and male long jumpers. It is concluded that sprinters have secured the injuries in hamstring, stress fractures, ankle sprains, and knee cartilage 75%, upper extremities injuries like rotator cuff elbow injury, fractures in hand 10%, head-and-neck injuries 5%, and spine injury in back due to training and high-intensity training 10%. It is concluded that long jumpers have secured the injuries in hamstring strains, groin strains, patella tendinitis, etc. 70%, upper extremities injuries like rotator cuff, elbow injury, fractures in hand 10%, head-and-neck injuries 5%, and spine injury in back due to training and high-intensity training 15%. The present study will bring the true facts and importance of sports injuries among sprinters and long jumpers. The results of the study may help coaches and physical educators to adopt an attitude of scientific approach to training methodology in achieving a high level of sports performance by reducing the injuries in the event of sprints and long jump.

**Keywords:** Long Jump, Sports injuries, Sprints etc.

## INTRODUCTION

In athletics and track and field, sprints (or dashes) are races over short distances. They are among the oldest running competitions, being recorded at the Ancient Olympic Games. Three sprints are currently held at the modern Summer Olympics and outdoor World Championships: the 100 m, 200 m, and 400 m. The long jump is a track and field event in which athletes combine speed, strength, and agility in an attempt to leap as far as possible from a takeoff point. Along with the triple jump, the two events that measure jumping for distance as a group are referred to as the “horizontal jumps.” This event has a history in the ancient Olympic Games and has been a modern Olympic event for men since the first Olympics in 1896 and for women since 1948.

## SPORTS INJURIES

Every day, a lot of people all over the world participate in games and sports activities or competitions. Participation in sports improves physical fitness and overall health and wellness. Games and sports can also result in injuries, some minor, some serious, and still other in lifelong medical problem. Sports injuries result from acute trauma or repetitive stress associated with athletic activities. Sports injuries can affect bones or soft tissue (ligaments, muscles, tendons). There are numerous sports injuries happened in the field of sports. It is very important for all coaches, trainers, and players to know the causes symptoms, prevention, and treatment for all these common injuries to avoid most of these types of injuries and also to update the poor training methods.

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Thakur and Kumar (2022): Sports injuries are injuries that occur during sport, athletic activities, or exercising. Platelet-rich plasma (PRP) is derived from autologous blood and

**Table 1: Percentage of injuries among sprinters in training and competition**

lower extremities injuries: Hamstring strain, Stress fractures, ankle sprains and cartilage issues in the knees etc.	Upper extremities: Rotator Cuff, elbow injury, Fractures in Hand	Head and Neck injury	Spine
75	10	5	10

**Table 2: Percentage of injuries among long jumpers in training and competition**

lower extremities injuries: Hamstring strains, groin strains , Patella tendinitis etc.	Upper extremities: Rotator Cuff, elbow injury, Fractures in Hand	Head and Neck	Spine
70	10	5	15

prepared so that the platelet concentration is above baseline value. PRP is currently being used and promoted for many muscle injuries, ligament tears and early arthritis in sports persons and young adults. This case series studied the short-term results of PRP injections in various sports injuries. All patients received three injections 1 week apart as an outpatient procedure. The sample for the study consists of 31 sports persons with injuries. Males were 25 and females were 6. The mean age was 24.7 years. Different injuries were noted in various sports. Type of injury and number of injections and post-injection complications were studied. Data were collected prospectively with pre-injection. Visual Analog Scores (VAS) (0–10) for pain (VAS pain) were recorded. In addition, as part of the final follow-up questionnaire, two “Yes/No” questions were asked: (i) are you satisfied with the result post-injection and (ii) if your symptoms recurred, would you have a repeat injection? The VAS pain improved from a mean of 8.16 (7–9) pre-injection to 1.4 (range 0–3) at final follow-up. All patients felt that they were better than they were before the injection. All patients would have another injection if their symptoms recurred. Only one patient with patellar tendinitis continued to have pain (VAS 7) even with 3 injections and needed a surgical debridement procedure. He had a severe flat foot which we feel, might have put mechanical overload on the patellar ligament. No severe adverse events or complications related to the injections were observed during the treatment or follow-up period. PRP was harvested and prepared using same commercial device in all these patients. Post-injection, all patients were put on early exercise therapy. Return to sports was allowed only after complete pain relief and function. The short-term results showed good pain relief, early return to sports and function following PRP therapy in various muscle injuries, tendinopathies, and grade I arthritis. PRP treatment offers the potential for a safe, convenient, and effective therapeutic option for athletes and other active persons who have musculoskeletal injuries.

Akhila (2021) studied about the sports injuries among goalkeepers in football and hockey in Telangana state. The sample for the study consists of 20 male goalkeepers in football and 20 male hockey goalkeepers in the age group of 19–22 years. The data are collected through questionnaire

at their practice session. It is concluded that goalkeepers in football, the lower extremities injuries are 45%, upper extremities injuries are 25%, head-and-neck injuries are 10%, and spine 20%. It is concluded that goalkeepers in hockey, the lower extremities injuries are 40%, upper extremities injuries are 30%, head-and-neck injuries are 15%, and spine 15%. This type of study is useful to coaches to give proper coaching for the development of motor qualities for the prevention of injuries among football and hockey goalkeepers.

## METHODOLOGY

The purpose of the study was to analyze the Sports Injuries among male sprinters and male long jumpers of Hyderabad district. The sample for the study was confined to 20 sprinters and 20 long jumpers of Hyderabad district between the age group of 20–22 years. The questionnaire is used to assess the sports injuries among male sprinters and male long jumpers.

## RESULTS AND DISCUSSION

In Table 1, it is concluded that sprinters have secured the injuries in hamstring, stress fractures, ankle sprains, knee cartilage 75%, upper extremities injuries like rotator cuff, elbow injury, fractures in hand 10%, head-and-neck injuries 5%, and spine injury in back due to training and high intensity training 10%.

In Table 2, it is concluded that long jumpers have secured the injuries in hamstring strains, groin strains, patella tendinitis, etc., 70%, upper extremities injuries like Rotator cuff, elbow injury, fractures in hand 10%, head-and-neck injuries 5%, and spine injury in back due to training and high intensity training 15%.

## CONCLUSIONS

The present study will bring the true facts and importance of sports injuries among sprinters and long jumpers. The results

of the study may help coaches and physical educators to adopt an attitude of scientific approach to training methodology in achieving the high level of performance by reducing the injuries in the event of sprints and long jump.

### **RECOMMENDATIONS**

This study also helps the injured athletes, physical educationist, sports scientists, etc., for their coaching in

the prevention of injuries through warming up and training methods.

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## Research Article

# Effect of different breathing exercises on sports' imaginary ability of female students in university college, Jaffna

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### ABSTRACT

Sports' imagery ability is one of the most influential mental training techniques students practice to improve academic performance and enhance success. Meanwhile, breathing exercises are among the tools for improving this particular ability in students. Based on that, the purpose of the current study was to evaluate the effect of three different breathing exercises on the sports' imaginary ability of female students in the Department of Cosmetology, University College of Jaffna. The methodology involved randomly selecting 45 students from the Department of Cosmetology aged 21–23 years. The students were randomly assigned into three groups, each group consisting of 15 female students, and they were provided with three different breathing exercises such as Nadi Shodhana Pranayama, Kapalabhati Pranayama, and Anuloma Viloma pranayama. The breathing exercises were given for 1 h/day and 3 days/week for 8 weeks. The sports' imaginary ability of the students was measured before and after the breathing exercises using a standard questionnaire with 7-point Likert scale. The results of pre and post-tests revealed a significant ( $P < 0.05$ ) improvement in the sports' imaginary ability of female students after undergoing Kapalabhati Pranayama and Anuloma Viloma pranayama exercises. Hence, these two breathing exercises could be used as tools for improving students' sports' imaginary ability and thereby improving their academic performance and success in their studies.

**Keywords:** Ability, Academic performance, Breathing, Students, Success

## INTRODUCTION

Yoga has been practiced for 1000 of years. It is based on ancient theories, observations, and principles of the mind-body connections. Substantial research has been conducted to look at the health benefits of yoga – yoga postures (asanas), yoga breathing (pranayama), and meditation. These yoga practices might interact with various somatic and neuroendocrine mechanisms, bringing about therapeutic effects (Malhotra *et al.*, 2009). Yoga practices can also be used as psycho-physiological stimuli to increase the secretion of melatonin, which, in turn, might be responsible for perceived well-being (Harinath *et al.*, 2004). Yoga breathing, or pranayama, is the science of breath control. Pranayama (breathing exercise), one of the yogic techniques, can produce different physiological responses in healthy individuals (Singh *et al.*, 2014). Asana and pranayama have been incorporated alongside Ayurvedic

medicine as the basis of a system of medical therapy. Training in yoga respiration selectively increases the respiratory sensation, perhaps through its persistent conditioning of the breathing pattern (Joshi *et al.*, 2011).

Pranayama literally means control of prana. Prana, in Indian philosophy, refers to all forms of energy in the universe. That is why pranayama is generally considered to regulate breathing. A yogi, through pranayama, can control his body's internal functions and finally control prana's manifestations even outside his body (Baljinder, 2015).

Breathing exercises have probably been labeled as Pranayama, as these are responsible for providing life energy to our bodies. Proper breathing helps oxygenate blood and remove carbon dioxide, enhancing mental concentration, good health, and longevity. It provides oxygen to the cells of various organs, including the brain, heart, and kidney. Oxygen gives life to the cells and keeps them alive. That is why the air is known as Pranayama, giving life to the human body.

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The common types of breathing exercises which are easy to learn and practice for day-to-day fitness and prevention of disease are equal breathing (bhasrika), clavicular breathing, costal breathing, and diaphragmatic breathing. Kapalabhati, alternate nostril breathing (anuloma viloma), Nadi Shodhana, bhramari pranayama, and tribandh breathing. These require proper learning under guidance. Ujjayi pranayama, sitali, and surya bheda pranayama also require proper training and have a calming effect on the body. Various types of breathing benefit the body when they are done regularly for the minimum recommended period (Dhaniwala *et al.*, 2020).

Nadi Shodhana is a simple and smooth pranayama technique with wide-reaching benefits when practiced regularly. Nadi means "subtle energy channel," and Shuddhi means "cleansing or purifying." Therefore, practicing this breath purifies the subtle energy channel, allowing oxygen to flow freely throughout the body. This will bring a strong feeling of clarity, focus, and peace inside the whole-body system. Kapalabhati Pranayama is an energizing breathing practice that clears the lungs, the nasal passages, and the mind. Therefore, brings lightness and clarity to the frontal region of the brain. Requiring a rapid contraction and release of the abdomen. Anuloma Viloma is a specific type of pranayama, or controlled breathing, in yoga. It involves holding one nostril closed while inhaling and then holding the other closed while exhaling. The process is then reversed and repeated. It is a form of alternate nostril breathing.

Breathing exercises are useful in maintaining good health and preventing various systemic diseases. However, they also keep us alert, active, and socially compatible and maintain a positive physical, mental, and social wellness state. For healthy and diseased populations, yoga may be as effective as or better than exercise at improving various health-related outcome measures (Ross and Thomas, 2010). Further, to the existing literature, the present study was done to identify how pranayama affects sports' imaginary ability.

### Objective

The aim of this study was to identify the effect of Nadi Shodhana Pranayama, Kapalabhati Pranayama, and Anuloma Viloma pranayama breathing exercises on the Sports' imaginary ability of female students in the University College of Jaffna.

## METHODOLOGY

### Sample

Forty-five female students aged 21–23 years were selected from the Department of Cosmetology, University College Jaffna, using a simple random sampling method.

### Provision of Training

The sample of 45 female students was divided into three equal groups so that one group consisted of 15 players, and they were

provided with three different breathing exercises such as Nadi Shodhana Pranayama, Kapalabhati Pranayama, and Anuloma Viloma pranayama. Each breathing exercises were given for 1 h/day on the basis of 3 days/week for a period of 8 weeks. The training of the selected breathing exercises following the features mentioned by Dhaniwala *et al.* (2020).

### Evaluation of Sports' Imaginary Ability

The sports' imaginary ability of college students was measured before and after the provision of training of breathing exercises using sports' imaginary ability scale with a standard questionnaire as recommended by Williams and Cumming (2011). The college students answer the 15 questions, with no time limit for completion. The scale uses a seven-point Likert scale for the responses, ranging from one (very hard to imagine) to seven (very easy to imagine). The scale measures responses to skill imagery ability, strategy imagery ability, goal imagery ability, affect imagery ability, and mastery imagery ability.

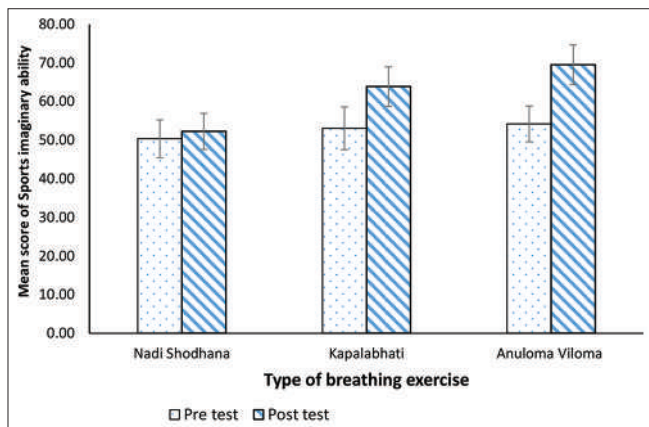
### Statistical Analysis

The collected data were analyzed using paired sample t-test (pre-test and post-test) to identify the effects of each breathing exercise on the imagery ability of college students. Then, the effects of pranayama breathing exercises on the imagery ability of students were compared using ANCOVA. All the analyses were performed at a 95% confidence level using SPSS software.

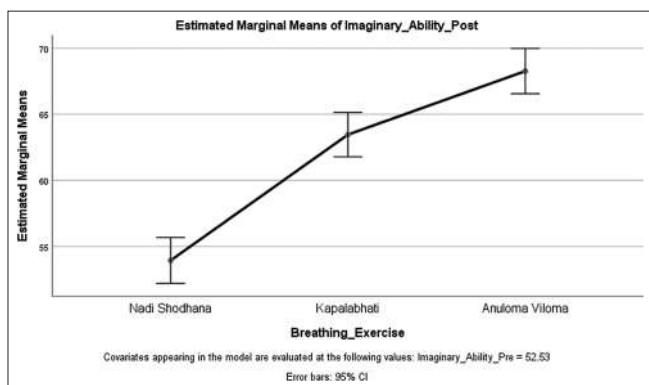
## RESULTS AND DISCUSSION

Exercises are of different types, which include swimming, cycling, team sports, brisk walking, running and athletics, aerobics, specific muscle strengthening and stretching, muscle contraction, joint mobilization, etc. They target specific motor skills of students. Meanwhile, breathing exercises are gaining more importance these days due to their definite role in improving blood oxygenation and utilization of the greater capacity of the lungs, thereby helping prevent many diseases (Dhaniwala *et al.*, 2020). To support this fact, the present study was done to evaluate how three selected breathing exercises (Nadi Shodhana Pranayama, Kapalabhati Pranayama, and Anuloma Viloma pranayama) will affect the sports' imaginary ability of college students.

The results [Figure 1] indicated that there was a significant ( $P < 0.05$ ) improvement in the sports' imaginary ability of students from  $53.07 \pm 5.52$  to  $63.87 \pm 5.11$  and from  $54.20 \pm 4.63$  to  $69.53 \pm 5.15$  after undergoing Kapalabhati Pranayama and Anuloma Viloma Pranayama, respectively. Kapalabhati is an advanced yogic diaphragmatic breathing technique that increases the lungs' capacity and oxygenates the mind and body. It helps release negative emotions, shakes off sluggishness, and energizes the person. Its utility in various disease conditions such as atelectasis and COVID-19 has been



**Figure 1:** Sports' imaginary ability before and after the three breathing exercises



**Figure 2:** Comparing the effect of three breathing exercises on sports' imaginary ability

documented (Dhaniwala *et al.*, 2020, Feng *et al.*, 2020 and Moradian *et al.*, 2019). Anuloma Viloma Pranayama cures simple upper respiratory tract infections and oxygenates the blood properly. Its rate and rhythm can be varied easily by the person. It instantly gives a feeling of freshness and well-being (Dhaniwala *et al.*, 2020). The study's findings support the positive impact of these two breathing exercises. However, there is no significant improvement in the sports' imaginary ability of students after undergoing Nadi Shodhana Pranayama.

Further, when comparing the effects of three breathing exercises on the sports' imaginary ability, the results of ANCOVA represent that when the pre-test is controlled, the effect of three breathing exercises on the post-test values of specific mental ability was significantly different. As shown

in Figure 2, among the three breathing exercises, the Anuloma viloma pranayama has a significantly highest effect on sports' imaginary ability when compared to the other two pranayama.

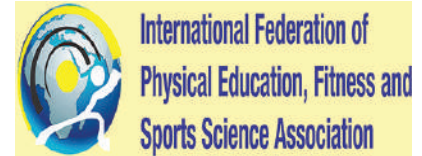
Breathing exercises improve the imaginary abilities of college students, where the students will have improved imagination abilities of Skills, Strategies, Goals, Effects, and Mastering. However, underpinning studies are required to evaluate the application in real-world scenarios.

## CONCLUSION

Breathing exercises such as Kapalabhati Pranayama and Anuloma Viloma Pranayama could improve students' sports' imagination which will lead to the improvement in academic performance and success in their studies. Meanwhile, further studies are needed to confirm the above findings at different training schedules.

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## Review Article

# Physical and psychological parameters variability after yogic and meditation practices: A prospective randomized comparative trial of soccer players

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### ABSTRACT

In the recent past our country, players and athletes are participated in many international events, the success rate of the players is still questionable due to many reasons. The players having many track records under their belt may fail in international level due to the stress and less mental stability. There is a need to improve the mental health of the players and also their physical health. "The relaxation techniques incorporated in yoga can lessen chronic pain, such as lower back pain, arthritis, headaches, and carpal tunnel syndrome," explains Dr. Nevins. "Yoga can also lower blood pressure and reduce insomnia." The other benefits of yoga includes increased flexibility, increased muscle strength, tone, improved respiration, energy, vitality, maintaining a balanced metabolism, weight reduction, cardio and circulatory health, improved athletic performance, and protection from injury, one of the best benefits of yoga is how it helps a person manage stress, which is known to have devastating effects on the body and mind. "Stress can reveal itself in many ways, including back or neck pain, sleeping problems, headaches, drug abuse, and an inability to concentrate," says Dr. Nevins. "Yoga can be very effective in developing coping skills and reaching a more positive outlook on life." Yoga's incorporation of meditation and breathing can help improve a person's mental well-being. "Regular yoga practice creates mental clarity and calmness; increases body awareness; relieves chronic stress patterns; relaxes the mind; centers attention; and sharpens concentration," says Dr. Nevins. Body- and self-awareness are particularly beneficial, she adds, "Because they can help with early detection of physical problems and allow for early preventive action." The proposal aims to improve the football player's performance as considering their past performance and practicing yoga for physical and mental ability. The entire module is well documented and can be provided for the use of the national and international society to improve the performance of the player. The web portal will be developed and maintained and assistance will be provided through audio and video tools.

**Keywords:** Meditation, Physical health and mental stability, Psychological health, Yoga

### INTRODUCTION

The word yoga is derived from the Sanskrit root "Yuj." The literal meaning of this word is "Union." It signifies the union of human being with the God, body with mind, the individual soul with the universal spirit, mortal with eternal, mind with the innermost center conscious mind with the unconscious mind, resulting into integration of different dimensions of the personality. It is generally related with metaphysics as well as physiology (Iyengar, 1999).

Yoga is a system of attaining perfect physical and mental health. The body is the temple of soul and to reach harmony of mind body and spirit, the body must be physically fit. It clearly reveals that there will be a sound mind only in a sound body. To keep our body in a good condition, it is essential that the various organs and system of our body must be in a good condition. Yogic practices play an important role in the maintenance of the above system. The practice of yoga not only develops the body but also produces the mental faculties.

Yogic practices and physical exercises play an important role in the development of the balance created in the nervous and endocrine systems which directly influence all the other systems and organs of the body. Yoga acts both as a curative and

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preventive therapy. The very essence of yoga lies in attaining mental peace improved concentration powers, a relaxed state of living and harmony in relationships (Iyengar, 1999).

Although the word meditation is not exactly right to indicate “Dhyana,” it has been used in the present study as there is no other word to translate. “Dhyana” into English, and meditation comes nearest to it. This word meditation comes from a Greek root “Medonui” which means to think about. However, “Dhyana” in fact means exactly the opposite. “Dhyana” means how not to think about; how to be in a state of no thought; how to come to a point where an individual exists but there is no thinking; a state of no mind, pure awareness.

Meditation is one of the techniques of yoga, which is supposed to bring about deep relaxation of the body, mind, and spirit. It helps a great deal to relieve stress tension and establish harmony in one’s life. Meditation is an appropriate means to overcome stress and the disorders caused by it.

Meditation follows concentration and concentration merges into meditation. Concentration is holding the mind on to some particular object. A consistent flow of thought or knowledge is with regard to the object of concentration. During meditation, the fluctuation of mind is converted into focused and one pointed.

According to Denniston and McWilliams (1975) meditation is a natural state of consciousness that is not “learned” any more than you learn to sleep. When the mind becomes one-pointed and steady, it will naturally go beyond the normal mundane awareness into the state referred to as meditation.

Meditation is a state of no-mind. It is state of pure consciousness with no content what so-ever. Ordinarily the mind is a constant traffic, that is, thoughts are moving, desires are moving, memories are moving, and ambitions are moving; so obviously, an individual’s consciousness is too full of rubbish. It is just like a mirror covered with dust. Even when a person is in a deep sleep the mind is dreaming, worries and anxieties are still there.

According to Osho (1995), meditation is just being delighted in your own presence; meditation is a delight in your own being. It is very simple-a totally relaxed state of consciousness where you are not doing anything.

### **Definition of the Problem**

The BIGGEST secret to you playing your best when it counts the most is learning how to keep yourself CALM and COMPOSED. If you allow yourself to get too nervous or too excited right before or during a competition, then your muscles will tighten up, you’ll lose your confidence and your play will go right down the tubes. This is what it means to CHOKE the athlete gets so nervous that he/she ends up performing tight and tentatively a mere shadow of his or her normal self.

The use of yoga unites the body and mind in harmony. Yoga, as a practice, seeks to correlate all aspects of living as it relates to those around us. This union is accomplished through physical postures, relaxation, and meditation.

### **Objectives**

The objectives of this study were as follows:

1. To study the impact of yoga practices on physical and psychological parameters of professional college men football players.
2. To study the impact of meditation practices and psychological on physical parameters of professional college men football players.
3. To study the combined impact of meditation practices and psychological on physical parameters of professional college men football players.
4. Create the open source website link and upload the yoga practices for players with demonstration video and photos for the benefit of our society.
5. Open source documentation and providing assistance to the interested institution and sports board in national wide.

## **REVIEW AND STATUS OF RESEARCH AND DEVELOPMENT IN THE SUBJECT**

### **International Status**

Due to government of India initiative, the yoga is recognized by the international society. The international yoga day is celebrated on June 21 of every year. Many international sports teams are started using the yoga for their players mental and physical health improvement.

### **National Status**

The word “yoga” comes from the Sanskrit root “yuj,” which means “to join” or “to yoke.” Yoga is a practical aid, not a religious practice. Yoga is an ancient art based on a harmonizing system of development for the body, mind, and spirit. The continuous practice of yoga will lead to a sense of peace and well-being, and also a feeling of being at one with their environment. This is a simple definition about yoga (Iyengar, 2001). Even though the yoga was originated in India, the sports teams and organization was not properly utilized the yoga for the benefits of their members. Hence, there is a need to explore the yoga for our sports teams and evaluate the uses.

### **Relevant References**

Peterson et al. (2016) identified altered metabolomic profiles following an Ayurveda-based intervention. In the experimental group, 65 healthy male and female subjects participated in a 6-day Panchakarma-based Ayurvedic intervention which included herbs, vegetarian diet, meditation, yoga, and massage. A set of 12 plasma phosphatidylcholines decreased (adjusted  $p < 0.01$ ) post-intervention in the experimental

(n = 65) compared to control group (n = 54) after Bonferroni correction for multiple testing; within these compounds, the phosphatidylcholine with the greatest decrease in abundance was PC ae C36:4 ( $\Delta = -0.34$ ). Application of a 10% FDR revealed an additional 57 metabolites that were differentially abundant between groups. Pathway analysis suggests that the intervention results in changes in metabolites across many pathways such as phospholipid biosynthesis, choline metabolism, and lipoprotein metabolism. The observed plasma metabolomic alterations may reflect a Panchakarma-induced modulation of metabolotypes. Panchakarma promoted statistically significant changes in plasma levels of phosphatidylcholines, sphingomyelins, and others in just 6 days. Forthcoming studies that integrate metabolomics with genomic, microbiome, and physiological parameters may facilitate a broader systems-level understanding and mechanistic insights into these integrative practices that are employed to promote health and well-being.

Misra et al. (2013) examined the effect of duration of Raj Yoga Meditation practice on affective and cognitive functions in terms of attention/concentration, memory, visual processing, neuroticism, hope, and happiness. Materials and Methods: Sixty-four healthy volunteers practicing Raj yoga from 1 month to more than 10 years were segregated into two groups of beginners and practitioners and their psychological and affective functions assessed using standard measures at a Raj Yoga Center in Delhi, India. Results and Conclusions: Results suggest that the group practicing Raj Yoga for longer duration had significantly less neurotic symptoms, scored higher on hope and happiness and higher on cognitive functions in comparison to the group practicing Raj Yoga for shorter duration. These results may be due to personality development, self-actualization, and better attention and concentration achieved due to training in Raj Yoga.

### Methodology

The main purpose of the study is to find out the Effects of Yogic Practices with and without Meditation Practices on Selected Physical and Psychological Parameters among Professional college men Football Players. In this study, the dependent variables such as physical fitness parameters speed, agility, back strength, leg strength and strength endurance, psychological parameters such as anxiety, aggression, and stress are to be selected. Further, in this study, the selected yogic practices, meditation practices, and combined training of yoga and meditation practices and control groups are to be selected as independent variables. The selected subjects will be medically examined by qualified medical personnel and certified that they physically fit for undergoing the training program. Furthermore, the methodology used and the training provided will be well documented using high quality video camera and will be published in the web site for benefit of our human society.

### Statement of the Problem

The purpose of the study was to determine the effects of yogic practices with and without meditation practices on selected physical and psychological parameters among professional college men football players.

### Significance of the Study

1. This study will help to know the level of improvement of selected physical and psychological parameters among professional college men football players.
2. This study will help to know the various factors related of physical and psychological parameters to fix the training program which, leads for the improvement of football performance to the improvement of physical and psychological parameters.
3. This study will create significant health awareness among football players especially professional college football players.

### Hypotheses

1. It will be hypothesized that there will be significant improvement on yogic practices group, meditation practices group and combination yogic practices and meditation group on selected physical fitness parameters among professional college men football players.
2. It will be hypothesized that there will be significant differences on yogic practices group, meditation practices group and combination yogic practices and meditation group on selected physical fitness parameters among professional college men football players.
3. It will be hypothesized that there will be significant improvement on yogic practices group, meditation practices group and combination yogic practices and meditation group on selected psychological parameters among professional college men football players.
4. It will be hypothesized that there will be significant differences on yogic practices group, meditation practices group and combination yogic practices and meditation group on selected psychological parameters among professional college men football players.

### Delimitations

1. The study will be confined into 120 football players who will be going to participate in the Anna University Zone-XV Football tournament during the year 2017-2018 will be selected as subjects.
2. The age of the subjects ranged from 18 to 25 years.
3. The subjects will be assigned at random into three groups of thirty each (n=30). Group-I undergoes yogic practices, Group-II undergoes meditation practices, Group-III undergoes combined yogic practices and meditation practices, and Group-IV acted as control.

4. The duration of the training period will be restricted to 12 weeks and the number of sessions per week was confined to three.
5. The following dependent variables were selected.

### Physical Fitness Components

- Speed
- Agility
- Back strength
- Leg strength
- Strength endurance

### Psychological Variables

- Anxiety
- Aggression
- Stress

### Independent Variables

- Yogic practices group
- Meditation practices group
- Combination of yogic practices and meditation group
- Control group

### Limitations

The following limitations will be considered while interpreting the results of the study.

1. The previous experience of the subjects in the field of sports and games, which may be influencing on the training and data collection, will not consider.
2. Psychological factors, food habits, rest period, lifestyle, etc., cannot be controlled.
3. The weather conditions such as atmospheric temperature, humidity, and meteorological factors during testing and training period will not considered.
4. Although the subjects will motivated, verbally no attempt is made to differentiate the motivation level during the period of training and testing.

### Definition of the Terms

#### *Yoga*

The word “yoga” comes from the Sanskrit root “yuj,” which means “to join” or “to yoke.” Yoga is a practical aid, not a religious practice. Yoga is an ancient art based on a harmonizing system of development for the body, mind, and spirit. The continuous practice of yoga will lead to a sense of peace and well-being, and also a feeling of being at one with their environment. This is a simple definition about yoga (Iyengar, 2001).

#### *Meditation*

Meditation is a process or state involving serious contemplation or thought, typically with the subject of achieving a mystical experience. A wide variety of processes involved; many of them with little in common. Zen and yoga are traditional meditative techniques.

#### *Football*

Football is a game which calls for a strenuous continuous thrilling action and, therefore, appeals to youth worldwide. The skills involved are simple natural and yet highly stimulating and satisfying to any player. The skills are kicking, jumping, throwing, dribbling, dodging, and out fetching an opponent.

#### *Speed*

The capacity of moving a limb or part of the body’s lower system or the whole body with the greatest possible velocity (Dick, 1980).

#### *Agility*

It is the ability of the human body to change direction quickly and effectively (Uppal, 1992).

#### *Back strength*

Back strength is the capacity of the upper limbs to exert muscular force.

#### *Leg strength*

Leg strength is the capacity of the lower limbs to exert muscular force.

#### *Strength endurance*

The ability of the muscle or group of muscles to overcome resistance or to act against resistance for longer duration of time under conditions of fatigue or tiredness.

#### *Anxiety*

Anxiety is an uneasiness and feeling of forbidding often when a person is about to get on, on a hazardous venture. It is often accompanied by a strong desire to excel.

#### *Aggression*

Hostile or violent behavior or attitudes toward another; readiness to attack or confront. Accidental harm is not aggression, but acts that are intended to injure others are aggression, whether or not they are successful.

#### *Stress*

The process by which the individual responds to environmental and psychological event that is perceived as threatening or challenging. The event that produces stress is called as stressors.

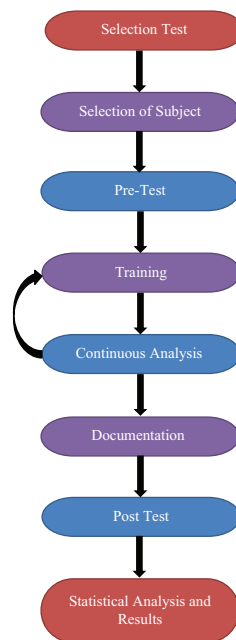
- a. Organization of work elements

#### *Selection of tests*

Before selecting the tests, the investigator will analysis the various literatures and the will be made discussed with experts in the field of physical education, and finally, the standardized tests were selected to assess the criterion variables, as shown in Table 1.

## Experimental Design and Statistical Technique

The study will be formulated as a true random group design, consisting of a pre-test and post-test. The subjects (N = 120) will be randomly assigned into four equal group of 30 each. The groups are assigned as yogic practices group, meditation practices group, combination of yogic practices, and meditation practices group and control group, respectively. Pre-test is conducted for all the 120 subjects on selected physical fitness parameters (speed, agility, back strength, leg strength, and strength endurance), and psychological variables (anxiety, aggression, and stress). The experimental groups will participate in their respective training for a period of 24 weeks. The control group will not participate in any training. The post test was conducted on the above said dependent variables after a period of 24 weeks of training. The training programs are to be scheduled from 6:30 to 7:30 a.m. on 3 days a week. Statistical technique will be used to find out the effects of yogic practices, physical exercises, and combination of yogic practices and physical exercises on selected physical fitness, physiological, and psychological variables among rural women students. The ANCOVA statistical technique was used to test the adjusted post-test mean differences among the experimental groups. When the adjusted post-test result was significant, the Scheffe's *post hoc* test was used to find out the paired mean differences (Harrison Clark, 1985).



**Table 1: The selected criterion variables and their standardized tests**

S. No.	Variables	Tests
1.	Speed	Fifty meters run test
2.	Agility	4 × 10 m shuttle run test
3.	Back strength	Dynamometer
4.	Leg strength	Dynamometer
5.	Strength endurance	Bent knee sit up tests
6.	Anxiety	SCAT questionnaire
7.	Aggression	Smith's aggressive questionnaire
8.	Stress	Everly and Girnado's. Questionnaire

## CONCLUSIONS

It is concluded that there is significant improvement on yogic practices group, meditation practices group and combination yogic practices and meditation group on selected physical fitness parameters among college men football players.

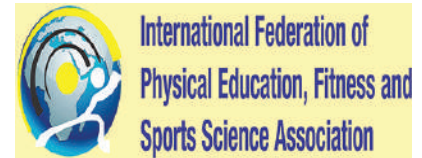
It is concluded that there is significant differences on yogic practices group, meditation practices group and combination yogic practices and meditation group on selected physical fitness parameters among college men football players.

It is concluded that there is significant improvement on yogic practices group, meditation practices group and combination yogic practices and meditation group on selected psychological parameters among college men football players.

It is concluded that there is significant differences on yogic practices group, meditation practices group and combination yogic practices and meditation group on selected psychological parameters among college men football players.

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## Research Article

# Survey on the current situation of physical education program at the People's Security University, Vietnam

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### ABSTRACT

The People's Security University is one of the key units in training security forces for Vietnam. In addition to ensuring specialized knowledge, the physical fitness of students is also a top concern. The results of a survey on the current status of physical education at the school show that in addition to the favorable aspects, there is also a significant proportion of students who do not meet the physical requirements issued by the Ministry of Education and Training of Vietnam, although this is a common standard for students of all professions. This is an important issue that needs to be addressed and resolved.

**Keywords:** Current, Physical education, People's Security University, Physical fitness

### INTRODUCTION

The People's Security University is one of the key units in training security forces for Vietnam. In addition to ensuring specialized knowledge, the physical fitness of students is also a top concern. The results of a survey on the current status of physical education (PE) at the school show that in addition to the favorable aspects, there is also a significant proportion of students who do not meet the physical requirements issued by the Ministry of Education and Training of Vietnam, although this is a common standard for students of all professions. This is an important issue that needs to be addressed and resolved.<sup>[1]</sup>

In parallel with the general education and training work, PE work in schools in particular is considered one of the important factors in the human education system, aiming to develop comprehensive human beings,<sup>[2]</sup> especially for students majoring in security. The process of studying and physical training along with the consolidation and development of physical qualities, willpower, self-confidence, courage, comradeship, and creativity is also formed. Therefore, PE

has become an indispensable part of the strategic goal of the Ministry of Education and Training of Vietnam at the present stage.

However, the content of some training programs still reveals many inadequacies compared to the reality of training organizations and the combat requirements of units and localities. The innovation initiative movement in some schools is still formal, and the application efficiency is limited. Despite many efforts, a practice still shows that the implementation of PE subjects still has many limitations such as the content is not rich, the means, equipment, and tools lacking. Due to many difficulties, the teaching quality is not high, the forms and methods of teaching are not really attractive to students, leading to failure to exploit the self-awareness and interest in practicing of students.

The People's Security University<sup>[3]</sup> is one of the schools that annually train Vietnam's national security forces. With the goal of training graduates, they must have strong political qualities; be good at work; have a firm grasp of the law; ensure security, order, and social safety; and be ready to accept and complete excellently all assigned tasks. Therefore, improving the physical fitness and health of People's Public Security School students in the current period is extremely important to serve the people better.

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## METHODOLOGY

### Statistical Procedure

The research process uses routine methods including: Document analysis and synthesis, sociological survey methods, SWOT analysis methods, and statistical mathematics.

### Aim of Study

Analyze the current status of PE study at The People's Security University to review the actual situation toward solutions to develop educational quality.

### Selection of Sample

808 male students currently studying at The People's Security University (202 1<sup>st</sup> year students, 204 2<sup>nd</sup> year students, 202 3<sup>rd</sup> year students, and 200 4<sup>th</sup> year students).

## RESULTS AND DISCUSSION

### Current Status of the PE Program

Teaching PE and organizing sport activities for school students are an important activity necessary to improve and develop physically, contributing to improving the health of learners. This is also the basis for developing comprehensive physical capacity, perfecting physical form, strengthening health, and forming a system of skills and techniques to serve professional work, aiming at the goal of being physically strong, morally healthy, and spiritually rich.

With the policy of increasingly improving training quality, meeting human resource requirements in the current new situation, and complying with the instructions of the Ministry of Education and Training; at The People's Security University, PE is a mandatory subject in the general education knowledge block in the university education framework program of the security science group, closely related to Education subjects, National defense education, and People's Public Security Martial Arts, contributing to helping students perfect and improve a number of movement skills, physical training, and bravery to successfully complete assigned tasks; is the basis for acquiring knowledge and practical skills of other subjects in the entire training program of the course. Build and form basic motor skills for learners. Educate, protect, and enhance health; develop harmonious physical health; contribute to forming and fostering personality; and meet comprehensive educational requirements for learners.

The PE program consists of two parts: Internal curricular (which students must complete) and extracurricular. The Internal curricular program includes 1 module, equivalent to 3 credits, divided into 86 periods, including: Theory (5 periods), Xenima, discussion, practice (67 periods), Exercises, tests, answers (10 periods), and Examination (4 periods).

The Internal curricular includes 3 main contents: Running, long jump (sitting style), and swimming it is built on the foundation of 3 core goals, including:

- Knowledge goal: Equip students with basic knowledge of sports subjects such as short-distance running, armed running, long jumping, and applied swimming. From there, develop knowledge and exercise methods to train yourself to have good health in study and work.
- Skill goals: Master the theory and practice basic technical operations correctly, fully, accurately, have the ability to short distance, armed running, applied swimming, good jumping aiming to achieve achievements according to regulations of the Ministry of Public Security.
- Objective of self-control and responsibility: Train students to have a sense of discipline, a spirit of determination and positivity, agility, and flexibility in work and combat.

The number of lecturers in charge of teaching the program is 11 lecturers with master's degrees. Thus, for the main course content, the ratio is 1 lecturer/about 123 students, ensuring enough requirements according to regulations.

### Current Status of Facilities Serving PE Activities

The current state of facilities was assessed visually through pedagogical observation and compiled data to report on the School's general facilities, up to the time of the survey. The results summarize the items for general sports activities including 1 multi-purpose gymnasium with 746 seats, 9 badminton courts, 1 volleyball court, 2 table tennis tables, 1 electronic shooting room Equipped with sound and lighting systems, fire protection equipment, 3 mini football fields with an area of 2500 m<sup>2</sup>, 2 tennis courts with an area of 1296 m<sup>2</sup>, 24 billiard tables with an area of 1500 m<sup>2</sup>, 1 multi-purpose gym.

Facilities for teaching and learning have been invested and upgraded by the Board of Directors. Every year, there is a policy of maintenance, repair, and safety for students' practice. This is a favorable condition for the Department to further promote the development of extracurricular sports activities – a healthy and useful playground for students.

### Current Physical Condition of Students

In Vietnam, to have an overview of the physical condition of students, every year schools organize physical assessments of students based on the criteria prescribed and issued by the Ministry of Education and Training No. 53/2008/QĐ-BGDĐT dated September 18, 2008.<sup>[4]</sup> According to the instructions, the assessment will include the following 4/6 tests: Grip strength with dominant hand (kg), Lying on your back and doing crunches for 30 s (times), Jumping on the spot (cm), and Running for 5 min depending on your strength (m). The choice of test depends on the actual conditions of the schools, but it is necessary to ensure that it is mandatory to

**Table 1: Current status of facilities serving PE activities**

No	Type of facility	Quantity	Total floor area (m <sup>2</sup> )	Use for		Status
				Internal curriculum	Extracurricular	
1	Gymnasium	1 house	3.200	x	x	Good
2	Badminton yard	9 yards	750	x	x	Good
3	Volleyball yard,	1 yard	300	x	x	Good
4	Ping-pong table,	2 tables	150	x	x	Good
5	Electronic shooting room	1 room	200	x	x	Good
6	Billiards	24 goals	1.500	x	x	Good
7	Football pitch	3 yards	2.500	x	x	Good
8	Gym house	1 house	1.500	x	x	Good
9	Tennis area	2 yards	1.296	x	x	Good

PE: Physical education

**Table 2: Standards for assessing the physical fitness of Vietnamese students (male)**

Age/Year	Rating	Strength of dominant hand (kg)	Supine sit-up (times/30 s)	Long jump on the spot (cm)	Run 30 m (s)	Shuttle run 4×10 m (s)	Run freely (5 min)
18 (1 <sup>st</sup> year)	Good	>47.2	>21	>222	<4.80	<11.80	>1050
	Pass	≥40.7	≥16	≥205	≤5.80	≤12.50	≥940
19 (2 <sup>nd</sup> year)	Good	>47.5	>22	>225	<4.70	<11.75	>1060
	Pass	≥41.4	≥17	≥207	≤5.70	≤12.40	≥950
20 (3 <sup>rd</sup> year and over)	Good	>48.7	>23	>227	<4.60	<11.70	>1070
	Pass	≥42.0	≥18	≥209	≤5.60	≤12.30	≥960

**Table 3: Current physical condition of students**

Year	Value	Height (cm)	Weight (kg)	BMI	Strength of dominant hand (kg)	Supine sit-up (times/30 s)	Long jump on the spot (cm)	Run freely (5 min)
1 <sup>st</sup> year	Mean	171.9	61.2	20.8	40.0	20.1	209.2	851.1
	S.D.	4.2	3.7	1.2	7.0	3.6	21.8	137.8
	Cv%	2.4	6.1	5.9	17.4	18.1	10.4	16.2
2 <sup>nd</sup> year	Mean	172.5	62.1	20.9	41.2	20.4	243.3	910.4
	S.D.	4.6	5.5	1.4	6.5	3.3	23.0	47.0
	Cv%	2.6	8.9	6.7	15.8	16.3	9.4	5.2
3 <sup>rd</sup> year	Mean	174.8	64.7	21.2	42.9	21.1	266.6	1151.2
	S.D.	4.8	5.2	1.0	3.0	2.2	13.4	68.6
	Cv%	2.7	8.0	4.9	7.0	10.4	5.0	6.0
4 <sup>th</sup> year	Mean	173.4	63.7	21.2	44.1	23.1	259.4	1173.3
	S.D.	4.4	4.4	1.2	4.1	2.0	18.3	105.9
	Cv%	2.5	6.8	5.4	9.3	8.9	7.0	9.0

perform the on-site Long Jump test (cm) and Run 5 min at your own pace (m).

The assessment is conducted at the same time for all students in the school. Due to the characteristics of the school, the number of students in each school year is uniform. At the

time of evaluation, a few students were unable to attend for a number of reasons, but this number was not significant. The total number of students participating in the physical assessment was 808/900, reaching a rate of 89.7%. The assessment is organized according to the process prescribed by the Ministry of Education and Training, and the results



Figure 1: Physical education activities at People's Security University

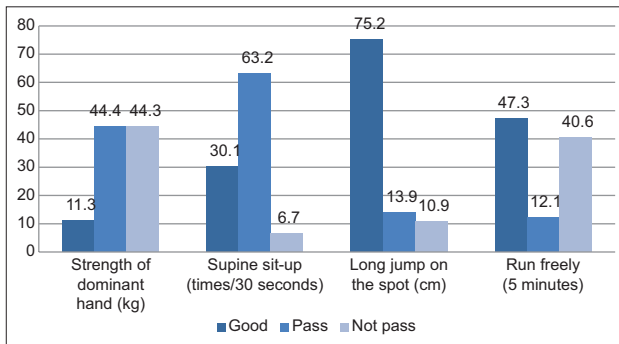


Figure 2: Statistics on student physical fitness classification according to MOET (Vietnam)

are stored at the Department to serve training and improve teaching quality.

The results obtained in the table show that the students have similar height and weight with negligible standard deviation. The reason is that the school's entrance examination requirements require men to be 165 cm or taller. In terms of physical fitness assessment criteria, in general, 1<sup>st</sup>-year students' achievements have the lowest uniformity ( $Cv\% > 10$ ); and 4<sup>th</sup>-year students have more uniform performance.

The percentage of students achieving each criterion of the physical fitness standard increases from the 1<sup>st</sup> year to the 4<sup>th</sup> year, the growth is clearly shown in the number classified into three levels: Good, pass, and not pass.

For 1<sup>st</sup>-year students, in general, the number of students who do not meet the physical requirements is still quite high. Among them, endurance is the quality with the highest number of students not meeting the requirements at 79.9%, with only 8.9% of students achieving a good level. The rate of unsatisfactory students with the strength of the dominant hand is 54%. On-site remote training has an unsatisfactory rate of 39.1%. Only the supine-bend test has a good rate and meets high requirements.

In two tests measuring explosive strength and core strength, the number of 2<sup>nd</sup>-year students who met the requirements or higher was 95.6% for standing distance jumps and 88.2% for lying on their backs. In the remaining two tests, similar to 1<sup>st</sup>-year students, 2<sup>nd</sup>-year students did not perform well. The number of students who do not meet the requirements in the 5-min

Running test at their own pace is very high, up to 79.9%. The rate of students failing to meet the requirements for squeezing force with the dominant hand is 50.4%.

For 3<sup>rd</sup>-year students, their physical strength has clearly increased compared to year 1 and 2 students. 4/4 tests all had good levels and scored very high in the order of On-the-spot Long Jump (100%), Run for 5 min depending on your strength (98%), Lie on your back and do crunches for 30 s (95%), and Squeezing strength with your dominant hand (95.6%).

Similar to 3<sup>rd</sup>-year students, the indicators of core strength, explosive strength, and endurance of 4<sup>th</sup>-year students are all graded at a satisfactory level or higher. Only the dominant hand grip strength test alone still left 33.3% of students who did not pass.

For the people's police force, students must go through a rigorous examination in terms of both physical and mental abilities. However, at a general level, there are still many students whose physical condition does not meet the requirements of the Ministry of Education and Training. In order from high to low, they are as follows: Strength of dominant hand grip (44.3%), Run for 5 min depending on your strength (40.6%), Jump on the spot (10.9%), and Lie on your back and do crunches for 30 s (6.7%). This situation is due to many different reasons such as students do not attach importance to PE, a lot of study time is spent on cultural subjects, as well as the physical conditions do not meet the needs of students. This is because therefore, in-depth analysis of the physical condition of students, especially people's police, is really necessary and should be taken seriously.

## CONCLUSION

The results of the survey and assessment show that the current status of PE activities at the People's Security University is in accordance with the requirements issued by the Ministry of Education and Training of Vietnam. However, the PE course program is quite small, with only 1 module with 3 credits for intracurricular activities. Extracurricular activities are organized for sports such as football, volleyball, and badminton but there is no specific curriculum for these activities. The results of assessing and classifying students' physical fitness according to the regulations of the Ministry of Education and Training show that there are still students whose physical condition does not meet the requirements, especially 1<sup>st</sup> and 2<sup>nd</sup>-year students.

## RECOMMENDATIONS

Thus, from the above results, it shows that this is a situation that needs to be specially overcome to ensure the quality of teaching and learning for a School specializing in Security. As a subject in charge and a lecturer directly teaching, the author recommends



that the school should develop a specific extracurricular program for sports to increase students' opportunities to participate in sports activities students while improving motor skills and enhancing learning quality for students.

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Research Article

# Behind the screen: Exploring habit formation of student-athletes during online training

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### ABSTRACT

The emergence of the SARS-CoV-2 virus in 2019 led to widespread economic disruption and loss of life, prompting governments worldwide to enforce strict lockdowns and quarantine measures. This affected various sectors, including sports and athletics, which transitioned to online platforms in the Philippines to comply with COVID-19 protocols. Guided by William James’s Habit Theory (1914), this study examined how high school student-athletes formed habits during online training. Through interviews, the research investigated how student-athletes break their bad habits, how they maintain consistency in their actions, and how the feedback loop affects the way they make decisions during online training. Interview transcripts were analyzed using Braun and Clarke’s (2006) thematic analysis, and data analysis revealed that there are numerous factors that influence their habit formation during online training, including their environment, connectivity, and motivations. All the participants admitted to being guilty of observing poor practices, but they also showed willingness to change their unwanted behaviors. Findings from this research can help advance interpreting student-athletes’ behavior in the digital world by understanding how they form their habits and identifying several factors that influence their actions and attitudes.

**Keywords:** COVID-19, Habit formation, Online training, Pandemic, Student-athletes

### INTRODUCTION

In the 21<sup>st</sup> century, student-athletes are known as the most actively engaged on college campuses. They are already regarded and recognized as public figures who are representing their respective schools and educational institutions (Corcuera, 2023). With this, they must convey an image that embodies the fundamental principles of these universities that they represent (Bireline, 2014). Moreover, their lives are far from easy, as balancing academic commitments with high-performance sports are a formidable challenge (Abenza-Cano, 2020). Certainly, balancing academic responsibilities, athletic commitments, and social lives while managing pressures from coaches, teammates, and the university community require exceptional resilience (Love, 2018).

In light of these challenges, it is essential for student-athletes to embrace principles that foster strong character (Arnold, 1999).

These values not only improve their academic and athletic performance (Dada, 2016) but also aid them in navigating high expectations, given their substantial following. However, forming them with these values became more challenging when the World Health Organization (WHO) declared the novel coronavirus (COVID-19) outbreak a global pandemic. This declaration drastically altered the lives of student-athletes. Due to the highly contagious nature of the virus, numerous nations, including the Philippines, enforced lockdowns, health restrictions, and safety protocols, lead to the suspension of all sports activities and events to curb the virus spread (WHO, 2020).

Moreover, due to lockdowns declared because of COVID-19, student-athletes also faced challenges in adjusting their training and studies (Abenza-Cano, 2020; Toresdahl and Asif, 2020). The pandemic also led to heightened anxiety and depressive symptoms among athletes (Shepherd *et al.*, 2021), compounded by concerns about academic futures. To address some of these challenges, like the absence of organized sports and the loss of connection with teammates, student-athletes voiced their preference for virtual training offered by their

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coaches (Shepherd *et al.*, 2021). Various sports organizations and departments in different universities and educational institutions began implementing online training. However, transitioning to the virtual space fell short of addressing all the adverse impacts of the pandemic on student-athletes.

### Habits of Student-athletes during Online Training

During the COVID-19 pandemic, student-athletes showcased resilience by maintaining consistent workouts and training regimes despite the shift to online setups (Jagim *et al.*, 2020; LeClaire, 2021). In the face of difficulties, they made physical well-being a top priority and successfully adjusted to unforeseen circumstances by making proactive decisions and employing adaptive coping strategies. In addition, in response to restrictions on team gatherings, student-athletes emphasized the importance of communication, leveraging online channels and social media platforms to strengthen team bonds (Harrington, 2019). It must be acknowledged that during the pandemic, maintaining team chemistry through virtual connections proved essential, as understanding teammates' strengths, weaknesses, and tendencies fostered collaboration and shared objectives. Furthermore, student-athletes also employed diverse coping mechanisms during the pandemic such as engaging in leisure activities and seeking positives in the situation, to maintain a positive mindset despite uncertainties about the future (Liu, 2020).

On the other hand, with the implementation of online training, coaches faced numerous limitations in monitoring student-athletes' performance due to restricted camera views, leading to the development of bad habits like poor posture and improper form, which may potentially result in injuries (Kumar, 2001). In addition, Generation Z student-athletes, issues related to the lack of social skills and resilience may exacerbate because of the pandemic's impact on face-to-face interactions with coaches and peers (Gould *et al.*, 2019). Moreover, online classes and training also contributed to formation of negative behaviors such as excessive device use and neglect of nutrition, which can adversely affect athletic performance. Given these challenges, it is essential for athletic teams to address these bad habits to safeguard athletes' careers and team dynamics. However, managing the increasing demands on coaches to address these issues diverts time and energy from training and preparation.

### Habit Theory

In this scholarly investigation, the Habit Theory proposed by William James in 1914 served as the foundational and foreshadowing theory. According to James (1914), habit formation occurs through repeated behaviors in consistent circumstances, leading to ingrained patterns in the brain. Moreover, James (1914) emphasized three maxims within habit theory: the significance of the environment, consistency, and feedback in cultivating positive habits, reflecting a

psychological phenomenon observed in human behavior. Table 1 outlines these three maxims succinctly.

### Research Questions

Guided by the Habit Theory (1914) of William James, this study aimed to increase the understanding of the habit formation of student-athletes during the COVID-19 pandemic, particularly in recognizing both the positive and negative practices and behaviors student-athletes have established during their online training. Specifically, this study seeks to address the following questions:

1. What kind of different habits have the athletes formed through online training?
2. How do student-athletes break bad habits to develop a better one during online training?
3. How do student-athletes maintain consistency in their actions during online training to develop a new habit?
4. How does the feedback loop affect the formation of new habits among student-athletes during online training?

## METHODOLOGY

### Research Design

The study adopted an exploratory approach by prioritizing an in-depth investigation into habit formation over proposing conclusive solutions (Dudovskiy, 2013). Exploratory research design was chosen since there was a knowledge gap about the phenomenon investigated. Specifically, this study delved into habit formation among student-athletes during online training amidst the COVID-19 pandemic and examined the effects of rewards on behavior development and their subsequent positive and negative impacts. In addition, the researchers' goal was to tackle relatively unexplored territory, particularly given the rise of online training due to COVID-19 quarantine protocols, social distancing norms, and safety measures.

**Table 1: Three Maxims of Habit Theory (1914) by William James**

Habit Maxims	Description
Habit Maxim #1	One must exert maximum effort and commitment to establish a new habit or break an old one by surrounding himself with conducive circumstances and incompatible commitments.
Habit Maxim #2	One must recognize that consistency is key in habit formation; even a single lapse can undo progress equivalent to numerous repetitions.
Habit Maxim #3	One should promptly act on decisions and emotional prompts to reinforce desired behaviors because goals and resolutions activate the brain's response through motor consequences, which are further bolstered by the satisfaction and pride experienced upon task completion.

## Population and Sampling Design

Since the research is focused on the habit formation or development of athletes, the researcher used non-probability sampling, specifically purposive and convenience sampling for this study. Specifically, participants in this study must meet the following criteria: (1) high school basketball player of a private university in Manila, Philippines; (2) consistently attending online basketball training sessions during the pandemic. After participant selection, these student-athletes were provided with an informed consent form to ensure they were aware of the study's specifics.

## Data Gathering and Analysis

In this qualitative study, virtual interviews emerged as the chosen method to delve into the intricate dynamics surrounding habit formation among student-athletes amidst their transition to online training. Recognizing the versatility and depth offered by interviews, the researchers opted for this approach to capture the nuanced perspectives and experiences of the participants (McNamara, 1999). Interviews serve as a practical tool, enabling researchers to engage in rich dialogs that yield valuable insights, especially pertinent to the research objectives.

Meanwhile, the researcher utilized Braun and Clarke's (2006) six-phase process for thematic analysis to interpret interview transcripts and identify recurring patterns. Thematic analysis involves systematically searching through qualitative data to uncover themes, which are then interpreted to provide insight into the research topic (Braun and Clark, 2006). Following the principles of William James's Habit Theory (1914), four distinct themes were identified and thoroughly explained with supporting evidence addressing the research questions. In addition, member checking was conducted to validate the identified themes derived from the transcripts. Furthermore, the saturation method was also used in this study after the researcher noted that the participants shared almost the same answers in all questions. Likewise, reflexivity was also observed to avoid biases and promote rigor in qualitative research.

## RESULTS AND DISCUSSION

Guided by the Habit Theory of William James (1914), four themes were identified by the researcher in this study, namely inspiring behaviors, undermining behaviors, restricting behaviors, and distressing behaviors. The summary of each theme is presented in Table 2.

### Inspiring Behaviors

In this study, the researchers found that student-athletes have specific motivations for why they aim to change their unwanted practices and develop new habits. These behaviors were then classified to be inspiring because these actions led the student-

**Table 2: Major themes and their corresponding descriptions**

Themes	Descriptions
Inspiring behaviors	It refers to the motivations of student-athletes to remove their unwanted habits and replace them with healthier practices.
Undermining behaviors	It refers to the negative influences that distract student-athletes in developing their craft, which results in the retainment of their unwanted habits.
Restricting behaviors	It refers to the limitations that can hinder student-athletes to grow, develop, and reach their maximum potential.
Distressing behaviors	It refers to the consequences of poor habits that student-athletes should be afraid of to be able to change their unwanted habits with better behaviors.

athletes to positive outcomes such as to develop new habits which would be helpful for them to achieve their goals as students and as athletes. Specifically, the results of the study showed that in the online setup, student-athletes are inspired to develop new practices that would help them maintain their physical fitness and body condition even in online training. In addition, it was found that student-athletes are motivated to build or increase their feeling of responsibility not just for themselves but also toward their team. Finally, the researcher revealed the various advantages rewards could have for student-athletes participating in online training.

### Restricting Behaviors

In this study, the researchers observed that some restrictions of online training prevent the development of new habits that can aid in the growth and development of student-athletes. These behaviors were then classified by the researcher to be restricting because there are certain limitations in online training that affects the athletes in their performance. Specifically, it was determined that there are many limits present in online training that may hinder the establishment of healthy behaviors that can replace unhealthy ones. These restrictions may be the result of the COVID-19 pandemic, which has limited them to using only electronic devices to communicate with their respective teams.

### Undermining Behaviors

The third theme discovered by the researchers is that student-athletes experience and confront a number of negative influences and temptations that force them to disregard online training, resulting in the maintenance of undesirable behaviors. These behaviors were deemed undermining as they hindered habit development and performance. Distractions, often from gadgets or teammates, were found to tempt athletes away from training. In addition, the study revealed that these temptations could lead to cheating. Furthermore, online training altered athletes' routines, leaving them fatigued and more likely to stick to undesirable habits rather than adopting healthier ones.

## Distressing Behavior

In this study, the researcher also discovered that student-athletes confront a variety of obstacles when attempting to maximize the potential of online training. The researcher categorized these behaviors as distressing because student-athletes experience numerous obstacles during online training that may prevent them from completely enjoying and maximizing the benefits of online training.

## CONCLUSION

The study unveiled a spectrum of habits among student-athletes during online training, encompassing both positive and negative behaviors. While some habits motivated athletes to excel and adopt healthier routines, others perpetuated undesirable behaviors. In addition, despite facing challenges, student-athletes still demonstrated resilience, maintaining physical fitness, discipline, and productivity during online training. However, detrimental habits such as increased screen time and peer pressure emerged, hindering athletic performance and overall well-being.

Moreover, the study also highlighted successful transitions from negative to positive habits among student-athletes through various online training techniques. Motivation played a pivotal role in prompting behavior change, with athletes recognizing the adverse effects of certain actions on their health and careers. In addition, the provision of gym equipment, prayer, positive thinking, and efficient drill performance aided in breaking bad habits during online training. Furthermore, practices like seeking inspiration from peers and receiving positive feedback contributed to maintaining consistency and fostering the development of better habits.

Finally, the study also underscored the significant influence of the feedback loop on habit formation among student-athletes during online training. Positive feedback served as a powerful motivator, encouraging athletes to persevere and strive for improvement. Conversely, negative feedback hindered habit formation, prolonging the persistence of unwanted behaviors. However, continuous positive reinforcement was found to foster the full development of new habits, ultimately supplanting unhealthy practices and ensuring the success of online training endeavors.

## RECOMMENDATIONS

This study aimed to explore the habits formed by student-athletes during online training. Given that the study only focused on a limited sample size, expanding the participant pool to include other team members and coaching staff could yield richer data. In addition, considering the broader range of sports would also offer a more comprehensive

understanding of habits formed during online training across different athletic disciplines. Furthermore, future research could extend beyond athletic habits to examine how online training impacts student-athletes' academic performance, potentially comparing habits in both contexts to identify any significant differences.

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