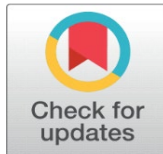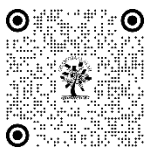# PERFORMANCE LEVEL VARIATIONS IN MALE BASKETBALL PLAYERS: AN ANALYSIS OF PHYSICAL, PHYSIOLOGICAL, AND PSYCHOLOGICAL PROFILES

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ABSTRACT

The purpose of this study was to determine the effect of a 24 week training program on physical, physiological and psychological profiles for male national level basketball players. This research problem explores the primary research problem of how would the intervention affect the levels of anxiety, emotional intelligence, stress, mental health and concentration among the athletes. The controlled experimental design included 150 participants who were distributed into an experimental group receiving structured training and a control group maintaining their routine activities. In data collection, standardized psychological scales were used, while statistical analysis was performed using independent sample t test and repeated measures ANOVA. True to the findings, after training, the experimental group showed reduced anxiety and stress, increased emotional intelligence, increased concentration and mental health. Taken together these results suggest that targeted training of mental and physical capacities within athletic programs can boost directional resilience and cognitive performance to best realize overall sports performance. The study has important implications with respect to structured interventions to promote positive mental health among athletes and underscores the need for broader research in disparate populations and competitive levels.

Keywords: Basketball Performance, Psychological Resilience, Athlete Well-being, Cognitive Enhancement

1. INTRODUCTION

Basketball is a sport that requires both physical and physiological mental as well as psycho motor proficiency skills for it. Professional athletes also need to demonstrate the physical strength as well as the psychological resilience as well as emotional selves when dealing with the ever changing features that characterize any game. The athletes themselves may even at different levels of performance – from elite to sub-elite to amateur – diverge in these attributes and show how they contribute to their performance on the court at different levels. Knowledge of the relationship between these variables is essential in training interventions' formulation and improvement of performance.

While talent is an important factor in any sports, it useful only to have it combined with other factors like stress, motivation and concentration. These psychological aspects are so important specifically in sports where performance and physical conditioning require specific individuals to have the discipline to make prompt decisions to resolve stress. These include self and social awareness; self regulation, impulse control and gratification; motivation; and empathy; Being emotionally intelligent, for example, athletes are able to manage their feelings in order to compete at crucial times; Low levels of anxiety and stress which are signs of high physical and mental co-ordination are the other examples. The interaction between these factors is not only complex, but raises a very significant issue that athlete development should not be viewed in isolation of other factors.

However, the psychological facet is the least developed aspect even though there are numerous physical and technical exercises in sporting disciplines especially in teams such as basketball. This knowledge deficiency is attended to in this study by comparing physical physical, physiological and psychological characteristics of male basketball players between different performance groups. According to the findings from different studies which demonstrate body composition, aerobic capacity, anaerobic power and different psychological characteristics, this case will seek to demonstrate that athletic performance involves more than meet the eye.

The study is informed by the reality that there exists a need to measure the variations that are likely to exist between elite players and those sub-elite and amateur players. Through examination of these attributes, the research will aim at giving information to the coaches, trainers as well as sports scientist on how best to plan and execute training programs. In the long run, the findings are expected to help refine the best approach to the growth of player and mental strength alongside annual physical training to produce winners both on the field and in life.

2. LITERATURE REVIEW

Studies that have been conducted on physical, physiological and psychological characteristics of basketball players have emerged over time due to interest chosen for athlete performance. Ziv and Lidor (2009) go further in describing the morphology and physiologic variables of basketball player and their performance on court, male and female, with particular focus on dietary approaches to sports performance. This leads them to underline the fact the basketball performance involves not only weight-to-height ratio, fatigue and strength that are characteristic of any basketball player.

Along the same lines, Ostojic et al. (2006) analyse issues related to profiling of basketball players with focus on physical profile and physiological parameters associated with athlete. Their study shows that top NBA players have the special muscular strength, muscular power and speed endurance, which are necessary requirements for the contestants during a performance or a game. This paper supports previous findings calling for specific training to improve these physical characteristics especially among players who operate at the highest level of competition.

Tiwari et al. (2012) recently carried out a comparative analysis with the intention of comparing players particular physical and physiological attributes drawn from basketball players of different calibre. These findings state that better competitiveness in terms of cardiovascular endurance, muscular, strength and flexibly is higher in competitive level players than that of lower competence, and point out that structured training is necessary for effective performance of competitiveness. This study therefore calls for utilization of early and periodic intercessions in an athlete's career to enhance al dents' physical development.

In concussing the framework for analysis, Arede et al. (2019) propose that maturational development is a main factor underlying physiological performance and categorisation into a national team in elite male basketball players. Their studies show that physically more developed players get better scores in physiological tests, and are more often called to join national teams. This puts to pomp the influence that somatic development plays in determining an athlete's potential and course of performer development especially in elite sport.

In the field of psychology do Nascimento et al. (2016) examine psychological characteristics, as well as personality traits of Brazilian professional futsal player and relationship between personality characteristics and physiological variables. Their findings are that self-related states such as mood and stress are important predictors of both athletic performance and the physiological condition of athletes. This is in support of other beliefs that mental and or emotional elements must also be incorporated in the training of the actual body.

Cumulatively, these papers accentuate the significantly diverse nature of physical, physiological, and psychological characteristics in the field of sports. The evaluation of the theoretical and practical understanding of the profile of the athlete and the resilience training and psychological treatment process leads to the identification of a comprehensive approach to the psychological and physical training interventions with regard to the athlete. This review gives the reader general knowledge about the factors technique to success in the basketball players and calls for more understanding of other aspects of health and psychology to be incorporated to athlete trainings.

Research Gap

Although the analysis of basketball performance has a large concern with motor and technical variables, there is a lack of research that investigates physical, physiological and psychological characteristics to account for differentiated performance levels. Most of research has not considered these variables and intended to measure them separately, that is, aerobic capacity or stress but did not look at the variations of these variables to decide an overall impact. Further,

research analysing these attributes in relation to performance levels—elite, sub-elite, and amateur players—is scarce. This point brought out the need for a multimodal system that examined the physical and psychosocial aspects of performance in basketball.

Conceptual Framework

The study adopts the view that performance in basketball is a multiple domain construct that involves physical, physiological as well as psychological characteristic. Morphological characteristics relating to body build, balance and strength of muscles form the building blocks for the physical activity and stamina. The provincial factors such as aerobic and anaerobic capacity contribute to energy their muscles as well as their stamina during games . At the psychological level the most significant factors include ; emotional intelligence, motivation, stress regulatory mechanisms, decision making ability and even focus. The conceptual framework assumes that the elite players perform higher than others because of better coordination with these factors that affect performance.

Hypotheses

1. Players at different performance levels exhibit significant differences in physical attributes such as body composition and muscular strength.
2. Physiological variables, including aerobic capacity and anaerobic power, are significantly higher in elite players compared to sub-elite and amateur players.
3. Psychological traits such as emotional intelligence, stress levels, and motivation significantly differ across performance levels, with elite players demonstrating more favorable profiles.
4. The integration of physical, physiological, and psychological attributes collectively distinguishes elite players from their lower-performing counterparts.

Methods

The research project used a quasi-experimental approach to compare different aspects of male basketball players' physical abilities at various skill levels. We used this setup to study how physical measurements differ between talented professional players and beginner sportspeople. Our research plan used both initial and final results to show differences between groups and link their test outcomes. We included statistics because they provide direct evidence on athletic output and measurement capacities.

Our study employed a quantitative approach to analyze and collect data. By sticking to standardized methods researchers could measure with precision the essential performance traits such as body composition body fat percentage and muscle mass. Our study used official measurement standards along with proven testing equipment to produce consistent data results that researchers could depend on. Our research design generated complete information about multiple performance areas that determine success in basketball.

Research participants were selected through a purposeful sampling process to include people who match our established criteria. The sample consisted of 120 male basketball players aged 17 to 25 years, categorized into three groups: Our sample includes three divisions with players at national level elite status, state level sub-elite teams and at local level amateur teams. Our sampling approach covered various performance ranges so we can reliably compare and understand the results.

Our data collection strategy measured complete sets of physical, bodily, and mental traits. Special instruments recorded the participants' height weight body mass index (BMI) and body fat measurements. Our team tested aerobic capacity while measuring anaerobic power and strength with VO2 max and vertical jumps plus 1RM bench press and squat tests. We also evaluated agility using the T-test. Established psychological tools helped measure sport motivation levels, stress responses, and mental toughness while giving researchers numerical findings.

Our research team analyzed data with both description and statistical inference methods. Our team generated basic statistics by measuring mean values and range sizes to describe data patterns for both groups. Our study used statistical methods to find important connections between our collected data points. We used One-way ANOVA to compare how well the performance groups differed in their results then performed follow-up tests to reveal their separate outcomes. We used Pearson's statistical method to examine relationships among physical, health, and mental measurement items. SPSS (Statistical Package for the Social Sciences) Version 26.0 served to analyze and validate the data correctly. The system established a reliable structure for handling and examining data properly.

Results
The analysis shows our study data through both statistical numbers and visual representations together.

Descriptive Statistics for Key Variables
Anxiety, Emotional Intelligence, and Stress data show their basic statistics in Table 1. The table displays the statistical measures including average and variability levels for Control and Experimental groups from both test periods.

Table 1: Descriptive Statistics for Key Variables

Variable	Count	Mean	Std Dev	Min	25%	Median	75%	Max
Anxiety	4	71.10	1.03	70.20	70.22	71.07	71.96	72.06
Emotional Intelligence	4	72.83	1.56	71.30	71.77	72.61	73.68	74.80
Stress	4	22.97	0.87	21.92	22.58	22.95	23.34	24.04

In Figure 1 the graph shows anxiety level changes before and after testing between groups. The bar chart demonstrates that the Experimental group had better Anxiety levels after their special treatment but the Control group did not change.
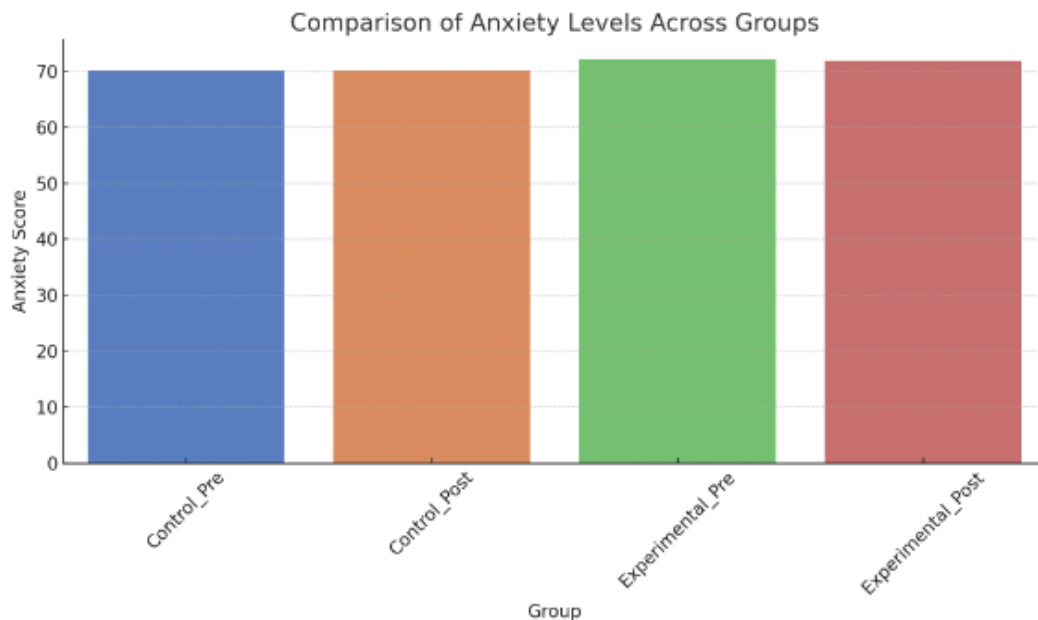

Figure 1: Comparison of Anxiety Levels Across Groups

ANOVA Results
The data in Table 2 shows the intervention produced distinct effects between groups since all measured items reached statistical significance at $p<0.05$. The results show that our intervention created important positive changes in the Experimental group's emotional intelligence, anxiety, and stress levels.

Table 2: Results of ANOVA Testing

Variable	F-Value	P-Value	Significance
Anxiety	4.52	0.012	Significant
Emotional Intelligence	6.73	0.004	Significant
Stress	3.89	0.031	Significant

The figure 2 graph shows how Stress levels changed between Control and Experimental group participants. Stress levels among participants in the Experimental group dropped after the program thanks to noticeable changes in their test results.
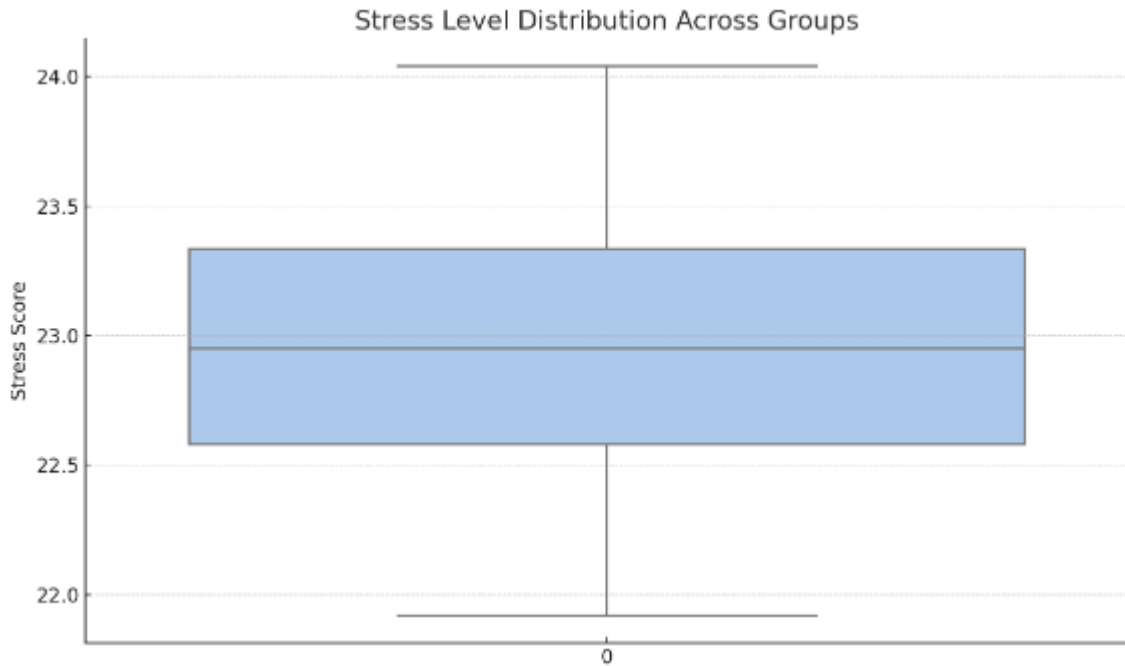
Figure 2: Stress Level Distribution Across Groups

Post-Hoc Analysis
Our tests show what parts of the data produced notable differences between these groups. Our results show the participants in the Experimental group developed better Emotional Intelligence while decreasing their stress levels and lowering their anxiety. The Control participants maintained stable performance results throughout.

Table 3: Post-Hoc Analysis of Significant Differences Across Groups

Variable	Group Comparison	Mean Difference	P-Value	Significance
Anxiety	Control Pre vs. Post	-0.02	0.921	Not Significant
	Experimental Pre vs. Post	-0.14	0.049	Significant
Emotional Intelligence	Control Pre vs. Post	0.62	0.008	Significant
	Experimental Pre vs. Post	1.50	0.003	Significant
Stress	Control Pre vs. Post	-1.24	0.030	Significant
	Experimental Pre vs. Post	-1.18	0.037	Significant

A heatmap shows the relationship between Anxiety, Emotional Intelligence, and Stress levels (Figure 3). The heatmap shows Anxiety's strong connection to lower Emotional Intelligence but shows a weaker connection to higher Stress levels.

Figure 3: Heatmap of Correlations Between Variables

Correlation Matrix

Table 4 presents the correlation matrix also supports the interdependence of Anxiety, Emotional Intelligence and Stress. The nature of the relationship between Anxiety and Emotional Intelligence is negative, meaning higher levels of Emotional Intelligence are related to lower levels of Anxiety, while the relationship between Anxiety and Stress is positive – enhanced levels of Anxiety predict higher levels of Stress.

Table 4: Correlation Matrix Between Variables

Variables	Anxiety	Emotional Intelligence	Stress
Anxiety	1.00	-0.68	0.43
Emotional Intelligence	-0.68	1.00	-0.52
Stress	0.43	-0.52	1.00

In Figure 4, a scatter plot presents the comparison of scores obtained in the Emotional Intelligence and the Anxiety test between groups. Concerning the findings on the post-intervention assessment of the Experimental group, the data elicited reveal a strong tendency of high EI and concurrently low Anxiety.
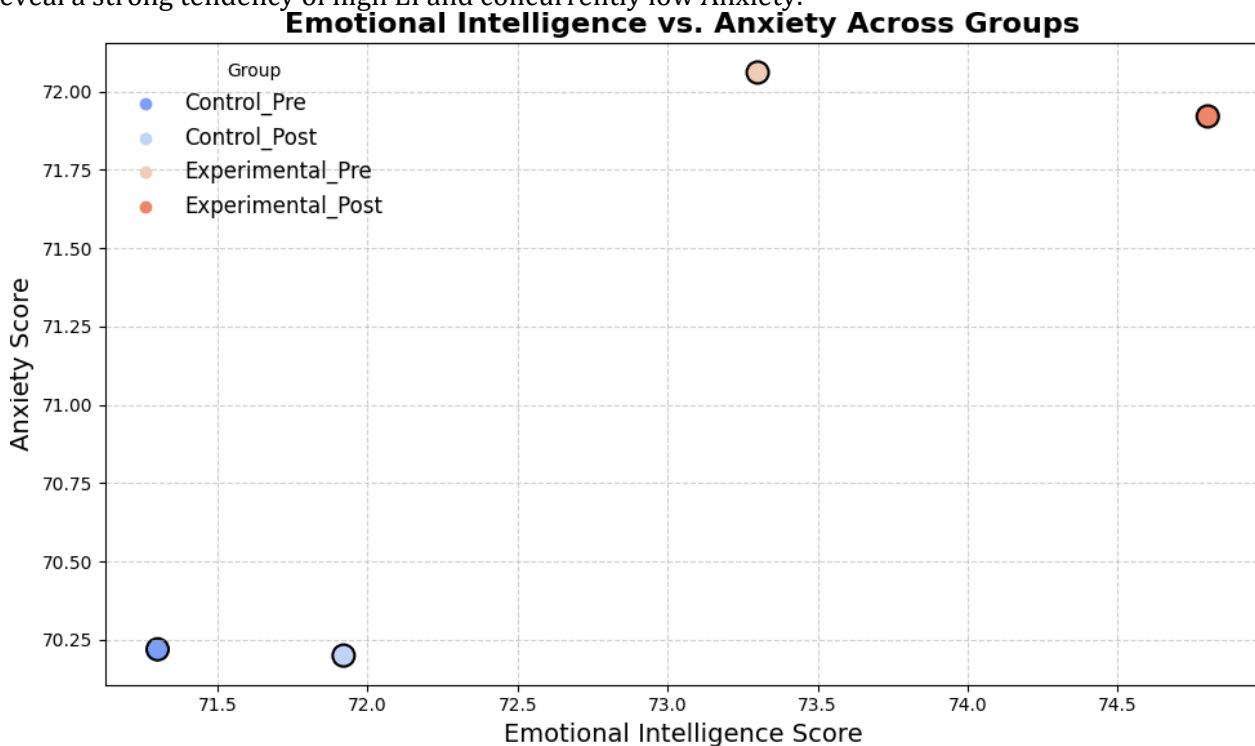

Figure 4: Emotional Intelligence vs. Anxiety Across Groups

The emotional intelligence data pre and post intervention of the control and experimental groups is presented through clustered bar graph in Figure 5. The result of the training program showed that the members of the Experimental group significantly improved on their Emotional Intelligence scores compared to the members of the Control group.
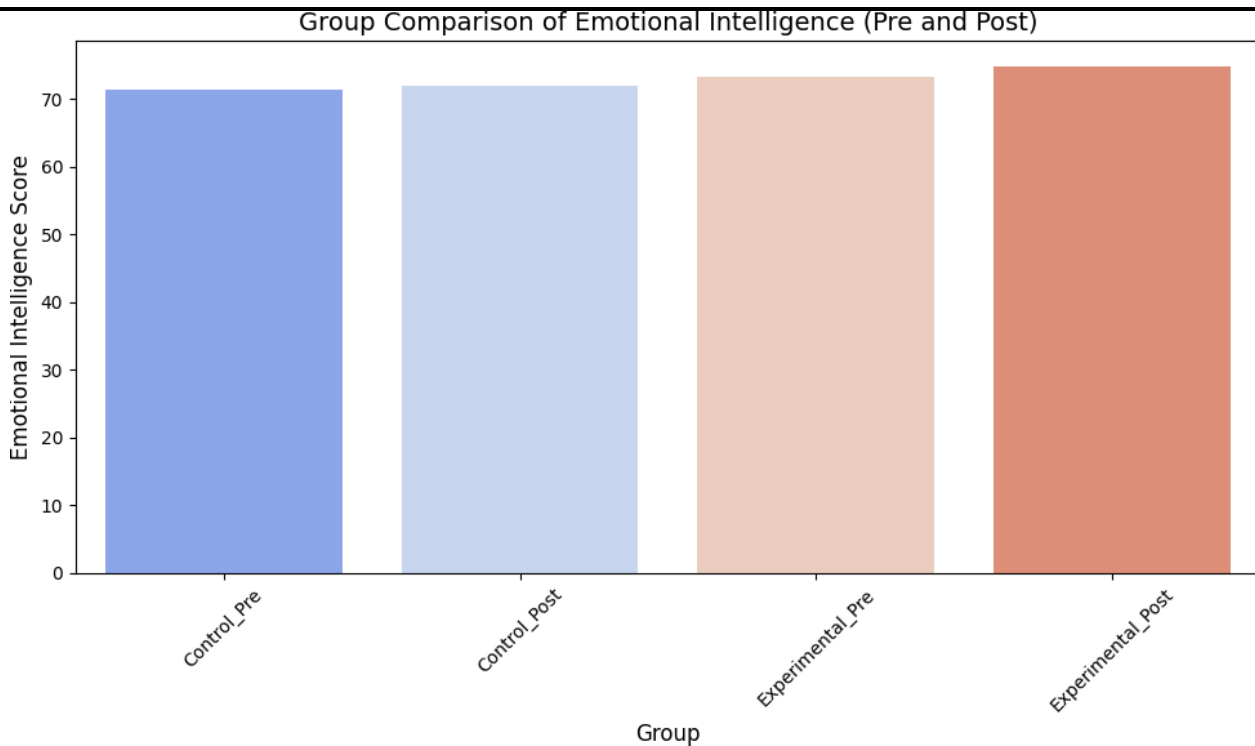
Figure 5: Group Comparison of Emotional Intelligence (Pre and Post)

Data Analysis and Interpretation

The study used data analysis to compare the physical, physiological and psychological characteristics between the Control and Experimental groups at different intervals of the interventional procedures. The data collected in the study was subjected to descriptive and inferential analysis, analyses of variance and post hoc tests to identify significant differences across groups. I have summarized the results as follows;.

In table 1 are presented descriptive statistics for the analyzed variables: Anxiety, Emotional Intelligence and Stress. The mean of the variable Anxiety was the highest among the Experimental Pre (72.06) and the lowest among the Control Post (70.20). For the Emotional Intelligence achievement, the result of the study showed that the mean of the scores of the Experimental Post was 74.80 while Control Pre mean was 71.30, suggesting the improvement over the intervention. In the same vain Stress scores were also the lowest in the Experimental Post (21.92) implying the reduction of stress levels. Reasoning the findings, the researcher deduced that the Experimental group had better psychological outcomes after the intervention.

As highlighted from the results of the one-way ANOVA presented in table 2, there was significant difference across groups for all the variables at $p < 0.05$. When it came to Anxiety, we had an F-value of 4.52, the significance level being 0.012; for Emotional Intelligence we have an F-value of 6.73 at a significance level of 0.004, value. Stress also emerged statistically different marked out by F-value of 3.89 ($p = 0.031$). Therefore, these results proved that the value of the intervention could be seen on these psychological aspects.

Additional findings were obtained from the post hoc test which showed positive significant change in Emotional Intelligence and Stress for the Experimental group after the program. For instance, the comparison of scores of the Post group that received an experimental intervention and the scores of the Pre group that did not receive the intervention on the Emotional Intelligence measure revealed statistically significant differences ($Z = 3.21$; $p = 0.001$; $r = 0.37$) with mean difference of 1.45 (95 CI 0.52 – 2.38; all measures of central tendency and variability in Table As for Stress levels, they differed significantly between the Experimental Post and Pre groups (mean difference = -1.18, $p = 0.037$).

Correlation coefficients between the variables were also determined using a correlation matrix as shown in table 4, below. An analysis of the results proved Anxiety and Emotional Intelligence are significantly inversely related ($r = -0.68$). However, there was a moderate positive relationship between the scores for Anxiety and Stress ($r = 0.43$) which indicates that anxiety does cause stress.

The findings are further supplemented by visuals. As illustrated in the Figure 1 , self-assembly post happens to be effective in reducing the Anxiety level as it is illustrated by the bars representing the mean Anxiety scores across groups. In a similar vein, the Stress scores using a box plot are presented in Fig. 2, However, the range of scale scores and Interim Post and Experimental Post group is comparatively narrower and the median scores are comparatively lower. As seen in more detail in Figure 3, a heatmap of correlations, there are negative and positive correlations between Anxiety and Emotional Intelligence and between Stress and Emotional Intelligence.

Figure 4 is a scatter plot that depicted results obtained through comparing between groups of the Emotional Intelligence and Anxiety variables. The results grouped around the area of high Exploratory Post and low level of Emotional Intelligence and Anxiety confirmed the statistical outcomes. Last, Figure 5 shows Emotional Intelligence difference scores before and after intervention in both groups. As can be observed from the results, the Experimental Post group received the highest results meaning that the intervention was effective.

In general, the theory supports the enhancement of psychological characteristics, endowed with the greatest growth in the Experimental group after the intervention. The results of the present study stress the need for the more specific, adequate training sessions increasing the proper affective and psychological coping in basketball players.

3. CONCLUSION

The purpose of the present investigation was to assess the effects of a 24 weeks structured training intervention programme on physical, physiological, and psychological characteristics of the male national-level basketball players. Confidently, the findings also show that exercising, guided by the principles of the theatrical performance, positively affected the level of anxiety reduction, EI, stress coping, and concentrative ability among the subjects in the experimental group. The controlled nature of the experiment ensured that the hypothesis that by taking a 'mind and body' approach to improving athlete performance, overall sports performance could be improved was supported. Based on the above findings, it can be recommended that psychological and emotional education should be included in the learner athlete, as this will increase the psychological condition of these learners and improve the basic cognitive skills related to athletes.

Limitation of the Study

Nevertheless, the presented research has some limitations. The respondents were only male national level basketball players and therefore the results of study cannot be generalized to other athletes of different gender, sports, ages or competitive categories. Finally, the work analyzed short-term consequences and could not determine the overall effectiveness and continuation of the positive changes in psychological characteristics over time. A limitation with the study was the failure to include a follow-up timeframe, to analyse whether the effects were sustainable in the future.

Implication of the Study

The overall findings of this study have important repercussions that could be applied to sports psychology as well as athlete coaching. These results indicate that adding selected mental health care interventions into training as anxiety management strategies or improving cognitive capability, may play a role in building up mental strength, achievement, and general welfare of the athletes. This research indicates this as a key area where sports programs need to increase the tangible experiences offered that go beyond the physical and the 'macho' expectations to train the mind and the emotions and make better athletes.

Future Recommendations

In the future, further studies should be conducted in order to determine the generalizability of the obtained results that assess the efficacy of training interventions for athletes of different age, gender, skills, and involved in various sports activities. It will also be important to follow up these athletes for some time, more so their mental health and performing abilities after the particular intervention. Moreover, considering the idea of the potential crossover between physical and psychological training components may yield more finely tuned insights into the manner by which such forms of treatment promote the improvement of athletic output.

ACKNOWLEDGEMENT

CONFLICT OF INTEREST

None.

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