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THE INFLUENCE OF EXTERNAL FACTORS IN THE EFFICIENCY OF BASKETBALL SCORING

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Abstract: *Modern sport psychology analyse the factors of anxiety on performance sport athletes and how they manage to cope with pressure, one of those important factors of anxiety being the public or the fans. In our research we started from the hypothesis that the public indifferent from home or away venue, can influence the sportive in their evolution and statistics. The research sample was formed by six athletes' components of the Under 16 BC CSU Sibiu basketball team, with an average age of 15 ± 0.8 years old, and an experience on basketball of 7 ± 2.3 years old, all males. We used several statistical significance parameters as ANOVA and student T test, and a basketball specific design named ABAB. The results showed statistical significant differences between sportive performance with public and without public at the free throw line. Conclusions of our research proved that the influence of public is an important factor in athletes' performance.*

Keywords: *basketball, efficiency, influence of external factors*

1. Introduction

There are a number of factors that can influence the athlete's performance during sports/sports match, without taking into account the athlete's skills. Performance athletes have to perform a certain test in front of a crowd of people (viewers), and this crowd expresses their feelings about the performance of the athlete by encouraging (by supporting them) or by shout out (discouraging) to them. The presence of such a public can affect both team performance and individual performance [4]. The effect of the audience is an attempt to explain psychologically the reason why the simple presence of viewers leads to high performance or low performance, depending on the situation [1].

In general, research indicates that the presence of one or more viewers may improve performance if the activity is mild or well-learned, but performance may fall into difficult or unfamiliar activities. Taking into account the above and the fact that performance athletes during sports tests/games perform well-known and learned activities, it is expected that the effects of social facilitation will exist for a

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sportsman during sports/sporting play [3]. Studies indicate that the audience has an impact on the psychological variables of athletes (degree of arousal, anxiety, etc.) [4] and also on their cognitive variables such as concepts and perceptions of performance [6].

The notion of the interaction of the audience with the athletes and the effects of this interaction on their performance is widely dealt with in the literature focusing on the advantage of playing at home. This term is used to highlight the fact that sports teams that are involved in championships have games both in the presence of the familiar audience (at home) and in the presence of the foreign public (away).

Scientists, athletes, and fans repeatedly affirm that the public is a key element during sports/sports games. More specifically, they consider that public support and the well-known public are some of the main issues that give the host team the advantage [11]. Over the years, the problem regarding the effect of the audience has on the performance of the teams and on the individual level, has been dealt with and results are contradictory [8] [9] [11]. Also, most of the research has studied the whole set of situations in a game and the team's performance in full (the number of points accumulated in a season, the number of wins / defeats). It is true that these findings are important because team performance is measured in times of competition, with unchecked audience.

In 2008, Hall and Henningsen [5] tested predictions of social facilitation on the 'home' match offered to male basketball players. Researchers say that the in-kind performance advantage offered by the "home crowd" game is reflected in how the audience at sports events interacts with individual players. Thus, the performance of athletes in "home" matches has a higher level than athletes' performance in "away" matches. Henningsen has used social facilitation as an explanatory mechanism for performance advantage and has generated the following hypothesis: social facilitation has a higher level in the case of teams with a higher level of training than teams with an average level of training to the lowest in case of free throws during the game.

In 2011, Epting et al. [4] studied the effects of different audience behaviors (encouragement, discouragement, passivity) on a specific skill in the case of golfers, baseball players, and basketball players. It was taken into account that in the case of golf, quietness is encouraged within the audience, so the hypothesis was assumed that among golf players the performance would be the highest if the audience would be silent compared to the moments' of encouragement or deterrence. At the same time, another assumption has been made that the performance of athletes practicing baseball and basketball will have high levels while the public will encourage them, compared to the times of discouragement and passivity when performance is expected to be minimal.

The results obtained indicate that there was no primary effect of the audience performance condition, $F(2.58) = .838$, $p = .438$. However, there was a significant interaction between the type of sport and the audience performance condition, $F(4.58) = 5.007$, $p = .001$, indicating that the effect of the audience condition was different depending on the type of sport. Knowing the way laterality and other

components of coordination operate, represents the starting point for identifying it and using it effectively during training sessions [2]. Also, studying laterality as an increasing factor of the motric and performance capacities can expose the importance of this skill in both upper and lower body [7].

2. Objectives and Hypothesis of the Research

The overall objective of this paper is to identify whether there is a variance within performance depending on the situation (with known / unknown public or without public). If this variation exists, we continue to study the performance variance according to the three scenarios.

The hypothesis of the research was the following: the presence of a known or unknown public during free throws among basketball players may influence their shooting efficiency.

3. Design of the Research

3.1.Subjects of the research

The research sample was formed by six athletes' components of the Under 16 BC CSU Sibiu basketball team, with an average age of 15 ± 0.8 years old, and an experience on basketball of 7 ± 2.3 years old, all males. 4.3.1

3.2. Stages of the experiment

The participants of the experiment are measured their sports performance in the case of a medium difficulty sports skill (free throws) in the presence of an audience (known / unknown) and in the absence of the public. Athletes are arranged in random series to make the throws. There will be a number of nine throws that score differently. The first 3 throws are worth 3 points each, the next 3 worth 2 points each, and the last three throws worth one point. The reason the free throws are scored like this is that at the time of the first throw the most pressure will be felt because they are not familiar with the task. Another reason for the dropping score is that as the athletes perform the free throws, they become accustomed to the action they have to perform, so the difficulty of the throws decreases. The experimental design is of the ABAB type and includes steps of data collection in the absence of the public, the presence of a well-known audience, the absence of the audience again and the presence of an unknown audience. Each athlete will be counted on the throws and will have a total free throw performance score. The minimum score that can be scored is 0 points and the maximum score is 18 points.

3.3.Methods of research

Given the ABAB experimental design that involves repeated measurements, we decided to use one way as a statistical method for analyzing the results of ANOVA-MR (Variance Analysis - Repeated Measurement).

4. Results of the research

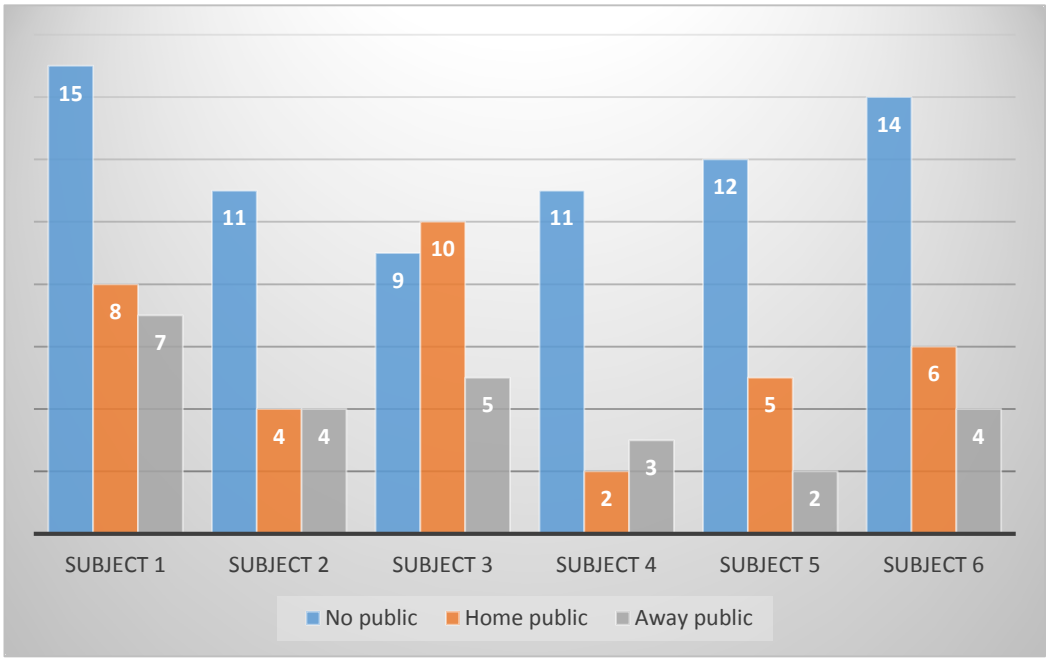

Fig. 1. *Results regarding the free throw with public (away/home) and without public*

Table 1

Statistics regarding the efficiency of free throwing with public / without public

Descriptive Statistics	Mean	Std. Deviation	N
The individual score obtained without the public	12.00	2.191	6
Individual score with unknown audience	4.17	1.722	6
Individual score achieved with known audience	5.83	2.858	6

From Table 1 and Fig. 1, descriptive statistics, we can see that in the first stage (A - the first attempt without public) the average performance as a score is 12 points, and the standard deviation is SD = 2.1. In the second stage (B - with an unknown audience) the average performance score is 4.17, almost 3 times lower than in the first stage, and the standard deviation is SD = 1.7. In the last stage of research, with a well-known public, the average performance score is 5.83, slightly higher than in the case of an unknown audience. Which leads to the idea that the public is an important factor in the players' efficiency at the free throw line. We further calculated whether the differences were significant.

The multivariate tests in apply when the factor has at least three levels, as is this case. Any of the tests in the multivariate test table can be used because they all indicate the same result. Multivariate tests indicate a statistically significant change (p = 0.12) of performance based on the presence or absence of the public, with a high level of effect size (0.96) and high observed power (0.95). The analysis

using Mauchly's Test of Sphericity, indicates that the sphericity condition (p = 0.443> p = 0.05) is fulfilled, which means that univariate tests can still be used and analyzed.

Since the condition for sphericity has been met, we analyze the Sphericity Assumed line (Tests of Within-Subjects Effects). Test F (3, 15) = 20.48 is significant (p =0.000002), which supports the research hypothesis that the level of performance varies depending on the presence (known or unknown) of the public or its absence. The effect size is very high (0.85), and the observed power (1.00). It can be seen that the result is similar to that for multivariate tests. The Pairwise Comparisons, shows the significance of the differences between all four pairs of averages of the measurement moments. The only statistically significant differences are those between scenario 1 and 2, 2 and 3, 3 and 4. Scenarios 1 and 3, 1 and 4, 2 and 4 are not statistically significant.

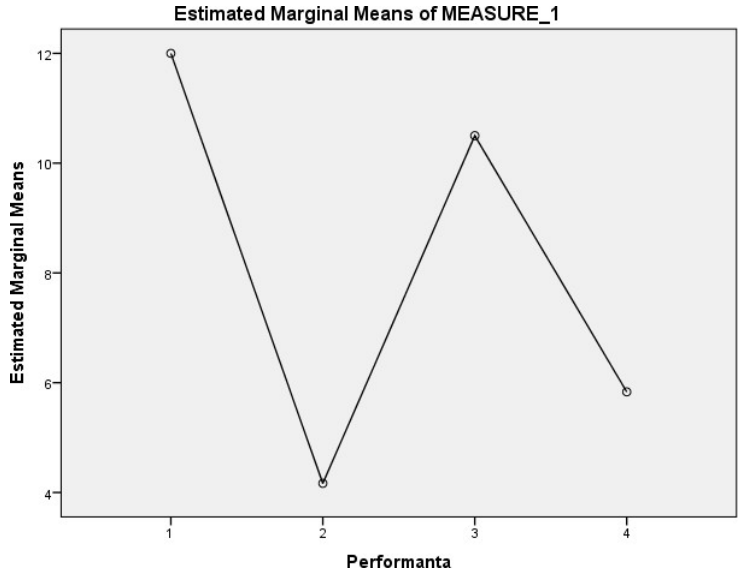

Fig. 2. *Statistics interpretation regarding the efficiency of free throwing with public and without public*

Figure 2 illustrates the existence of a statistically significant global variation but also significant differences from one scenario to another (presence of known / unknown public and the absence of the public). This shows a decrease from the moment 1 (in the absence of the public) at the moment 2 (the presence of the unknown public) of the performance level. From time 2 (presence of a known audience) at time 3 (audience absence), we can again see an increase in performance that is lower than at time 1. Comparison between time 3 (public absence) and time 4 (the presence of a well-known audience) shows a drop in performance again. By comparing moments 2 (unknown audience) and 4 (known audience), there is a slight increase in performance.

5. Discussions

Data collection has been runned with ANOVA-MR one way (Variant Analysis - Repeated Measurements one way). Analysis of multivariate tests indicates a statistically significant change (p = 0.12) of performance based on the presence or absence of the public, with a high level of effect size (0.96) and high observed power (0.95). We have further tested the sphericity condition with the Mauchly test (p = 0.443> p = 0.05), which means that sphericity is checked, so univariate tests can still be used. Analyzing the univariate tests of sphericity we identified an F (3.15) = 20.48 significant (p = 0.000002) test, which supports the research hypothesis that the performance level varies depending on the presence of a known/unknown public or in its absence. The effect size is very high (0.85), and the observed power (1.00). It can be seen that the result is similar to that for multivariate tests. After analyzing multiple comparisons to identify which measurement moments are statistically significant differences, we have identified scenarios 1 and 2, 2 and 3, 3 and 4, and for scenarios 1 and 3, 1 and 4, 2 and 4 we could not find any statistical significance. This indicates that there are differences between moments when the audience was absent and present. There was no statistically significant difference between the known / unknown public.

The analyse of the scenario:

a) Scenario 1 (in the absence of the public and in the presence of the unknown public) - in the analysis of these scenario, we identified a statistically significant difference (p = 0.02) between averages of 7.83 units. Thus, in the presence of the unknown public, the basketball players had a lower level of performance than in the non-public scenario. This indicates confirmation of the research hypothesis.

b) Scenario 2 (in the absence of the public in the presence of the known public) - in the analysis of these scenario found out that there is a difference between averages but not statistically significant (p = 0.51).

c) Scenario 3 (in the presence of the unknown public and in the presence of known public) - in the analysis of these scenarios there is a difference between them of 6.33 units representing statistically significant averages (p = 0.01). This confirms the hypothesis of the research that states that performance levels of athletes are higher if the audience is known compared to the presence of the unknown public.

According to previous studies on social facilitation, we expected that when the known public was present, the level of performance would increase significantly, given that the task was medium difficulty and the subjects were very familiar with it. However, the level of performance was much lower when the audience both known and unknown was present during the test than if the audience was absent.

6. Conclusions

The psychology of sport is still an unexplored field of science. Thus, studying the specialized literature (sports psychology) we identified some domains that have not been studied. We have identified the need for experimental studies to seek out, identify and explain

factors and causes that have a significant influence on all the performance of the athletes. Following the ANOVA-MR one-way process, a statistically significant influence on the level of performance (F (3, 15) = 20.48, p = 0.000002, eta = 0.85)) with an observed power equal to (1.00), indicating confirmation of the hypothesis.

We then analyzed all the scenarios: in the absence of the public, in the presence of the known audience and in the presence of the unknown public, and we identified statistically significant differences between the public and the non-public scenarios.

Following the analysis of scenarios 1, 2, and 3, we identified differences with statistically significant averages, which confirms the research hypothesis.

Concluding, we can say that the level of basketball players' performance is negatively influenced when they perform free throws in the presence of an unknown audience.

Under social facilitation, the presence of a well-known public does not cause inhibition so the performance is better. Scientists have found interesting relationships between extreme negative behavior of the audience and the performance of basketball teams.

In the 5 minutes interval following a particular moment of the audience that exhibited extreme negative behaviors, more than shouting, such as throwing objects, physical violence, obscene scandal or racist scandal and silence, the host team tended to commit far more irregularities and mistakes than the opposing team. This is an example of extreme antisocial behavior of the audience that predicts decreases in performance within the host team [4].

The digital era has also brought improvements in computer-assisted statistical analysis that has relieved the work of specialists in objectively analyzing the effectiveness of players [10].

The contribution made in the field of work is represented by the fact that the audience's effect on the performance of the basketball players was investigated experimentally. Information obtained from data analysis is a novelty value and may be a benchmark for future research in the field of sport psychology. Taking into account the results, it can be concluded that in order to increase the performance of athletes during the competition program it is necessary to desensitize them towards the public. To confirm these results, it is necessary to replicate this study on another group of subjects and compare the results obtained. We also think it would be necessary to replicate the study on other sports to identify the effects of the audience in other cases as well.

The objectives of this study were achieved by the fact that a variance was identified in the basketball players' performance at the time of free throws in the presence of the known or unknown public and in the absence of it.

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