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U18 Point Guards Vs Shooting Guards/Small Forwards (Wings): Physiological Profile Differences

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ABSTRACT

The purpose of the study was to examine and potentially identify differences in the physiological profiles of U18 male basketball players between the PGs (organisers) and SGs/SFs (Wings) positions. The sample size consisted of 20 young male basketball players who participated in this study (mean weight 77.7 kg, mean height 1.91.6 cm, mean age 16.6 years). Players were classified according to their positions in PG: (n = 10) and in SG/SF (Wings) (n = 10). The players participated in the Developmental Program of the Hellenic Basketball Federation. To determine and compare the physiological profile of the players that participated in the study, the following physiological characteristics were analyzed between the two examined playing positions: CMJ, SJ, SLJ, Illinois Agility Test, 5 - 10m sprint. The sample was studied separately for the two different positions on the field, PGs and SGs/SFs (wings). In the inductive analysis, possible differences between the different positions of the players were examined. Due to limited sample size (N = 20), tests were performed with the non-parametric Mann-Whitney test for two independent samples. This test compares the average values of the ranks (Ranks) between two groups, where the ranks are the position of each measurement in the ordered set of measurements. The main findings of the study suggest that jumping ability (horizontal and vertical) and agility separate PGs from SGs/SFs (wings) at the U18 age level, with the latter position excelling in jumping tests and PGs in agility. In the measurements of the physiological characteristic of the 5-10m sprint speed, no differences were observed between the positions.

Keywords : U18; basketball players; physiological profile; PG, SG/SF (Wings)

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INTRODUCTION

The sport of basketball is a dynamic team sport that is played at different speeds and involves constant changes of movements and activities, in which the winner is the one who will score the most points in a basket, which is at a distance of 3.05 meters from the ground. Basketball players regardless of the level they compete in must possess sufficient levels of physical ability as well as developed technical skills in order to be able to cope with the demands of competitive games. In recent years, analysis of the physiological demands of the sport of basketball has shown that players cover around 5-8 km during matches, performing over 40 accelerations/decelerations, and a large number of sprints and jumps which gradually decrease from the 1st to the 4th period, while it has been found that the players of the position of Guards are the most active, followed by the Forwards and Centers (Ben Abdelkrim et al., 2010; García et al., 2020; Svilar et al., 2018; Vázquez-Guerrero et al., 2019).However, modern basketball is a constantly changing sport that combines actions of different intensities with specific technical and tactical skills that differ by position, creating specific physiological profiles depending on the role of each player. In particular, taller players who move close to the basket (PF/C) have increased anthropometric characteristics but show worse performances in the physiological characteristics of speed, agility, endurance and jumping ability compared to Guards (Lockie et al., 2020; Pion et al., 2018; Sallet et al., 2005; Scanlan et al., 2014).Thus, it is understood that the physiological profile of basketball players differs from position to position, and the factors that separate the positions should be investigated comprehensively. In fact, according to Nagar et al. (2012) speed, agility, explosive power and endurance are associated with increased performance in the sport of basketball.

Regardless of the differences in the physiological profiles between the competing positions, differences are also observed in the physiological profiles of basketball players of different ages. Recent studies on the developmental ages of men has shown that players of the older age groups (U18/U20) have better physiological profiles in terms of speed and agility compared to U16 or U14 players, while it seems that at these ages the jumping ability of Forwards and Centers is better than that of Guards (Androutsopoulos et al., 2022; Gonzalo-Skok et al., 2017; İMer & Yapici, 2018; Mancha-Triguero et al., 2021).On the contrary, the physiological characteristic of jumping ability at developmental ages should not be an effective factor in evaluating performance and physiological profile.Shalfawi et al. (2011) and Altavilla et al. (2018) recorded significantly better performances of male professional basketball players in jumping tests compared to U16 developmental age players (Orhan et al., 2019). In addition, the physiological profile appears to differ significantly depending on the level of basketball players. More specifically, Delextrat & Cohen (2008) and Ferioli et al. (2018), in their studies recorded significantly better performances of elite male players in tests of strength, agility, endurance and jumping ability compared to players of lower categories and levels, while similar findings for the superiority of elite players have also been recognized at the age level of U16/ U14 (Torres-Unda et al., 2013).

At the same time, the selection process of young players that have sufficient physiological profiles to fill the men's teams but who do not yet possess the experience to play at a high level is one of the most difficult issues that researchers and coaches face. Therefore, it seems necessary to carry out various assessments and physiological tests at different times during the season in order to monitor and also aid the development of individual physiological characteristics of players by playing position and age. However, there are still no commonly accepted standards for the assessment tests of physiological profiles and characteristics, with most of them being performed on the physical abilities of speed, endurance, strength, agility as well as aerobic/anaerobic abilities (Morrison et al., 2022; Roni Gottlieb et al., 2021).Thus, the

selection procedures in modern basketball are mainly based on morphological, physiological, technical and mental characteristics that differ from one level to another and from competing position to competing position (Androutsopoulos et al., 2021; Lockie et al., 2020; Trunić & Mladenović, 2014).Also, given the fact that many studies confirm that the use of Plyometric Training (PT) in developmental ages significantly improves the physiological characteristics of agility and speed (Aksović et al., 2020; S Senthil Kumaran, 2018), arises the question of investigating the differences in the physiological profiles between the competing positions in U18 basketball players as from this age on the distinction is usually made regarding the roles and positions they will cover in the future.

Given the existing findings in this area and although the physiological profile of young players has been sufficiently studied, it would be useful to further investigate the differences in the physiological profile of young basketball players, emphasizing the investigation of PGs (organizer) position in relation to that of SGs/SFs (Wings). Besides, we are aware of no previous research in the international literature that examines in detail the differences in the physiological profile of U18 players between the PGs and SGs/SFs (Wings) positions, as there seems to be shortage of data in this area. In order to assess the physiological profiles of the players in the present study, physiological field tests or laboratory tests, previously validated and adapted to the sport of basketball, should preferably be used. Therefore, the purpose of the present study was: to examine and possibly identify differences in the physiological profiles of U18 players between the PGs (organizer) and SGs/SFs (Wings) positions.

METHODS

Participants

A total of 20 young male basketball players took part in the research, who had not shown any injury in at least the previous 6 months (mean weight 77.7 kg, average height 1.91.6 cm, average age 16.6 years). The players were classified according to the competing positions in which they played for the longest duration during the games into PGs: (n = 10) and SGs/SFs (Wings) (n = 10). As PGs in this study, players were categorized based on whether they performed the task of organizing the game and had the ball in their hands for most of the live time while as Wings were categorized the players who played in the remaining two (2) perimeter off-ball positions. The categorization was based and checked by two experienced and qualified coaches, who were responsible for the training programs of the players as well as they were the ones who chose the competing position and the role of each player during the games. The players participated in the Developmental Program of the Hellenic Basketball Federation and were training in a summer camp exclusively for Guards/Wings where the measurements were made. Upon arrival at the training facilities, the players and their parents were thoroughly informed about the procedures and content of the research, the risks and the benefits that the players would have from the results obtained. Then, the written consent form was obtained from the parents or legal guardians for the participation of their children in the study procedures, while the research was reviewed and approved by the ethics committee of the University of Peloponnese, School of Human Movement and Quality of Life, Department of Sports Organization and Administration, University of Peloponnese, Sparta Laconia and was in accordance with the Principles of the Declaration of Helsinki (2008).

Procedures

Measurements of physiological characteristics to determine the physiological profile were carried out on the 1st and 2nd day of the players' presence at the National U18 Training camp. Before the measurements were carried out, all test subjects filled out a questionnaire about their

health status, were checked for lower extremity injuries by a certified physician and then signed a consent form allowing the tests to be performed. In order to minimize omissions as much as possible and to ensure optimal conditions for the measurement of the physiological characteristics, these were carried out at the same time before the players' breakfast (09.00-10.00 am). The evaluation and the execution of the tests of the physiological characteristics took place in a closed basketball court with a wooden floor-parquet- with the temperature inside being controlled (23°C-25°C). Each athlete was examined on 2 separate occasions and performed a total of 6 physiological tests. Sessions were completed within the first 2 days with a rest period of at least 24 h between sessions. After a thorough explanation of the experimental procedures, the players completed a standardized warm-up consisting of 5 minutes of jogging, 5 minutes of dynamic stretching, and 5 minutes of short acceleration-decelerations with gradual build-up of running speed, submaximal jumping, and agility drills. For the final five minutes of the warm-up, the players performed tests at submaximal intensity to enhance the warm-up of specific muscles and joints. The 2 sessions were presented in random order as described below. Session 1 took place on the basketball court used for basketball practice. It consisted of 3 field tests presented in this series: Counter-movement Jump (CMJ), Squat Jump (SJ) and Standing Long Jump (SLJ).

Counter-movement Jump (CMJ) Test: Players started by standing with their hands on their hips (ie, without swinging their arms). They were then instructed to bend their knees (approximately 90 °) as fast as possible and then jump as high as possible in the next concentric phase. The test was held on the wooden floor of the basketball court and each athlete was given a 90-second break between jumping repetitions, while allowing 4 minutes of rest until the next jump test. The players made 3 jumps and the best result was recorded.

Squat Jump (SJ) Test: Players started from the upright position with their hands on their hips and then were instructed to bend their knees and hold a predetermined knee position (approximately 90 °) and the examiner then measured for 3 seconds. In measurement 3, the athlete was instructed to jump as high as he could without performing any reverse movement before performing the jump. The test was held on the wooden floor of the basketball court and each athlete was given a 90-second break between jumping repetitions, while allowing 4 minutes of rest until the next jump test. The players made 3 jumps and the best result was recorded.

Standing Long Jump (SLJ)Test: The athlete stands behind a line marked on the ground with feet slightly apart in a parallel position. A two-foot take-off and landing is used. To begin the jump, the players swing the arms and bend the knees to provide forward drive. The subject attempts to jump as far as possible, landing on both feet without falling backwards. On landing, the athlete's heel which is the last point of contact to the ground is measured as the result in centimeters (cm). The test was held on the wooden floor of the basketball court and each athlete was given a 90-second break between jumping repetitions, while allowing 4 minutes of rest until the next jump test. The players made 3 jumps and the best result was recorded.

The Optojump system (Optojump Next®, Italy) measured the flight time of the jumps with an accuracy of 1/1000 seconds (1 kHz) for the 2 vertical jump (SJ, CMJ) tests through the height of the jumps (in cm).

Session 2 took place on the basketball court used for training. It consisted of 3 field trials presented in this order: 5-10m; Sprint and Illinois Agility Test.

5m.-10m. Sprint Tests: Players started from an upright position behind the starting line when they were ready. The sprint time was recorded by photocells (Wireless speedtrap2; Brower Timing Systems, Draper, UT), as they passed through the 3 gates (0-5-10m.) With the command "Let's go", the players ran 10 meters as fast as possible. When they crossed the finish line, the time of 5m. and 10m. were recorded. 3 attempts were made with the best one per distance being

recorded. These distances were chosen because at developmental ages the majority of basketball sprints lasted up to 2 sec. (Lehnert et al., 2013).

Illinois Agility Test: The test process consisted of four cones that formed the path (10 m length x 5m wide). The cone at point A marked the starting point. The cones at point B & C marked the turning points. The cone at point D marked the end of the test. The time was recorded using a handheld timer. The players started with the "let's go" command, touched the cones with their hands in B & C turning points and the test was then completed when they crossed the finish line and when there were no cones falling to the ground. The fastest of the 2 attempts was recorded.

Overall, the parameters measured to define and identify the differences of the physiological profile between the 2 positions were divided into 3 characteristics: speed (5m-10m Sprint), agility (Illinois Agility Test) and jumping ability / anaerobic power (CMJ, DJ, SLJ).

Statistical Analysis

Initially, data were recorded and categorized using the Microsoft Excel program. They were then transferred and all statistical analyzes were performed using the Social Science Statistical Package (SPSS version 24.0, IBMSPSS, Chicago, IL). Descriptive data analysis was performed using mean values and standard deviations (M±SD). The sample was studied separately for the two different player positions on the field, PGs and SGs/SFs (wings). In the inductive analysis, possible differences between the different positions of the players were examined. Due to limited sample size (N = 20), tests were performed with the non-parametric Mann-Whitney test for two independent samples. This test compares the average values of the ranks (Ranks) between two groups, where the ranks are the position of each measurement in the ordered set of measurements. The null hypothesis of the test is that there is no difference in the population from which the sample was drawn. The test assumes that the null hypothesis is valid and based on this it calculates the probability that the observed difference exists. If this probability is calculated to be less than a =0.05, the null hypothesis is rejected and the difference between the two groups is statistically significant.

RESULT

The descriptive statistics of all measurements of the physiological variables between the two examined positions are presented in Table 1.

Table 1. Means ± standard deviations of physiological characteristics by position

Variables	Point Guards (N = 10)	SG/SF (Wings) (N = 10)	P-Value
Cmj (elastic power) h=cm	28.97 (± 4.821)	33.42 (± 4.025)	0.031
Sj (explosive power) h=cm	28.57 (± 5.527)	32.42 (± 2.79)	0.049
Slj (cm)	216 (± 12.51)	233 (± 14.43)	0.015
0-5 (m)	0.78 (± 0.079)	0.76 (± 0.069)	0.970
0-10 (M)	1.96 (± 0.15)	1.93 (± 0.078)	0.791
Illinois Agility Test (Sec)	16.6 (± 0.6)	17.1 (± 0.6)	0.045

Inductive analysis of the results with the Mann-Whitney Test revealed statistically significant differences in four (4) of the six (6) physiological variables measured. More specifically, the SG/SF (Wings) position players presented a statistically better performance in the CMJ test (W 33.42± 4.025 cm vs PG 28.97± 4.821 cm) (p-value < 0.05), in the DJ test (W 32.42 ± 2.79 cm vs PG 28.57±5.527 cm) (p-value < 0.05) as well as in the SLJ test (W 233± 14.43 cm vs PG 216±12.51 cm) (p-value < 0.05) compared to the players of the position of PG. On the contrary, in

the Illinois Agility Test the players of the PG position recorded statistically better performances with a shorter time to complete the test (PG 16.6± 0.6 sec vs W 17.1±0.6 sec) (p-value < 0.05) compared to the players of the SG/SF (Wings) position. In the remaining two measurements, those of speed (5-10m sprints), no statistically significant differences were observed between the two examined positions. The aforementioned differences are presented in Figures 1-4.

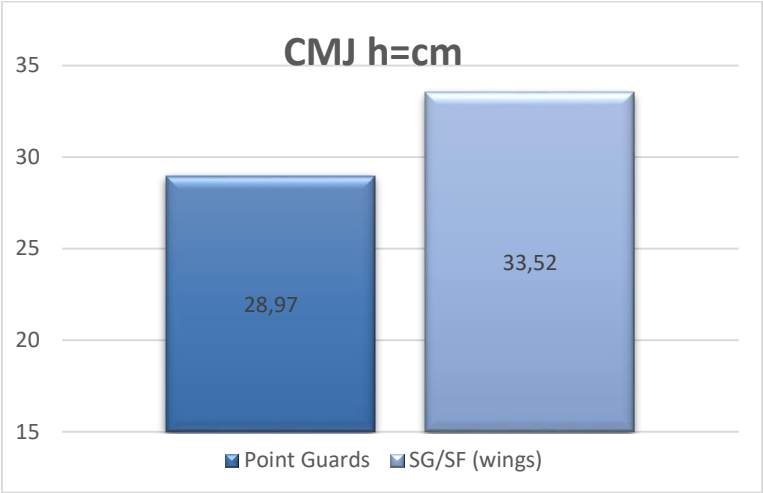

Figure 1. CMJ height difference between the positions

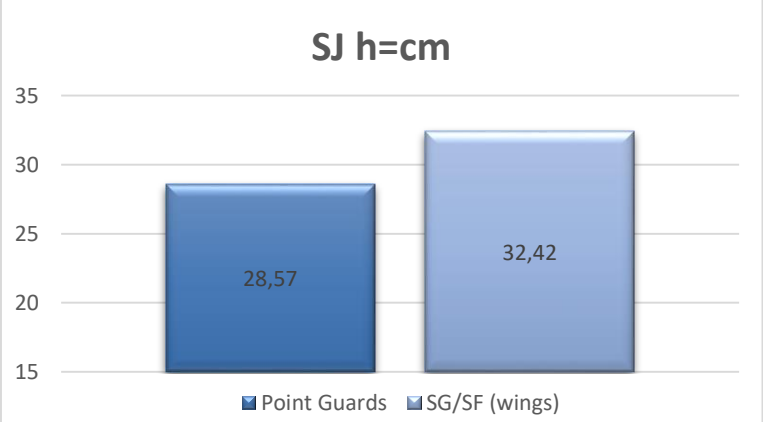

Figure 2. SJ height difference between the positions

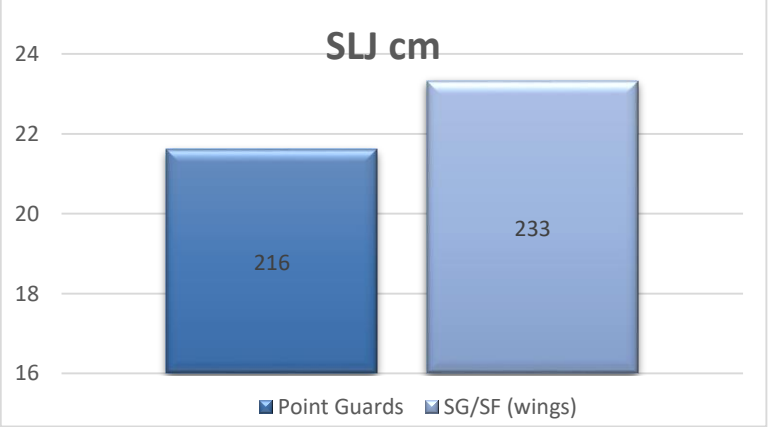

Figure 3. SLJ difference between the positions

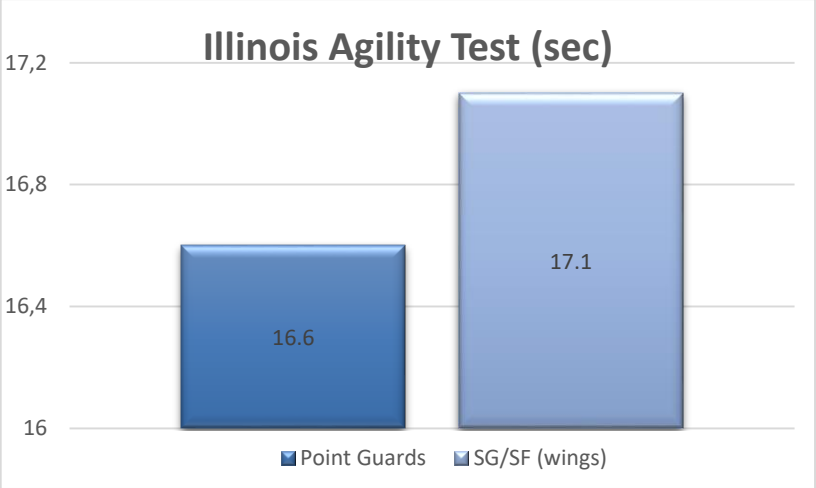

Figure 4. Illinois Agility Test time difference between the positions

DISCUSSION

The present study is the first attempt to record and compare the differences between the physiological profiles of the PG (organizer) position and that of the SG/SF (wings), at the age level of U18 male basketball players. The main findings of the study indicate differences between the two examined positions in the physiological characteristics of jumping ability and agility, while on the physiological characteristic of speed, no differences were observed. More specifically, players of the SG/SF (wings) position showed better performances (±5 cm) in the SJ and CMJ vertical jumping ability tests as well as significantly better performances in the SLJ horizontal jumping ability test (±20 cm), while the players of the PG (organizer) position were faster/better by almost half a second in the agility test. In the speed/sprint tests both positions yielded identical results with no clear differences. These results are in contrast to those found by Bezmylov et al. (2022), who in their research on Ukrainian players of the same age group recorded better jumping performances of PGs compared to SG/SFs and also they found differences in favor of PGs in sprint tests something that was not found in the present study. The differences observed in the present study can perhaps be attributed to the fact that the players on both sides of the two positions that were examined were not the selected regional players of the PGs and SGs/SFs (Wings) positions who would possibly make up the U18 national team of Greece but a sample of regional players at a summer training camp from which a player or players may in the future be selected to form the U18 National team. In addition, the performance of the players of both groups in our study was clearly inferior in terms of jumping ability and speed in comparison to elite players of the same age group who are members of the National Teams of Serbia and Spain but were quite similar especially in the physiological characteristic of 10m sprint speed compared to Turkish players and significantly better in terms of agility in the Illinois Agility Test than Indian college basketball players (İMer & Yapici, 2018; Ivanović et al., 2022; Mancha-Triguero et al., 2021; Sudhakar et al., 2016).

Then, overall the physiological profile demonstrated by the players of the present study was inferior in the physiological characteristic of vertical jumping ability to that of male professional players competing in the positions of PG and SG/SF (wings).Boone & Bourgois (2013)and Altavilla et al. (2018) in their studies on professional male basketball players recorded performances ranging from 32-45 cm and from 32-42 cm for the SJ of the PGs and SGs/SFs (Wings) respectively as well as 37-45 cm and 39-45 cm CMJ performances of the same positions. Players of both positions in the present study recorded lower performances in both aforementioned jumping tests of 10-12 cm on average each. Generally, the performance in the

vertical jump tests of all the players that participated in this study was not considered particularly good. It is thus understood that the physiological characteristic of vertical jumping ability at the U18 age level needs further training and development in order for players occupying both the PG and SG/SF (Wings) positions to be able to cope with the competitive demands of the senior professional level later on. On the other hand, regarding the horizontal jumping ability of the SLJ test, Asadi & Ramírez-Campillo (2016) and Ozen et al. (2020) recorded in their studies performances of 213 cm and 183 cm respectively, with the players of both examined positions of the present study recording significantly better performances in cm (PG 216 -W 233). However, these researchers used different ways of measuring and calculating this specific variable. Therefore, based on the fact that few researches at the U18 level have dealt with this specific measurement, further evaluation is needed to draw safer conclusions.

Furthermore, in the physiological characteristic of 5-10m sprint speed, the study's PGs and SGs/SFs (Wings) performed better in both positions than Belgian professional players and had almost similar completion times to that of Australian semi-professional and also elite male Tunisian professional players (Abdelkrim et al., 2010; Boone & Bourgois, 2013; Scanlan et al., 2014).Additionally, the results of the present study on the performance of PGs and SGs/SFs (Wings) on the physiological trait of agility with the Illinois Agility Test are consistent with those of other studies.Mitra et al. (2013) in their study on college men aged 18-23, recorded times of 16.6 sec in completing the Illinois Agility Test, values quite close to those recorded by the players of both positions (PG 16.6 sec -W 17.1 sec) in the present study . Also, the performance of the players in our study in the Illinois Agility Test was significantly better compared to both lower level U16 players and lower level collegiate players (Kryeziu et al., 2019; Sudhakar et al., 2016).The aforementioned satisfactory results in the physiological characteristics of speed and agility show that at the U18 age level ,these two physical abilities have already been developed and possibly will be the ones that separate the players that in the future will go on and staff the men's teams at the professional level.

The present study has encountered some limitations. Firstly, the size of the sample could be larger and players from previous years could be included in it, which was not possible Secondly, there could not be a separate categorization of the athletes of the SF position and therefore a comparison of PGs vs SGs/SFs was made as the specific position of SFs, especially at the U18 level, is not encountered often so the athletes were selected and categorized as off-ball SGs/SFs (wings).Thirdly, the study did not take into account the biological maturation of the players who were the research sample. The researchers were not able to know the biological maturation of the players of each position separately but only their biological age.

CONCLUSION

Jumping ability (horizontal and vertical) and agility are the main physiological characteristics that separate U18 players between the PG and SG/SF (Wings) positions. The physiological characteristic of speed does not seem to be a distinguishing criterion. The physiological profile of U18 male basketball players of the PG and SG/SF (wings) positions in terms of agility and speed was found to be at a satisfactory level and close to the level of U18 National Teams as well as male players of other countries. The results of this study can be used by the coaches and all those involved in the field of basketball for the best preparation, training and selection of the players who cover the competitive positions of the perimeter in basketball matches, while special emphasis should be placed on the development of jumping ability at the U18 age level.

CONFLICT OF INTEREST

All the authors state that there is no conflict of interest.

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