Journal of Physical Education and Sport ® (JPES), 17(4), Art 309, pp. 2678 - 2684, 2017
online ISSN: 2247 - 806X; p-ISSN: 2247 – 8051; ISSN - L = 2247 - 8051 © JPES

Original Article

Selected demographic characteristics of male basketball players: the case of China and the USA

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Published online: December 30, 2017
(Accepted for publication December 22, 2017
DOI:10.7752/jpes.2017.04309

Abstract:
Background: The sports competition of the 21st century is about talents and some key characteristics for the athletes include their age, height, and weight. These are important fundamental parameters of basketball athletes.
Purpose: This study therefore systematically compared the differences in age, height, and weight between Chinese basketball players in the professional league and university leagues and American male basketball players drawn from the National Basketball Association (NBA), National Collegiate Athletics Association (NCAA) and National Association of Intercollegiate Athletics (NAIA) leagues. This is helpful in finding out whether there exist any differences in the basic physical parameters in player characteristics between Chinese and American players.
Method: The study was a retrospective one as it analyzed archived demographic data of players in the Chinese and United States professional and college basketball teams during the 2015/2016 season. The basic physical data included academic year of study in college for Chinese Universities Basketball Association (CUBA), NCAA and NAIA and age, height, weight and field position for all the leagues.
Results: The results showed that there was significant difference between CBA and NBA players in terms of their height and weight, but not age. On the other hand, there was also a gap between the weight and height of players in the CUBA compared to those in the NCAA and NAIA. There is insufficient height between CBA vs NBA, CUBA vs NCAA and NAIA except in the guard position where there is a little advantage with CUBA and CBA. There is a big disadvantage in weight between CBA and NBA, CUBA and NCAA, NAIA.
Conclusions: It is apparent that there were significant differences in age, height and weight between CUBA (China) on the one hand and NCAA and NAIA (USA) male athletes on the other. However, whereas there were significant height and weight differences between CBA and NBA players, there was no difference in their average age.
Keywords: basketball; athlete; age; height; weight, National Basketball Association,

Introduction

On December 21, 1891, James Naismith published rules for a new game using five basic ideas and thirteen rules (Arceri and Bianchini, 2004). Dr. Naismith, with all of his imaginative planning, creativity and innovation could not have dreamed his "Peach Basket" game would develop into the world's greatest indoor sport that it has become today (Harris, 2014). Although the original 13 rules expanded to over 100, the spirit and principles of the original rules are still in effect in today's game. From the original 13 rules, major changes over the years addressed the number of players, the court boundaries, dribbling, and the elimination of the center jump after made baskets. This evolution of the rules and the game led to inter-sectional competitions in the 1930's. This development made it obvious that standardization of rules throughout the world was necessary if the game was to spread to all the corners of the world (Arias et al., 2011).

It has been 126 years of history. Over that period, basketball has become widely popular around the world as evidenced by 213 nations affiliated to the Federation of International Basketball Associations and the over 450 million players that are actively taking part in the sport (Lukosel and Senthilkumar, 2015). As a game, basketball entails finesse, precision and efficient coordination of the technical and tactical exercises including players' physical attributes such as height, size, athleticism and outstanding physical quality (Ştefănescu, 2016). All the players on the team involve themselves in a competitive combat that involves collective teamwork and individual sacrifice and intelligence under conditions of high stress. Given the high pace of the game, dictated by

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the rapid succession of phases with numerous successes in the offensive game, the game of basketball is one of the most watched in the world. One of the reasons that basketball has become one of the most popular sports in the world is its accessibility in terms of necessary infrastructure and equipment. Additionally, athletes play the game with different characteristics including ability, gender, age, height and size. At the elite level, research on what performance indicators can discriminate winners from losers at the finals of major competitions reveals that successful defensive and offensive rebounding are critical indices for success (Causevic, 2015). These indices therefore influence the type of players on a team and their deployment to maximize on defending under the post and attacking the opponent's post. The key player characteristics that a coach has little control over include height and to some extend size. These physical characteristics, although important, are not coachable and a coach has therefore to select players carefully at the recruitment stage.

Young basketball players yearn to eventually play in the world's most popular and well- paying league which is the NBA. The NBA started in New York City on June 6, 1946, as the Basketball Association of America (BAA) (Koppett, 2007). The league is the pre-eminent men's professional basketball league in North America and is widely considered the premier men's professional basketball league in the world (Maymin et al., 2013). However, the NBA gets most of its top players from the Intercollegiate Athletics ranks represented by the NCAA and the NAIA, which started in 1906 (Britannica, 2016) and in 1937 (NAIA, 2017) respectively. The Intercollegiate basketball programs are very attractive in the USA because they not only provide a gateway to the professional leagues, but also offer huge scholarships thereby affording talented players a chance to play and also have a shot at getting a degree.

Intercollegiate Athletics is a highly competitive endeavor in the United States of America. Parents strive hard for their child to excel in sports to secure a scholarship to attend a high profile Institution. Coaches use all forms of recruitment strategies to get the highest ranked talents especially in basketball and football (Williams et al., 2011). Due to the high publicity that is associated with college sports, especially NCAA, the public focuses on the athletics programs dominated by big institutions. However, operating in the shadow of NCAA is the NAIA that comprises four-year colleges/universities with small populations. These institutions also have athletics programs with scholarships including basketball, volleyball, track and field, cross-country, soccer, and baseball among others (Williams et al., 2011). Basketball is a winter sport in USA colleges. Although there is paucity of research on the international demographics of student athletes, this study aimed at establishing the selected characteristics of the basketball players in China and the USA, both at the professional and collegiate levels.

Before the 1992 Olympic Games, the USA relied on players drawn from the college ranks. Even with college players, they were competitive enough to dominate at the Olympics against other nations of the world that relied on the best players. On the other hand, the Chinese Basketball Association (CBA) League is the highest level of Chinese professional basketball game, and it was founded in 1995 (Xu, 2011). The Chinese league is now attracting players from around the world including some talents from the NBA. Just below the CBA is the Chinese University Basketball Association (CUBA), which started in 1996 and the league launched in 1998. CUBA is the most competitive and popular college basketball competition in China. CUBA intended to mirror the NCAA Men's Basketball (Zhang and Mi, 2004). The human body shape is a complex phenomenon with sophisticated detail and function. The molding of skeletal structures, as well as the distribution of muscles and fat, define the general shape or figure of a person (Abernethy, et al., 2012). Body shape is an important determinant of athletic performance, which has an important effect on athletic performance (Xing, 1985) especially in a sport such as basketball. Indeed, the quality of a team is dependent on the characteristics of the players including age, experience, size and height. This extends to the national teams while competing in international competitions such as the Olympic Games or World Championships. During the 2016 Rio Olympic Games, the Chinese men's basketball team lost to Team USA by a score of 62-119 (Bohnert, 2016). This indicates that there is a huge gap in the quality of basketball between the two countries. From a global perspective, American professional and college basketball represent the highest level in the world of basketball. Some of the strong attributes of the USA basketball, both at the professional and college levels is the size, height and athleticism of their players. Additionally, basketball is accessible at a very young age so kids spend a lot of time playing and perfecting their skills. Thus, a comparison of the physical attributes of professional and collegiate players in the USA and those from the equivalent levels in China would help shed some light on the player characteristics in the two countries.

Material & methods

The study analyzed archival basic physical data of players in the Chinese and United States professional and college basketball leagues. The basic physical data analyzed included age, height, field and weight and field position. The data were collected from the websites for NBA, CBA, NCAA, NAIA, and CUBA. The data were restricted to the 2015-2016 season as the data collection was done in July 2016. In total, personal data for 2066, players were processed (100% male). The player profiles accessed were from the NBA (30 teams, 487 players) and CBA (20 teams, 331 players). These comprised the professional players in the study. For the NCAA, data were collected from the player profiles for the Big 12 League including 10 teams and 141 players. For the NAIA,

data were collected from the Red River League conference involving 11 teams and 151 players. In China, data were for 48 CUBA teams from the top 12 of the four divisions, and involved 956 players.

The profiles of basketball athletes in the CUBA, NCAA and CBA captured and categorized their positions as center, forward, guard respectively. However, the NBA and NAIA presented player positions in five roles including Centre, forward, forward/center, guard, and guard/forward. This study adopted a three-position approach and therefore combined forward and forward/center into forward; guard and guard/forward into guard, and the center remained on its own.

To make the data more globally understood, the personal player profile data was converted into Imperial units from the Standard units used in the USA eg. 1 cm= 0.39 inch; 1 kg= 2.2 lbs. In case of some data missing for players, only those available were used in the analysis. This situation only appears in the individual team players of NCAA and NAIA. All data were reviewed and separately extracted using a standardized form of PASW Statistics 18 (formerly SPSS Statistics) and used the one-way analysis of variance for the professional league players. For the college players, a regression analysis was used, where appropriate. The results are presented descriptively using tables.

Results

The statistical results of China and USA college basketball athletes' academic year of study in the CUBA, NCAA, and NAIA in the 2015-2016 season are shown in table 1.

Table 1. The academic classification (in number of years) statistical data of the CUBA, NAIA and NCAA players at each position and population

Class	CUBA		NAIA		NCAA		P	
	X±S	N	X±S	N	X±S	N	CUBA & NAIA	CUBA & NCAA
Overall Average	2.99±0.31	956	2.60±1.10	154	2.50±1.11	141	<0.01	<0.01
Center	3.01±0.31	177	3.17±0.75	6	2.83±1.17	6	>0.05	>0.05
Forward	2.99±0.29	428	2.63±1.14	59	2.54±1.12	59	<0.01	<0.01
Guard	2.98±0.32	351	2.54±1.09	89	2.43±1.11	76	<0.01	<0.01

Table one shows that most players in the center position average three years (juniors) in college in CUBA and NAIA, while in NCAA, they are mostly juniors and sophomores going by the average years of 2.83. For forwards, average years in college were 2.99 for CUBA, 2.63 for NAIA and 2.54 in NCAA. While for the guards, they averaged 2.98 years in CUBA, 2.54 in NAIA and 2.43 in NCAA. Apparently, NCAA had on average more players participating in their earlier years in college, averaging 2.50, which is between sophomore and junior. For CUBA, on average, players were drawn from Junior ie. 2.99 years of college while NAIA averaged 2.60.

Regarding the age for CBA and NBA players, the results are shown in table 2.

Table 2: The age (in years) statistical data of the NBA and CBA players at each position and population

Age	*NBA*		*CBA*		*T*	*P*
	X±S	N	X±S	N		
Overall average	26.31±4.32	487	26.32±4.32	329	-0.43	> 0.05
Center	26.02±4.10	59	26.35±4.12	80	-0.472	> 0.05
Forward	26.28±4.50	186	26.05±4.35	146	-0,474	> 0.05
Guard	26.40±4.23	242	26.68±4.45	103	-0.56	> 0.05

Table 2 shows that both the NBA and CBA had players whose overall average age was 26 years, although the centers in CBA were slightly older (26.32) compared to 26.02 in the NBA. The forwards in NBA were slightly older (26.28) compared to 26.05 in the CBA. Regarding the guards, those in the NBA were slightly younger (26.40), compared to 26.68 for CBA guards. Height is a significant parameter when it comes to recruiting players into college of at the professional level to play basketball. Table 3 therefore shows statistical results of players in the CUBA, NAIA and NCAA.

Table 3: The statistical data for average height (in Centimetres) of the CUBA, NCAA and NAIA players at each position and population

Height	*CUBA*		*NAIA*		*NCAA*		*P*	
	X±S	N	X±S	N	X±S	N	CUBA & NAIA	CUBA & NCAA
Overall average	190.56±7.12	956	190.26±9.78	153	196.69±8.91	141	>0.05	<0.01
Center	198.32±4.01	177	204.83±2.93	6	208.17±2.56	6	<0.01	<0.01
Forward	192.58±4.88	428	197.34±4.84	59	204.19±6.08	59	<0.01	<0.01
Guard	184.18±5.00	351	184.52±8.31	88	189.96±5.78	76	>0.05	<0.01

Table 3 shows that both the CUBA (190.56 cm) and NAIA (190.26 cm) have players whose overall average height is lower than those of the NCAA (196.69 cm). In the center position, players in CUBA averaged 198.32 cm; lower than those in the NCAA (208.17 cm) and the NAIA (204.83 cm). The average height of the CUBA forward players was 192.58 cm, which is also lower than the NCAA's 197.34 cm and NAIA's 204.19 cm. The average height of the players playing the guard position in the CUBA was 184.18 cm tall, which is lower than 184.52 for the NAIA and much lower than 189.96 cm for NCAA players. At the professional level, the results for the height of the CBA and NBA players is shown in table 4.

Table 4: The average height (in centimetres) statistical data for the NBA and CBA players at each position and population

Height	*NBA*		*CBA*		*T*	*P*
	X±S	N	X±S	N		
Overall average	201.12±8.76	487	198.26±9.06	329	4.513	<0.01
Center	213.00±3.16	59	201.41±9.58	80	8.929	<0.01
Forward	206.41±3.81	186	198.66±8.49	146	11.114	<0.01
Guard	194.15±6.03	242	195.24±8.54	103	−1.348	> 0.05

Table 4 shows that the average height of NBA (201.12cm) players is higher than that of the CBA players (198.26 cm). At specific positions, the NBA center players averaged 213.00 cm, and they are 11.59 cm taller than CBA players, whose height is 201.41 cm. The NBA's forward players' height average was 206.41 cm, while that of the CBA was 198.66 cm. It is interesting that the average height of the players in the guard position in the CBA was 195.24, which is 1.09 cm taller than the NBA players whose average height was 194.15cm.

Weight is a significant feature of player size and therefore a key physical indicator of a player's potential in basketball. Table 5 and 6 therefore show the statistical results of Chinese and USA basketball athletes' weight.

Table 5: The average weight (Kilograms) statistical data of the CUBA, NCAA and NAIA players at each position and population

Weight	*CUBA*		*NAIA*		*NCAA*		*P*	
	X±S	N	X±S	N	X±S	N	CUBA & NAIA	CUBA & NCAA
Overall average	86.65±12.01	956	83.10±8.63	51	94.87±12.01	141	>0.05	<0.01
Center	101.01±11.97	177	113.00	1	114.00±10.37	6	-	-
Forward	87.42±9.03	428	89.19±6.93	16	103.61±8.10	59	<0.01	<0.01
Guard	78.47±7.07	351	79.35±5.61	34	86.57±7.21	76	>0.05	<0.01

The results of the average weight of players in the CUBA, NCAA, and NAIA are shown in table 5.

Table 5 shows that the CUBA player' average weight was 86.65 kg, below that for the NCAA (94.87 kg) and NAIA (83.10 kg) players. The average weight of the center players in the CUBA was 101.01 kg, while the NCAA's players were 114.00 kg, and the NAIA 113.00 kg respectively. Regarding the forward position, the CUBA players weighed 87.42 kg, NAIA, 89.19 and NCAA, 103.61 respectively. For the players in the guard position, the CUBA players averaged 78.47 Kg, NAIA 79.35 Kg and the NCAA weighed 86.57 Kg.

At the professional level, the results of the average weight of CBA and NBA players are shown in table 6.

Table 6: The average weight (Kilometres) statistical data of the NBA and CBA players at each position and population

Weight	*NBA*		*CBA*		*T*	*P*
	X±S	N	X±S	N		
Overall average	99.55±11.66	487	93.58±13.30	329	6.782	<0.01
Center	115.53±7.51	59	107.65±12.33	80	4.660	<0.01
Forward	106.00±6.85	186	93.53±8.93	146	13.946	<0.01
Guard	90.71±7.18	242	82.71±7.95	103	9.170	<0.01

Table 6 shows that NBA players were on average much heavier (99.55 kg) than the CBA players (93.58 kg). At specific positions, including center, forward and guard, the NBA players weighed 115.53 kg, 106.00 Kg, and 90.71 Kg respectively, which are much heavier than for the CBA, which were 107.65 Kg, 93.53 Kg and 82.71 Kg respectively. It is significantly obvious that the NBA players' average weight in all the three positions, as well as the overall average, are greater than those of the CBA players.

Discussion

Academic classification

The results regarding the academic classification of the collegiate players show that most players in the center position were in college, on average of three years (juniors) in CUBA and NAIA, while in NCAA, they are mostly juniors and sophomores going by the average years of 2.83. For forwards, average years in college were 2.99 for CUBA, 2.63 for NAIA and 2.54 in NCAA. While for the guards, they averaged 2.98 years in CUBA, 2.54 in NAIA and 2.43 in NCAA. Apparently, NCAA had on average more players participating in their earlier years in college, averaging 2.50, which is between sophomore and junior. This reflects the fact that a high number of players in NCAA tend to transition into professional ranks after only one or two years of college experience. On the other hand, more players in CUBA, who average 2.99 years and those of the NAIA, who averaged 2.60, tended to stay longer in college.

Age

The age of the athletes can reflect the level of their development, competition experience, and maturity. For team sport disciplines such as basketball, tacit understanding between players and the rational use of game tactics and strategies as well as individual technical qualities are very important. The physical function, physical quality and technical level of basketball players are related to the age and physique of players (Wang, 2014). These attributes also directly affect the overall level of the team. Therefore, analysis of the age and other demographic attributes of basketball players can indirectly show the level of the team (Yan, 2013). The NBA and CBA had players whose overall average age was 26 years, although the centers in CBA were slightly older (26.32) compared to 26.02 in the NBA. In addition, the forwards in NBA were slightly older (26.28) compared to 26.05 in the CBA. Regarding the guards, those in the NBA were slightly younger (26.40), compared to 26.68 for CBA guards. It is evident that the average age of players in CBA and NBA is very close. This shows that CBA and NBA athletes' development level and maturity are the same. However, this does not mean that their game experience and technical abilities are the same. Despite being close in age, CBA teams play only about 40 games a year, while the NBA players participate in 82 regular season games each year, plus the playoffs, exhibition games and other competitions. These diverse competitive and intensive schedules lead to accumulation of experience that provides very favorable talent development conditions. Indeed, the age of 26-27 is the peak time for basketball players. However, compared with the study findings by Wang and Wang (2016), the difference of the players' age between CBA and NBA has become very small. Wang and Wang (2016) had established that there was a 3-year-old age gap between CBA and NBA. It is therefore apparent that over the last 10 years of development of the CBA and its constituent players, they have gained parity with their counterparts in the NBA.

Height

Height is a reflection of human skeletal development; it is an important indicator of the body's longitudinal development level (Peng, 2012). Basketball is a sport that requires players with good height. This allows a player to get closer to the basket and therefore makes it easier to attack as well as defend the basket. For a basketball player, height has an important influence on his competitive level, while for a team; athletes' height is an important indicator of the potential of a team (Li, 2011). Therefore, height in basketball offers enormous advantages and therefore it is significant to know this characteristic among basketball players. The average height of college players shows that both the CUBA (190.56 cm) and NAIA (190.26 cm) have players whose overall average height is lower than those of the NCAA (196.69 cm). The average height of CUBA players in China could be affected by the fact that some players with high stature enter the youth teams and youth sports schools in various provinces early, without entering the university (Yu et al., 2002). In China, many tall players in high school join youth ranks of professional teams to participate in local professional training as opposed to

joining university. University teams therefore miss having tall and talented basketball prospects. On the other hand, outstanding players of NCAA can enter the professional ranks after one year of college. Given that the majority of players drafted to the NBA are drawn from NCAA programs, most talented and tall players target to play in college where they are also given scholarships so that they can stand higher chances of getting drafted into the NBA and possibly other professional leagues. The NAIA teams tend to recruit less talented players and therefore they tend to get players with lesser height compared to the NCAA teams.

The average height of professional players

At the professional level including CBA and NBA, the players are relatively tall compared to other disciplines. The average height of NBA (201.12cm) players is higher than that of the CBA players (198.26 cm). At specific positions, the NBA center players averaged 213.00 cm, and they are 11.59 cm taller than CBA players, whose height is 201.41 cm. The average height for the NBA's forward players was 206.41 cm, while that of the CBA was 198.66 cm. It is curious that the average height of the players in the guard position in the CBA was 195.24, which is 1.09 cm taller than the NBA players whose average height was 194.15cm.

For the center players, the first condition is to have a good height for effective offense and defense. In the fierce inside confrontation, the center player's height is the basis of confrontation and a priority asset (Xu, 2006). This implies that the center players of CBA, who are 11.59 cm shorter than NBA players, are disadvantaged. Thus, the CBA's center players lack the height to make CBA's inside play as fierce as that experienced in the NBA. This could have an impact on the competitive level of China's outstanding basketball players as evidenced by the lopsided score between the Team USA and China in the 2016 Olympic Games where the former won 119 to 62. The forward position is dominated by players that are also tall and powerful and only slightly shorter than the center players. However, the forward players of CBA, especially the power forward player's height is much lower than those in the NBA. This disadvantage could also affect a team's offensive and defensive quality. The NBA also happens to draw international players that are not only talented but also have the height to dominate in their roles. Good examples in the NBA include the now retired Yao Ming (Former Houston Rockets player, China), Dikembe Mutombo, Democratic Republic of Congo, Minute Ball, Southern Sudan and Dirk Nowitzki (Dallas Mavericks players, Germany). These tall and talented players were recruited into the NBA to strengthen the center and forward positions. Given the high profile nature and quality of the NBA where players are also hugely rewarded for their talent, the United States, as a country becomes an attractive destination for forward and center players that are not as plenty at local levels. The internationalization process of NBA also affects China as some Chinese tall players deeply influenced by some NBA star guard players, such as Michael Jordan (Former Chicago Bulls player, 198cm), Kobe Bryant (Los Angeles Lakers players, 201com), etc., began to practice playing the guard position from an early age. The popularity of these players in China therefore attracted many players to focus on playing the guard position even for some tall players. No wonder, the average height of CBA guard players is higher than that of the NBA players. Some of the youth team coaches in China may think that a tall guard player provides a tactical advantage in passing and shooting from the outside.

Weight

Weight is a reflection of human lateral growth and circumference, width, thickness and weight of the overall index. It reflects the human bones, muscles, subcutaneous fat and visceral organ development and human plumpness, and can indirectly reflect the nutritional status of the human body (Liu, 2007). Weight is also a reflection of the body's degree of physical strength, which is a key athletic attribute for basketball players and their tactical deployment in terms of role-play during a match. The weight of a player is a key indicator of their physical potential to do battle with the opposition especially when defending or attacking the basket.

The average weight of college players in the CUBA was 86.65 kg, below that for the NCAA (94.87 kg) and NAIA (83.10 kg) players. The average weight of the center players in the CUBA was 101.01 kg, while the NCAA's players were 114.00 kg, and the NAIA 113.00 kg respectively. Regarding the forward position, the CUBA players weighed 87.42 kg, NAIA, 89.19 and NCAA, 103.61 respectively. For the players in the guard position, the CUBA players averaged 78.47 Kg, NAIA 79.35 Kg and the NCAA weighed 86.57 Kg. The CUBA players weighed less in all positions including center, forward and guard. It is noteworthy to point out that NCAA and NAIA players are mainly from black and white races, while the vast majority of CUBA players are from the yellow race. It is apparent that the three races have a large difference in terms of their constitutional make up especially their physique, muscle composition and body size (Skinner, 2001). Despite the constitutional differences, some of the weight differences could be attributed to the athletic conditioning and dietary prescriptions that are vital to talent development. Whereas many teams in the NCAA and even NAIA have provisions for strength and conditioning coaches, athletic trainers and nutritional scientists together with well-equipped weight training gymnasiums, most of the CUBA teams are mainly dependent on a coach, who plays several roles. These athletic performance-enhancing provisions in American colleges make a huge difference in building the strength of players and consequently affects their average weight for the better of the game.

The average weight of professional players in the NBA was much heavier (99.55 kg) than the CBA players (93.58 kg). At specific positions, including center, forward and guard, the NBA players weighed 115.53 kg, 106.00 Kg, and 90.71 Kg respectively, compared to those of the CBA, which were 107.65 Kg, 93.53 Kg and 82.71 Kg respectively. It is therefore obvious that the average weight of NBA players is significantly higher in all the three positions as well as the overall average than those in the CBA.

Conclusions

It is apparent that there were significant differences in age, height and weight between CUBA (China) on the one hand and NCAA and NAIA (USA) male athletes on the other. However, whereas there were significant height and weight differences between CBA and NBA players, there was no difference in their average age. This implies that that there is a huge difference in the demographic make- up of the players taking part in basketball at the collegiate and professional levels between China and the United States of America.

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