How Important is Height and Weight in Staying Healthy in the NBA?

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https://github.com/m-vrhy/cosc4931

1. Abstract

Here, I examine the potential effect that height and weight have on an athlete's chance of getting injured in the NBA. With the growing trend of big men in basketball starting to play unconventionally in regards to their size, the demand for tall players is rising. Many people claim that tall, lanky players are more injury-prone than others. The purpose of this paper is to examine that claim and decide whether it is founded on factual evidence or not. By examining the proportionality of injured players by position, height, and weight and creating visualizations, it is revealed that centers make up 15.85% of the total injured players [Table 2], a decrease of 3.05% from a past study on basketball injuries conducted in 2000 [8].

2. Introduction

The 2018-2019 NBA season is just around the corner. With this new season comes a whole new host of rookie players. Seven out of the first ten draft picks for the 2018 Draft stand at heights above 6 feet 8 inches [5]. As basketball has come to evolve, big men have also evolved, transitioning from physical powerhouses, to shooting threats at all points on the floor. Around the All-Star break for the 2016-2017 NBA season, players taller than 6 feet 10 inches attempted 7,072 three-point shots, connecting on 2,482 of them. Ten years ago, for the complete season, only 2,995 threes were put up by big men with only 1,021 of them being made baskets [7]. This change in the game necessitates a change in players desired by teams.

Recently a mock draft for the 2019 NBA draft was published by Forbes. On this list, predicted to be the 16th overall pick is Bol Bol, a freshman from Oregon. Bol, who stands at 7 feet 2 inches, is the son of former 7 foot 7-inch NBA legend Manute Bol; the only player in NBA history to have killed a lion with a spear [1]. In this Forbes article, they describe Bol as a "polarizing player in this draft class" due to his "frail frame" [2]. This dismissal of a potential star athlete due to his frame came across as a bit shocking seeing as Bol averaged 20.4 points, 8.2 rebounds, and 2.4 blocks his senior year of high school [3]. Because of this, I began to research the impact "frail frames" can have on a career in the NBA.

3. Literature review

My research led me to investigate the prevalence and nature of basketball injuries. The journal which granted me with the most understanding and insight into the topic is the work of Peter A. Harmer titled "Basketball Injuries". In his work Harmer reveals faults created by past injury research studies. The two most important problems being "the focus has not been on specific sports" and "a lack of a universal definition of injury making comparison across studies difficult" [4].

John Zelisko et al. conducted research on professional basketball injuries between men and women. They drew conclusions that provide reasoning for injury stereotype of frail frames. A question they considered involved mass's effect on injuries, contusions to be specific. Their initial belief was that the male sample would have higher risk of contusions due to their greater mass and resulting greater momentum. What they found was the opposite as female players suffered a significantly higher amount of contusions [10]. It's a vast conclusion to accept this finding as law, but it does give some credibility to the belief that a frail athlete is at higher risk for injury.

My research led me to findings related to injury but not specifically to basketball. For example, J.E. Taunton examined running injuries in 2002. He found that many running injuries were a result of both intrinsic (training errors and old shoes) and extrinsic factors (poor flexibility and previous injury) [9]. While his findings are in a completely different sport, they still offer insight

into the causes of injuries.

Mckay's research on ankle injuries published in the British Journal of Sports Medicine identified three risk factors associated with ankle injuries in basketball specifically. The risk factors are (1.) history of injury, (2.) shoe type, and (3.) warming up and stretching [6].

Finally, in "Injuries and Illnesses in the National Basketball Association: A 10-Year Perspective", Chad Starkey set out to compare professional injuries to college level injuries. As seen below in Table 1, he categorized the injured players based on position.

Table 1: Starkey's Findings

Position	Total	Percentage
Guard	1550	40.3%
Forward	1565	40.7%
Center	728	18.9%

From my review of relevant literature, I developed the research question, are taller players at a higher risk for injury than other players? To begin to answer this, I set out to acquire a dataset of players who were injured in the NBA.

4. Data analysis

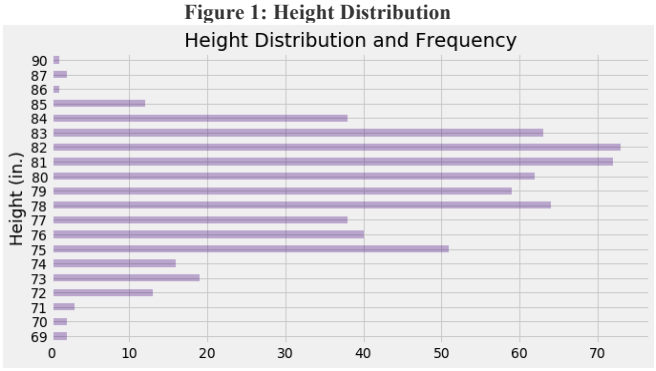
The dataset I am working with is a dataset of all injuries from 2010 to 2017 in the NBA. A player is added to this dataset if he missed a game due to an injury. Due to many duplicate entries for injuries that lasted more than a game, the specific type of injury was not a factor I was interested in researching. Rather, I was focused on finding out the likelihood of suffering an injury due to height and weight. This dataset was limited however, in that the only data given was the player's name, team, date of injury, and notes on the injury. To get more information on the injured players, I used another dataset of all ABA and NBA players, which contained names, heights, weights, positions, colleges, age, and time spent in the NBA/ABA. Using the names from the injured players dataset, I was able to retrieve the data I was interested in.

While cleaning my data, I made the decision not to include age or analyze its effect on injury. My reasoning for this is past basketball injuries studies have failed to find common ground on age's correlation to injury. Harmer's journal accepts the idea from a researcher named Michaud who "reported that the risk appears to increase with pubertal development rather than chronological age" [4]. Since it is safe to assume everyone in my dataset has reached full pubertal development, I found age unnecessary to examine.

One issue I encountered while analyzing the dataset of every player was the data on positions. In basketball, there are three main positions, guards, forwards, and centers. This dataset listed players who could play two positions, making more categories to define these players. So, as part of my data cleaning process, I categorized players by their main position creating three distinct positions. This means that a player who mainly played center but could also play forward would be listed as a center. Ultimately, this led to cleaner visualizations.

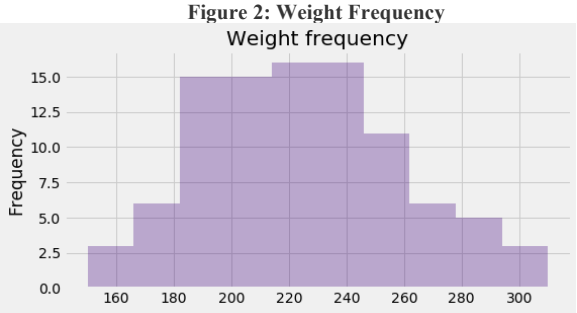
Through the cleaning process I also found that converting height in feet to height in inches also resulted in cleaner visualizations.

Figure 1: Height Distribution



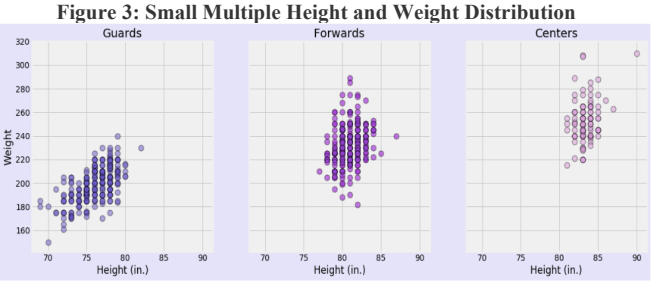
The goal of my first visualization was to see how height was distributed across my dataset. As seen in Figure 1, the greatest number of players stood at 82 inches or 6 feet 10 inches. On average, an injured player was 79 inches (6 feet 7 inches). The tallest player, Yao Ming, stood at 90 inches (7 feet 7 inches), and the shortest players standing at 69 inches (5 foot 9 inches) were Isaiah Thomas and Nate Robinson.

Figure 2: Weight Frequency



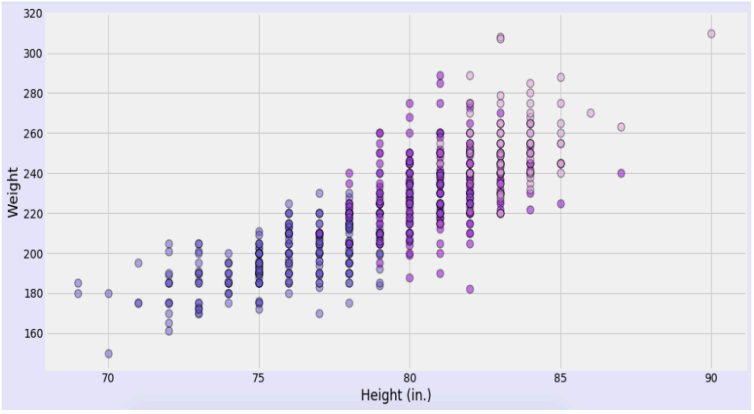
My second visualization [Figure 2] sought to do the same as my first, but with weight instead of height. The greatest number of players weighed between 215 and 245 pounds. The mean weight of the injured players was 221 pounds. The heaviest player was again Yao Ming weighing in at 310 pounds, while the lightest, Tyler Ulis, weighed in at just 150 pounds.

Figure 3: Small Multiple Height and Weight Distribution



My third visualization [Figure 3] is a small multiple of scatter plots, plotting height and weight for each position. The result was not surprising as guards, on average, are shorter and weight less than forwards and centers. Finally, Figure 4 is a combination of the small multiples in Figure 3. This visualization helps to see how height and weight do not determine position as there are multiple data points in the same area, but of a different position.

Figure 4: Combined Height and Weight Distribution



5. Conclusion

In conclusion, the percentage of players who get injured per position is almost equivalent to the percentage of players per position on the floor. In a typical basketball game, there are ten players on the floor; 4 guards, 4 forwards and 2 centers. My findings show that if a player is injured, there is a 42.31% chance the player is a guard, 41.84% chance he is a forward, and 14.85% chance he is a center. If anything, when it comes to centers, people should be less worried about them being injured as they make up 20% of the players on the court, but only 14.85% of those injured.

From past research and my findings, I've concluded that there has not been a drastic change in those effected by injuries. For example, Chad Starkey's research into NBA injuries 18 years ago found that 18.9% of injured players were centers, 40.7% were forwards, and 40.3% were guards [8]. There percentages differ only slightly from my findings in Table 2. Starkey also reported the mean height of an injured player to be 200.8 cm and their weight to be 100.2 kg. From my dataset, the mean height was 200.66 cm while the mean weight was 100.54, differing a miniscule amount from Starkey's reporting. Starkey also found that "playing guard is more hazardous than playing forward", consistent with my finding, but not by a wide margin as there were only three more guards injured than forwards [8].

Table 2: My Findings

Position	Counts	Percentage	Mean Height	Mean Weight
Guard	267	42.3138	76.0375	199.142
Forward	264	41.8384	80.9394	232.598
Center	100	15.8479	83.41	253.06

To conclude my initial research question, are taller players at a higher risk for injury than other players, I have found that they are not. In fact, these tall players are less likely to be injured than smaller players. Hopefully people realize this and set aside their biases when predicting young player's timeline of success. Viewing tall, frail players as injury prone is not justified or supported by fact. By subscribing to this belief,

people are ignoring the issues and factors that concretely influence a player's chance of being injured.

6. References

[1] Henry Abbott. 2011. The real story of Manute Bol. (August 2011). Retrieved October 15, 2018 from http://www.espn.com/blog/truehoop/post/_/id/31423/the-real-story-of-manute-bol

[2] Tommy Beer. 2018. An Early 2019 NBA Mock Draft: Duke's Barrett And Reddish On Track To Go 1-2. (September 2018). Retrieved October 15, 2018 from https://www.forbes.com/sites/tommybeer/2018/09/12/early-2019-nba-mock-draft/#35b97eef19eb

[3] Anon. 2018. Bol Bol's High School Basketball Stats. (October 2018). Retrieved October 16, 2018 from http://www.maxpreps.com/athlete/bol-bol/TrlmDd-dEeaT-Oz0u-e-FA/gendersport/basketball-stats.htm

[4] Peter A. Harmer. 2005. Basketball Injuries. *Epidemiology of Pediatric Sports Injuries Medicine and Sport Science*(2005), 31–61. DOI:http://dx.doi.org/10.1159/000085341

[5] Anon. NBA Draft 2018 Picks by Round - ESPN Draftcast. Retrieved October 16, 2018 from http://www.espn.com/nba/draft/rounds

[6] G.D. Mckay. 2001. Ankle injuries in basketball: injury rate and risk factors. *British Journal of Sports Medicine*35, 2 (January 2001), 103–108. DOI:http://dx.doi.org/10.1136/bjsm.35.2.103

[7] A.J. Neuharth-Keusch. 2017. NBA big men at heart of three-point shooting revolution. (February 2017). Retrieved October 16, 2018 from https://www.usatoday.com/story/sports/nba/2017/02/16/nba-three-point-shooting-cousins-gasol-lopez-davis/97248784/

[8] Chad Starkey. 2000. Injuries and Illnesses in the National Basketball Association: A 10-Year Perspective. *Journal of Athletic Training*(2000), 161–167.

[9] J.E. Taunton. 2002. A retrospective case-control analysis of 2002 running injuries. *British Journal of Sports Medicine*36, 2 (January 2002), 95–101. DOI:http://dx.doi.org/10.1136/bjsm.36.2.95

[10] John A. Zelisko, H.Bates Noble, and Marianne Porter. 1982. A comparison of men's and women's professional basketball injuries. *The American Journal of Sports Medicine*10, 5 (1982), 297–299.