

The Impact of Genetics on Athletics

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At one point in life, many people have probably dreamt of becoming a professional athlete at their favorite sport. These dreamers likely trained incredibly hard to become very good at their craft, but they were soon presented with an unsolvable problem: they were too short in height, and they lacked the athleticism needed to dominate their sport. This begs a few questions about the relationship between one's DNA and their athletic talents. Does an athlete's genetic makeup affect their athletic performance? If so, what genetic traits are necessary in order for someone to be a successful athlete?

To answer these questions, case studies from all across professional sports can be used to identify common genetic traits in professional athletes. There are many instances of families who have had multiple athletes make it to the professional level in their sport. Examples include the Mannings in professional football, the Curry family in professional basketball, the Sedin family in professional hockey, and the Bonds family in professional baseball (Kram Jr. and Keith).

The last name 'Manning' is one of the most recognizable names in professional sports, especially for those who follow professional football. Archie Manning played quarterback for the Ole Miss Rebels and the NFL's New Orleans Saints in the 1970s and 1980s (Tazhatuveetil). Peyton, one of Archie's sons, played quarterback for the Tennessee Volunteers and the NFL's Indianapolis Colts and Denver Broncos. Eli, Archie's youngest son, followed in his father's footsteps and played quarterback for the Ole Miss Rebels (Tazhatuveetil). Eli also made the NFL, playing for the New York Giants for his whole career. Both Eli and Peyton won the NFL's Super Bowl twice, meaning that they were both very good quarterbacks (Jenkins, "His Own Manning"). The oldest son

out of the three, Cooper Manning, planned to play wide receiver at Ole Miss before his playing career ended due to spinal stenosis (Tazhatuveetil). Although the other three Mannings found success in college and the pros, it is clear to most football fans that Peyton Manning is the most talented player out of all the Mannings. Peyton is widely considered one of the greatest quarterbacks of all time, while there remains a debate about whether or not Eli will make the Pro Football Hall of Fame. Although Archie, Eli, and Peyton are the most famous Manning players, a third generation of quarterbacks is on the rise. Arch Manning, the son of Cooper Manning, was rated as a five-star prospect coming out of high school in Louisiana (Tazhatuveetil). Over the past summer, he committed to the University of Texas to play quarterback for the Longhorns. Noticeably, the four quarterbacks within the Manning family possess very similar physical characteristics and athletic traits. They all have around the same size, and they all have very strong throwing arms. The oldest three quarterbacks all have very low mobility, while Arch seemingly has decent legs. So while Peyton is the best and most accomplished out of the Mannings, they all have similar play styles and builds.

The Sedin twins of the National Hockey League both played for the Vancouver Canucks during their professional hockey careers. Contrary to the Manning family, Henrik and Daniel Sedin played different positions and maintained different play styles during their professional careers. Daniel played as a goal-scoring left wing while Henrik was a play-making center (Farber). Another difference between the Sedins and the Mannings is the fact that there isn't a consensus best player between the two brothers. Although Henrik was named to the All-Star Game in 2008 and Daniel was not, both of them contributed to the success of the Canucks very closely. A similarity in the Manning

and Sedin situations is the fact that the Sedins also have similar athletic builds because they are twins. While they aren't considered to be incredibly big, they were blessed with being big enough to play in the NHL for an extended period of time. One facet of their games that they were blessed with is their hand-eye coordination, which really helped them dominate with the puck on the offensive side of the ice.

Another family in professional sports is the Curry family, consisting of father Dell and sons Steph and Seth. Dell Curry played college basketball at Virginia Tech and then played 16 years in the NBA, mostly for the Charlotte Hornets (Fleming). Steph is one of the most famous athletes on the planet at this point in time; he has completely reinvented the game of basketball because of his deep shooting range. Steph played college basketball at Davidson College, and has played for the NBA's Golden State Warriors since 2009 (Fleming). Since entering the NBA, he is a four-time NBA champion, two-time League MVP, one-time NBA Finals MVP, multiple-time All-Star, and is widely considered the greatest shooter in basketball history. The other Curry son, Seth, has had a very solid basketball career in his own right. Seth starred at Liberty University before transferring to Duke University to finish out his college career (Jenkins, "Incredible Journey"). Despite averaging 17.5 points as a senior at Duke, Seth went undrafted in 2013 because of health concerns (Jenkins, "Incredible Journey"). He bounced around the NBA G-League for a few years before finally becoming a key rotational player for the Sacramento Kings. The Curry family possesses the same similarities across family members as the Manning and Sedin family do. Steph and Seth are of incredibly similar size, even though Steph is about an inch taller than Seth. The play styles of Dell, Steph, and Seth are strikingly similar as well. All three of them are

known for their shooting abilities, even if Steph is most famous for it because he is the best at it. While shooting ability is something that can be practiced, the overall shooting form of the Curry family has been genetically passed down from Dell to his sons Steph and Seth.

Baseball is another sport where members of the same family tend to succeed at the professional level. One of the most famous father-son duos in all professional sports is the duo of Bobby and Barry Bonds. Both of these men maintained very successful careers in the MLB. Before playing baseball professionally, Bobby Bonds was an incredible athlete in track and field at Riverside Poly High School. He was the long-jump state champion in California his senior year of high school, and he ran a reported 9.5-second forty yard dash (Peters). These athletic gifts certainly aided his MLB career, as he was known as one of baseball's fastest players during his playing days. While his speed was noteworthy, Bobby's hitting skills were the trademark of his career. He finished his MLB career with 332 home runs and almost 2,000 hits (Peters). While he did have a tendency to strike out, Bobby logged five seasons where he recorded over 30 home runs and stole over 30 bases (known in baseball terms as a 30/30 season). Barry, like his father, hit a lot of home runs throughout his MLB career too. He currently holds the MLB record for homeruns with 762, which go along with seven National League MVP awards, eight Gold Glove awards, and twelve Silver Slugger awards (Nightengale). While these accolades indicate an incredible career, there remains a massive asterisk on Barry's career due to his use of anabolic steroids beginning in 2008 (Nightengale). While this certainly damages the validity of his stats, Barry was still a very dominant baseball player before his steroid use. Noticeably, Barry's play style was

incredibly similar to that of his father's before he began to cheat. Both utilized their speed and above-average power to hit around thirty home runs a year while also dominating defensively and stealing a lot of bases. So while the Bonds family is a controversial topic because of Barry's steroid use, they serve as more evidence of athletic gifts being passed down from generation to generation and being utilized at the professional level.

So far, there are a select few characteristics in successful athletic families that seem to be passed down from generation to generation. First, the physical characteristics of successful athletes seem to be similar among relatives. Eli, Peyton, and now Arch have inherited Archie's strong throwing arm. The Sedins are incredibly similar in size because they are twins. The Curry family members are all around the same size, and Barry Bonds inherited Bobby's speed and power. Second, family members seem to play the same positions and develop similar play styles as each other. The high-profile Mannings have all played quarterback throughout their football careers. The Sedin twins are both forwards who are known for their skills on the offensive end of the ice. All three Curry players have played as guards, with a strong emphasis on the three-point shot in their skill sets. Bobby and Barry were both outfielders who played with speed and power. Of course, one could argue that these younger athletes were naturally nurtured to play like their parents through their upbringing. While this is likely true for a lot of case studies, it is undeniable that the passing of certain physical characteristics through genetics motivated some of these players to play a certain way in their respective sports.

Recent research studies have been conducted in an attempt to explain the role of genetics in sports performances. While the exact role of genetics in sports is still debated, there are a few areas of genetics in which the medical industry is in agreement. First, innate genetic factors such as power, strength, aerobic capacity, flexibility, and coordination are incredibly important traits to have as an athlete (Varillas-Delgado et al.). Second, there have been discoveries of certain gene variants that are associated with elite athletic status. In fact, more than 69 genetic markers have been linked to power athlete status (Varillas-Delgado et al.). In addition, it is well-accepted that most endurance-related phenotypes are under strong genetic influence, which means an athlete's endurance is affected by their gene pool. Muscle performance is another important factor in athletic performance that is strongly influenced by an athlete's genetics (Ozyener). Furthermore, an athlete's injury history can also have a correlation with their genes. The genetic makeup of a given individual can strongly increase the chances of an athlete suffering painful tendon disorders (Ozyener). This means that an athlete from a younger generation may be predisposed to lingering tendon injuries if their parents suffered from those same injuries. Therefore, an athlete's sports performance as well as their ability to stay on the field are both determined by their genetics.

Even though genetics are important for an athlete to be successful, there have been a number of athletically gifted athletes over the years who have struggled to succeed at the professional level of their sport.

One of the most athletically gifted players in the history of football was Jamarcus Russell, who played college football for the Louisiana State Tigers in the mid-2000s

(Wertheim). In the 2007 NFL Draft, the Oakland Raiders selected Russell first overall, in large part due to his athletic gifts. Russell had an incredibly strong arm and became one of the tallest quarterbacks in the NFL when he made his debut. Despite this athletic talent, Russell never found success in the NFL, and he is now very well known as one of the biggest draft busts in NFL history. There are a lot of theories as to why Russell failed to make it in the pros, but it is widely accepted that Russell's work ethic was very subpar (Wertheim). There were a lot of reports during his career that Russell fell asleep during team meetings, and his weight fluctuated heavily while he was in Oakland (Wertheim). As a result of his poor performance, the Oakland Raiders released Russell in the spring of 2010.

Sticking with football, Tony Mandarich was one of the biggest athletic freaks of nature in the history of the sport. Mandarich stood at six-foot-six and weighed 315 pounds as an offensive lineman coming out of Michigan State University (Telander). While those stats may sound incredible, it was Mandarich's muscle that was truly outstanding. As a result of his high strength, the Green Bay Packers selected Mandarich with the second overall pick in the 1989 NFL Draft, right after Hall of Famer Troy Aikman and before Hall of Famers Barry Sanders, Deion Sanders, and Derrick Thomas (Telander). Unlike the stars drafted around him, Mandarich had a far from successful NFL career. While part of this was due to his steroid use, Mandarich has recently stated that his work ethic while he was on the Packers was nowhere near where it needed to be in order for him to be a star offensive lineman (Telander). After just three seasons with the Green Bay Packers, Mandarich took four years off of football to focus on his recovery from drugs. After this period was over, Mandarich played three

solid seasons with the Indianapolis Colts, which are a reflection of Tony's hard work to recover from steroid use and salvage a professional football career (Telander).

Although it seems so far that genetics are necessary for strong athletic performance, there are several professional athletes who have found success despite not winning the genetic lottery. In fact, it seems as though the number of undersized athletes has increased recently despite the recent period of discovery about the importance of an athlete's genes.

The 2023 NFL Draft took place just last week, with teams drafting a handful of players to make up the future of their organization. Among the athletic freaks of nature that were selected last week, a small but mighty player who was taken in the sixth round might be the most impressive of everyone who was chosen. Deuce Vaughn, a running back from the Kansas State Wildcats, was selected 212th overall by the Dallas Cowboys on Saturday afternoon (Bumbaca). Vaughn, whose father is actually a scout for the Cowboys, stands at just 5-foot-5. This makes him the shortest player measured in the combine or selected in the draft since 2003 (Bumbaca). Despite his low stature, Vaughn has found success all throughout his football career. He rushed for over 1,000 yards during all three of his college seasons, and he was a unanimous All-American in 2022 while at Kansas State (Bumbaca).

While Vaughn looks to have a promising career ahead of him, he has not yet played at the professional level just yet. One of the best undersized players ever is Isaiah Thomas, a point guard who played in the National Basketball Association for many years. While he has recently found some issues finding a roster spot at the professional level, Isaiah Thomas was once one of the best point guards in the entire

league. In fact, Thomas made the All-NBA second-team in 2017 and received a lot of votes for that year's Most Valuable Player award (Westerholm). In the same sense as Vaughn, Isaiah Thomas stands just five-foot-nine, which is well below the average height of a basketball player who plays professionally. Despite his well below-average height, Thomas managed to form a very good career in a professional sports league where height is considered very important.

To answer the questions from the beginning, an athlete's genetic makeup does indeed affect their performance in sports. Some of the most important genetic traits that affect athletic performance include height, physical build, hand-eye coordination, and speed. Past these answers, a number of conclusions can be drawn regarding the success of athletes based on the genetics that they have inherited. First, it is reasonable to say that a strong gene pool can kickstart a successful athletic career for a given person. The Mannings' arm strength, the Curry's shooting forms, the Sedins' hand-eye coordination, and the Bonds' speed were all incredibly helpful for their athletic careers. However, it can also be concluded that athleticism is never enough if somebody wants to play professionally and succeed at it. Mandarich and Russell had all of the athletic tools to become successful professional athletes, but they never made it in part from the second conclusion that can be drawn.

The second and perhaps more important conclusion is that an athlete's work ethic must be evident in order to allow for a successful career. The successful families mentioned above all worked incredibly hard to make the most of their athletic gifts and have successful careers in their sports. While each individual member of those families were or are currently successful, there are some gaps between the individual members

of these families when it comes to how much success they actually had. These gaps could be explained by the difference in hard work that was put in by the individual athletes. For example, Peyton Manning and Eli Manning had very similar physical characteristics during their playing days in college and the NFL. However, Peyton is widely considered to be the better quarterback out of the two. This could be attributed to the hypothesis that Peyton Manning worked much harder than Eli to become an incredibly smart quarterback who could read every defense he played and make the proper adaptations. A similar statement could be said about the Curry family. While Dell and Seth have or currently have solid and respectable careers, Steph is going to go down as one of basketball's all-time best players. The gap in success between Steph and Dell and Seth could be explained by the incredibly strong work ethic that Steph has maintained throughout his entire career. There's a strong possibility that Steph spent more time on his shot-creating and passing skills than Seth and Dell did. This possibly allowed Steph's game to evolve past just the three-point shooting that Dell was known for and Seth is known for.

The third conclusion from this research is that a strong gene pool is not necessarily needed for a player to find success at the professional level. Many professional athletes, such as Deuce Vaughn and Isaiah Thomas, were not given the same athletic gifts as the other professionals in their sports. However, they worked incredibly hard to get to the point where their lack of height does not really matter anymore. The existence of this third conclusion supports the idea that the second conclusion is more important than the first. Therefore, it can be concluded that while

genetics can definitely assist athletic performance, an athlete's work ethic will always be the most important factor in determining whether or not they are successful.

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