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A Better Predictor of NFL Success: Collegiate Performance or the NFL Draft Combine?

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A Better Predictor of NFL Success: Collegiate Performance or the NFL Draft Combine?

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by

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ABSTRACT

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NFL teams spend massive sums to ensure they are prepared for the future, but how should they determine whom that future includes? This study set out to find what predicts NFL success more accurately – collegiate in-game performance or the NFL Draft Combine. In the sample of 2007-2012 first-round picks, 191 athletes were measured in three NFL Draft Combine drills, two physical components, and a varying amount of in-game collegiate and NFL performance statistical categories, dependent on position. Secondarily, this work examined Power 5 and non-Power 5 players to determine if attending a more prolific program was predictive of NFL success. Findings included that 40-yard dash and vertical jump are predictive of offensive linemen and cornerback NFL success, that in-game collegiate statistics are most indicative of NFL success amongst defensive players, and that Power 5 prospects are no more prepared for NFL success than those coming from non-Power 5 schools.

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CHAPTER 1

INTRODUCTION

The National Football League is a dominant franchise across the United States, drawing the lion's share of U.S. sports fans' consciousness and attention. In 2016, 33 of the top 50 most-viewed sports broadcasts were NFL games ("2016 Ratings Wrap", 2017), headlined by the most-viewed program across all genres in 2016, Super Bowl 50, the 50th installment of the NFL's annual championship game (Porter, 2016). The gap between the Super Bowl's audience, over 111 million total viewers, and the top non-NFL broadcast of the year was over 70 million viewers, with the decisive Game 7 of the World Series dwarfed by the annual spectacle (Porter, 2016).

With football drawing droves of individuals to their televisions and to events throughout the year, large sums are paid from advertisers to the league, from the league to the owners, and from the owners to the players. To entertain an audience the size the NFL boasts takes healthy sums of money, and the importance of making sure that money is given to the most talented players to maintain a successful product on the field takes top talent evaluators and is of dire importance to a franchise's success. When attempting to find the right mix of individuals, those talent evaluators and general managers have two options – the modern concept of free agency, which gives players the chance to move around during their career, or the long-standing tradition of building through the NFL Draft.

Building From The Outside In – Free Agency

First instituted in 1993 after more than 70 years of players being bound to their original team in varying degrees (The history of, 2018), free agency marks the biggest

structural change to the game in the last quarter century (Harrison, 2013), and has since affected the trajectory of many different NFL franchises by making the danger of a player leaving a franchise via unrestricted free agency all the more real. When this is the case, the franchise receives no compensation, thus putting the player's former franchise in a difficult position. The San Diego Chargers were victims of this in 2006, letting free agent quarterback Drew Brees test free agency waters, sign with New Orleans, and turn a 3-13 Saints team into a 10-6 group the next year, immediately leading them to an NFC championship appearance and, a few seasons later, a Super Bowl win (Harrison, 2013). While the Saints were winners in this one-sided transaction, as free agency often is, the Chargers were left with Phillip Rivers, who has led the team to just one conference championship appearance in 13 seasons.

Along with the empowerment of players that comes from the last quarter century of free agency (Harrison, 2013), an ever-growing trend of players demanding a trade to a different team he feels will fit him more properly, or hold out of football activities for a new contract he believes is more fair, has arisen. Pittsburgh's Le'Veon Bell did this during the entire 2018 season, leaving the Steelers, a playoff team the previous four years with Bell, on the outside looking in for the first time since 2013.

In the era of veteran players having more control of their futures, the more traditional way of building a winning franchise, through the NFL Draft, has become that much more vital (McCaffrey, 2015).

Building From Within – The NFL Draft

One of the most famous examples of the draft's importance was a 2014 Green Bay Packers team that had only two players on its 53-man roster that played for a

different franchise to that point in their career. In that season the Packers were one of eight teams left standing after winning a playoff game over the Washington Redskins. General Manager Brian Gutekunst, in the Packers organization for 20 seasons, pointed out that year was not an aberration, stating the Packers always have wanted to build through the draft (Demovsky, 2018). The track record of success shows what is attainable by doing so, as the Packers have finished at .500 or better each of the last 15 seasons, finished with double-digit wins 12 times since Gutekunst joined the organization, while winning Super Bow XLV in 2010, just the second 2nd Super Bowl in the last 50 years for the team.

Aaron Rodgers, drafted by the Packers in the 2005 season, was the quarterback that led Green Bay to the Super Bowl victory, though he was not the only draft product that had Super Bowl success while playing for the same team that drafted him. In the last 16 NFL seasons, 11 of the Super Bowl Champions won with a quarterback that they drafted, the only exceptions being Philadelphia's Nick Foles, the aforementioned Brees in New Orleans, a veteran Peyton Manning in Denver, and New York's Eli Manning who was all but a draftee of the Giants, traded on draft night from San Diego to New York in 2004.

Along with the aforementioned complications that can reveal themselves in free agency and the realization that 31 other NFL teams may be competing for the same free agents as a given organization, the NFL Draft presents a much more straightforward and organic option for roster improvement. This makes the process of evaluating potential draftees an important one, and the two main ways talent evaluators for NFL franchises do so is by watching prospects during their college careers, and evaluating them at the NFL

Draft Combine (Kelly, 2015). Abilities given the most preference differ from scout-to-scout and franchise-to-franchise, which leaves much room for variance amongst opinion, and a wandering question – is there one area in the evaluation process that acts as a predictor of NFL success more than the others?

Previous research has looked at this issue in varying ways (Kuzmits & Adams, 2008; Robbins, 2010, Mulholland & Jensen, 2016; Park, 2016), though Lyons, Hoffman, Michel, and Williams 2011 research "On the Predictive Efficiency of Past Performance and Physical Ability: The Care of the National Football League" most mirrors the work done in the current study.

While Lyons et al. (2011) provide a good baseline, the current study sets itself apart from others by examining where the majority of money is spent in the draft, the first-round selections, while also using a modern sample of a more representative size that includes statistics over a longer period along with more in-depth analysis of individual cases. In so doing, this work will examine first-round draftees from the 2007-2012 years and their performance during their entire collegiate careers, in three drills at the NFL Draft Combine, and throughout their seasons in the NFL. Following data collection, statistical operations will be performed to determine if collegiate performance or Combine performance are more predictive of success in the NFL. However, before this study arrives at these conclusions, it is important to understand the maturation of the Combine, stories of success and failure from it, as well as previous attempts to statistically predict prospects prolific play from collegiate game performance.

CHAPTER 2

LITERATURE REVIEW

In addition to being a tremendously important annual night for NFL teams, the NFL Draft is also one of the most popular events outside of game action for football fans. A three-night event, the draft gives NFL teams the chance to select collegiate prospects that have declared themselves eligible for the selection process and demonstrated a perceived ability to succeed as a professional. This event marries two dedicated and sizeable fan bases, those of professional football and those of collegiate football, acting as an anchor to keep enthusiasts' attention from both worlds during a time where football's significance would otherwise be diminished. With the NFL being the giant of the national sports scene and college football generating large numbers as well (over 25 million watched college football's national title game in 2017), the 2017 NFL Draft saw ESPN average nearly 7 million viewers during the draft's first round, with another 1.3 million tuning in online. In addition, nearly 250,000 attended the event in the 2017 host city of Philadelphia (Kay, 2017). The 4.0 rating that the draft garnered on its first night was greater than the National Basketball Association's playoff doubleheader the same night (Kay, 2017). The NBA is widely thought of as No. 2 amongst the American sports consumer, so the ratings battle that was won by the NFL that night should demonstrate the size of the popularity gap between the NFL and other major sports.

The NFL Draft – The Super Bowl for NFL Hopefuls

With millions of eyes enamored with the three days that are set aside for the NFL Draft, to think of the event as a standalone venture would be a mistake. Rather, the road for potential draftees tends to loosely follow the one for professionals that have already

made the NFL and are trying to reach the apex of their sport by getting to the Super Bowl. For relative congruence, the NFL Draft is the Super Bowl for these individual collegiate prospects – these are the nights their football journeys have been building towards, much like the athletes that take the field for the NFL's title game. Just like the 16 regular season games are lead ups to the NFL Playoffs which determine the participants in the Super Bowl, the draft has events that lead into it as well, and much like the NFL's best must perform well to advance through the lead ups to the Super Bowl, potential draftees must do the same as they approach the NFL Draft.

For instance, prospects play varying years of collegiate football, but must be at least three years removed from high school in order to be drafted, so their game action is plentiful prior to their draft eligibility. Think of this as the first step towards their Super Bowl, much the same way the 16-game regular season is the first step for professionals to reach the actual Super Bowl. The best teams after 16 games in the NFL are invited to the playoffs, and should collegiate prospects stand out above their competition during their time on the field in college, either for their physical gifts or exceptional statistical and team production, or any combination of these factors, they can move on to the next step – the "playoffs" of their road to the NFL. These playoffs are also by invite only and give prospects the chance to enter the collective consciousness of the professional football world. The similarities continue – the stakes are high, there are winners and losers, there are sweat and tears, and for those that are successful, millions of dollars and a chance at incredible fame. For those that fail, dreams can be dashed.

All that can be said of the Super Bowl, and so too of the final step before prospects hear their name called at the Draft, or live through the painful opposite. The

place some believe future champions are born and franchise cornerstones are made, the playoffs of these prospects' livelihood - the NFL Scouting Combine.

The History of The Combine

The Combine comes from humble beginnings, starting in 1982 with 163 athletes participating. At that time, the event was called the National Invitational Camp put on by National Football Scouting, and was largely held as a way to ascertain medical information for the prospects that attended ("History", 2017). In 1985, National Football Scouting merged its camp with two others, creating the first scouting camp in which all 28 teams that were part of the NFL at the time attended. The event was renamed the NFL Scouting Combine post-merger, and began measuring prospective NFL athletes in drills such as the 40-yard dash, the bench press, and the vertical leap. In 1987, the Combine was moved to its current home of Indianapolis (Gabriel, 2017), and has grown into a media event that is widely covered and enthusiastically consumed. The first Combine to be televised was in 2004 with the inception of the NFL Network (Wood, 2004), and the event has grown to over 300 athletes on a yearly basis. The event contains 14 different mental and physical drills, and for the first time in 2017 included spectators ("NFL announces", 2016). This holy grail of scouting venues is watched with wonder by fans, flocked to by scouts, and highly sought after by collegiate prospects. Opinions are formed and conclusions are drawn based solely off the performances put forth on this big stage.

The Combine – Effective or Irrational?

The effectiveness of the Combine, though, has been a point of contention since its rise to prominence, and while it may possess some measure of face validity for future NFL performance (Kuzmits & Adams, 2008), just how much of a measuring stick it can

be is a point that is certainly in doubt. The 40-yard dash measures in-line, unimpeded speed for 40 yards, the bench press logs how many times a player can push 225 pounds in the air while lying on his back, and the vertical leap records a player standing still and jumping in the air as high as he can. These are not activities often seen on an NFL field, which has led to many misnomers regarding future success of prospects.

One of the most famous examples of misidentifying a player's ability at the NFL draft based off one of the battery of tests at the Combine was draft prospect Terrell Suggs. In Suggs' final season at Arizona State in 2002 he recorded an NCAA record 24 sacks in a season, and still ranks as the NCAA Division I all-time leader in career sacks with 44 ("Football Bowl", 2017). Suggs ran a 4.83 40-yard dash at the Combine and repped 225 pounds only 19 times on the bench press, both numbers considered subpar for a top prospect at his position. Suggs saw his draft stock fall thanks to these valuations (Silverman, 2012), but would go on to be one of the most dominant defensive players in the NFL in his playing career, winning Defensive Rookie of the Year in his first pro season, Defensive Player of the Year in 2011, and being selected to six Pro Bowls during a 15-year NFL career that is still active as of the conclusion of this study.

Various Combine measurables for Joe Haden, Anquan Boldin, and Tom Brady in which they did not score well all led to those prospects tumbling down draft boards in the eyes of some, but the teams that drafted them trusted game footage more than the numbers from the Combine, and all have made at least one Pro Bowl, making good on the team's trust in their ability on the football field (Ruiz, 2016). For example, the aforementioned Brady's 40-yard dash time was 5.28 when he was drafted in 2000, the slowest amongst active NFL quarterbacks as of the 2016 season (Duffy, 2017). Brady

went on to win six Super Bowls and be named to the Pro Bowl 12 times, and is still one of the league's best quarterbacks at 41 years of age. These types of stories led Lyons et al. (2011) to suggest a new testing battery that is less about judging indicators of success and more about setting up scenarios that may actually occur within a football game.

Many players have performed well at the Combine, despite college careers that lacked consistency and reliability. Matt Jones, a quarterback at Arkansas in college, was not considered one of the top quarterbacks coming out of the collegiate ranks that year, so he was drafted as a wide receiver by the Jacksonville Jaguars in the first round in 2005 – a result of his performance in the 40-yard dash and vertical jump, considered by most to be indicative of wide receiver success. Jones started just 15 games for Jacksonville, not appearing on an NFL roster again after the 2008 season ("Matt Jones", 2009). Numbers from the Combine predicted great success positionally for Jones, but having never appeared in a game at receiver for Arkansas, the Jaguars had little tangible backing for this selection.

Troy Williamson was selected seventh in the same draft as Jones by the Minnesota Vikings following his best season for South Carolina, which netted Williamson just 835 receiving yards, a mark that put him outside the top 40 in the country that season ("FBS Player", 2006). After running a 4.34 40-yard dash at the Combine in 2005, fifth-fastest amongst over 300 athletes in attendance, he was taken by the Vikings, only to be out of the NFL after playing in just 49 games over 5 seasons ("Troy Williamson", 2010).

Mike Mamula, drafted seventh overall in 1995 by the Philadelphia Eagles, was projected as a third-round pick off of his game performance entering the Combine. At

6’4”, 252 pounds, Mamula ran a 4.58 40-yard dash, leapt nearly 40 inches, and produced a combine-high 37 reps on the bench press (Breer, 2015), leading the Eagles to select him, as it proved to be, much too early, as he lasted only five years in the NFL.

The latter three examples of Jones, Williamson, and Mamula being selected off of Combine measurements rather than game performance lasted a combined 14 years in the NFL, 4.66 per athlete, half the average career of an NFL first-round pick (“Average playing career”, 2017).

Fails without Football Reason

While these examples seem telling, they cover only a few of the stories from the Combine, and truly, one can find examples on all sides of a subject that may be outliers. Some players that have gone through their collegiate journey and reached the pinnacle of being drafted in the first round have encountered outside obstacles that have thrown them off course that have nothing to do with their collegiate, or Combine, performances.

The Oakland Raiders made what is widely considered one of the worst selections in the history of the NFL Draft, taking Jamarcus Russell first overall in 2007, only to see him play in just 31 NFL games. Russell’s impressive stature, standing 6’5” and weighing in at 265 pounds, along with his ability to wow throwing the football long distances in non-game situations (Evolve IMG, 2013), overrode an incomplete collegiate resume that lacked ample performance to justify a selection at No. 1 overall, and also a work ethic that was not at the level it needed to be, partially because of an alleged sleep apnea issue (Wertheim, 2011).

Charles Rodgers, a wide receiver out of Michigan State selected No. 2 overall in the 2003 NFL Draft who some peers called the best athlete they had ever seen (Tucker,

2017), had an impressive collegiate career, putting forth back-to-back 1,300-yard seasons in college to go along with 27 combined touchdowns those two years ("Charles Rogers", 2003). Rodgers also ran one of the best 40-yard dash times in NFL Combine history, logging a 4.28 (Fransen, 2017) while measuring 6'3" and 220 pounds, a rare combination of size and speed at the position. But Rogers broke his clavicle in back-to-back seasons, became addicted to pain pills, and as of April 2017, still admits to smoking marijuana every day (Tucker, 2017), a drug outlawed in the NFL's Substance Abuse Policy which Rodgers was suspended for violating in 2005. Rogers later found legal trouble for his marijuana usage as well ("Judge Issues Warrant", 2013).

David Carr, who was selected by the Houston Texans first overall in the 2002 NFL Draft, built and developed his way to a huge senior season, throwing for over 4800 yards and 46 touchdowns to just nine interceptions at Fresno State ("David Carr", 2002). He ran a 4.67 40-yard dash, a virtual tie for fastest amongst quarterbacks at the Combine in 2002, leapt 35 inches, and stood nearly 6'4", 225 pounds ("2002 NFL Combine", 2002), ideal quarterback size. But 2002 was the Texans inaugural year in the NFL, entering the league via expansion, and their first pick in the expansion draft, Tony Boselli, an offensive tackle taken to protect Carr, never played a game because of injuries. Partially due to Boselli's absence, Carr would be sacked 249 times in his first five seasons in the NFL, and still holds two of the top three marks for most times sacked in a season in NFL history ("NFL Sacked", 2017). Carr's record as a starter was 23-52 with Houston, and he would be released after five years with the team.

Combine Attempts from all Angles

Many tales of failure and success out of the Combine can be told, and calling out individual stories can be effective to a point, but what this study looks for is consistency in order to determine the best method to judge a collegiate prospect's professional trajectory, something that to this date has been fleeting and fruitless for those that have attempted to find it.

One example of an effort to standardize a statistical system of evaluation came from Lopez (2010), who isolated the quarterback position with the belief that the 26-27-60 formula could help determine a future NFL signal-caller's worth. This formula states that if a quarterback scores 26 on the general aptitude test at the Combine (called the Wonderlic), starts at least 27 games in his collegiate career, and completes at least 60 percent of passes in college, he will be successful in the NFL. Some examples of this formula holding true include NFL mainstays Peyton Manning, Phillip Rivers, Eli Manning, Drew Brees, Tony Romo, Matt Ryan, and Matt Stafford, at least two of which (P. Manning and Drew Brees) will one day be Hall of Famers, while four more (E. Manning, Ryan, Stafford, Romo) have a legitimate chance to join them. Those that have not met the formula include the aforementioned David Carr and Jamarcus Russell, Tim Couch, Akili Smith, Joey Harrington, Michael Vick, Ryan Leaf, Daunte Culpepper, and Vince Young. Five of those quarterbacks are ranked amongst the 15 worst of all-time (Beckett, 2015), while another spent time in jail ("Michael Vick", 2015) and another faced alleged mental health barriers (Travis, 2008), none having experienced consistent success. Still, this simplistic rule has its exceptions, as the same Tom Brady referenced earlier did not fit the criteria but has amassed one of the greatest careers in NFL history,

while Super Bowl winners and long-time starters for their teams Ben Roethlisberger and Joe Flacco also came up short of meeting the 26-27-60 threshold but thrived regardless.

While Lopez was not successful in his collegiate and Combine combination approach, previous studies have had success in showing that 40-yard dash times produced at the Combine can be representative of future NFL success, but the notion only holds on a position-specific basis.

Kuzmits and Adams (2008) supported the above, studying wide receivers, running backs, and quarterbacks from 1999-2004 across 10 drills at the Combine, putting together correlations based off 10 variables measured against those drills. Of the 218 correlations they calculated, only 14 were significant, and in the case of the quarterback and wide receiver groups, the significance was indicative of a random chance model, therefore the authors dismissed the findings as irrelevant. The only significant correlation that held after the authors scrutinized the data further was the relationship between running back sprint times and NFL success. All other variables across positions did not appear to hold up under the statistical spotlight, shedding skepticism on an overwhelming majority of Combine predictability.

Mulholland and Jensen (2016) did an extensive study of wide receivers' college vs. Combine data using regression analyses and recursive partitioning decision trees. Across the 15 years included in their study, the one predictor of draft success from the Combine that was deemed significant was the 40-yard dash. They also collaborated on a similar work in which tight ends were the subject, the outcome showing players were selected in the draft based on 40-yard dash and vertical jump.

Park (2016) had different means to come to the same conclusion, using multi-linear regression and random forest statistical regression to find that 85% of wide receivers that were one standard deviation above the mean in the 40-yard dash were drafted, while only 30% that were one standard deviation below were taken.

However, an important distinction must be noted. While 40-yard dash was indicative of being drafted (Park, 2016; Mulholland & Jensen, 2016), it did not predict NFL success statistically in Park's study and was not in the most prevalent predictor group in Mulholland & Jensen's (2016) study. The current study does not look to discover what numbers lead to a player getting taken in the draft, but what numbers lead to a player having success once drafted.

Robbins (2010) attempted to draw a connection between normalizing data to better design a model that would be reliable for predicting players selection in the NFL draft. While that aspect of the study failed, as no connection was found between normalizing vs. using raw or ratio-scaled Combine data in order to predict draft order, it found that 40-yard dash and vertical leap are the two most significant drills that lead to NFL teams drafting players across positions.

The information gleaned across these studies is extremely valuable, as it shows that 40-yard dash time most often influences scouts and decision-makers to draft a player, the point driven home by the Robbins article. In total, of the articles listed above, four set out to find predictive success of players in the NFL based off their Combine measurements (Kuzmits & Adams, 2008; Park, 2016; Mulholland & Jensen, 2014 & 2016), while Robbins (2010) attempted to normalize Combine data for predictive purposes. Of the five studies, Kuzmits and Adams (2008), Park (2016), and both

Mulholland & Jensen (2014, 2016) studies are most applicable to this work. Kuzmits and Adams (2008) supported the 40-yard dash in predicting NFL success for running backs, Park (2016) supported it in predicting draft positioning for running backs and wide receivers, and Mullholland & Jensen (2016) mildly supported it for predicting NFL success amongst NFL tight ends and wide receivers. All four, though, reject the Combine in predicting NFL success in every other area. These mixed results, along with the statement from the Robbins (2010) study that found NFL brass use 40-yard dash and vertical leap amongst Combine drills most-often in selecting prospects, has led the authors to look at the 40-yard dash and vertical jump as two drills to examine potential relationships between NFL success and quality performance in the drills. Because of results like Mike Mamula and Terrell Suggs described earlier, bench press is the third drill studied in this work to attempt to determine whether the Combine is an accurate predictor of success across positions.

Most related to this work is the journey Lyons et al. (2011) embarked on, pitting what they called "signs" (generalized tests of ability, in both of our cases the Combine) against "samples" (directly related prior experiences, in both of our cases collegiate game performance) in hopes of finding which of the two resulted in higher criterion-related validity. Lyons et al.'s (2011) study differs from the previous examples discussed directly above as it did not exclude the majority of positions (Kuzmits & Adams, 2008; Park, 2016; Mulholland & Jensen, 2014 & 2016), did not normalize and scale data (Robbins, 2010), and did not attempt to determine draft success (Park, 2016; Mulholland & Jensen, 2014& 2016; Robbins, 2010), only future NFL success, all of which can also be said about the current study as well. The results of Lyons et al. (2011) study were supportive

of previously presented data in terms of "signs", as the 40-yard dash was the most statistically significant relationship of Combine drills and best predictor of NFL success after thorough intercorelational and hierarchical regression analyses. But while the 40-yard dash was the best predictor amongst "signs", it, as well as the other drills that were examined at the Combine, were dwarfed by the results when judging collegiate performance, which was deemed by a wide margin the best predictor of NFL success of the variables measured. While Lyons et al. (2011) bolstered results mentioned in the four studies above, their study also presents guidelines to answer of one of our most difficult questions in this study – how does one measure successful collegiate performance?

Lyons et al. (2011) did this a few ways to ensure they were capturing all of the outliers that could be involved in measuring collegiate performance. They started by including a control variable that specified the player's affiliation, or lack thereof, with a Bowl Championship Series conference during college. This was done because, even within Division I competition, which is broken up into clusters called conferences, different perceived skill levels are present depending on which conference an athlete is a part of. Most important amongst these conferences, according to Lyons et al. (2011), is an affiliation with a conference within the BCS, historically the highest level of college football competition prior to its elimination as an entity.

Following the institution of a control variable, the authors standardized their college performance data to calculate averages from each draft they examined (three from 2002-2004), and determined how those averages stood up to criterion-related validity by testing different standard deviations removed from the average. Those averages came from 11 different statistical categories for offensive players and five for defensive

players, of which the categories were broken down positionally after they were separated into offensive and defensive subsets. The statistical categories that were tallied for collegiate performance were also used by the authors to gather NFL statistics from the first four years of the players' professional career, ensuring consistency across data collected, and also acting as a way to log college vs. professional performance in a directly representative way.

Standing Apart from Other Attempts

While Lyons et al. (2011) prepared a thorough study that gave many queues for how to carry out this work, certain limitations to their methods exist, and the present study seeks to address these limitations and refine their model. Specifically, their control variable lacked necessary depth to identify trends amongst conferences, their work ignored the wide variance of skill and importance between the subgroups of first-round draftees and the rest of those selected, they took only partial data from subjects collegiate and professional careers, their sample covered only three years, and their data is now outdated, coming from a time range in which the Combine was just becoming the event that it is now and scouting practices were just beginning to evolve.

Firstly, while instituting a control variable was a wise idea to ensure differences in competition throughout BCS schools and the rest of college football, the method leaves questions unanswered. Most notably, while players of BCS schools may have more, or less success based on the competition they face and their natural ability that has landed them a scholarship at a large, successful program, there are many subtleties across different conferences, and further, schools. These differences and subtleties may skew data one way and make BCS or non-BCS schools look attractive, when in fact they

simply look that way because a few schools from the entire BCS, or a few from each conference, are weighting data and overlooking a lack of consistency. There is room for misinterpretation by coding for only two options, BCS and non-BCS, so the current study codes for each school to attempt to determine if attending a certain school in a conference, or the conference as a whole, gives prospects a better chance at professional prosperity.

Next, they did not separate draft prospects into different subgroups, despite the fact that the NFL does so with the round that a player is selected in. Rather than taking queues from the organization, Lyons et al. (2011) studied all seven rounds of the NFL Draft over their three sampled seasons. Because this study hopes to act as a guide to NFL teams on where to effectively delegate the most lucrative contracts they sign every spring, the author's focus is only on first-round picks. Gaines and Yuhari (2017) showed via graphs the steep drop off and relatively small amount of money spent past round one of the Draft. The most telling image was a graph closely resembling the second half of a bell curve with first-round pick compensation at the top left of the one quadrant graph, a quick decline moving from left to right with seventh-round picks on the bottom right of the X axis. This illustrates why, on top of the fact that it is important to compare like-samples for accurate information, this study logs only first round draftee activities.

Further, their 2011 study looked only at the final year of a player's statistics in college, but to validate that a player had consistent success collegiately this study includes data from a prospect's entire collegiate career. This should help ensure that the author has a large enough sample size of the players' collegiate performances to disregard any one-off seasons that could skew results.

Similarly, the foundational study for this work only looked at the first four years of NFL performance amongst subjects. This study will look at the entire career of participants to judge longevity and overall impact throughout their professional presence. Some in this study, particularly those that turned professional in 2011 and 2012, will not have complete career data to count, as many of the first-round picks are still active in the NFL. Despite this fact, a more complete subject snapshot can be developed based on the larger amount of data this work will collect from a subject's career, and those still playing can, at the most elementary level, already be considered successful NFL players, as the majority that are still active have already eclipsed the sample's average for NFL first-round pick career length at their respective positions.

Finally, the 2002-2004 time-period represents multiple issues. First, it is only three years, half the length of the current study. Second, being a full 15 years ago, the current work is of a more modern nature, with 2002-2004 no longer representing the current landscape of scouting practices by organizations and preparation by players for the Combine. With rapid advancements in technology, strength programs, desired attributes, and an ever-evolving definition of the modern NFL athlete, let alone the evolution of the event itself (Fierro, 2015), the player data may be rendered useless in comparison to near-current day measurements in the modern age of scouting. Add that to the growing sample of successful, and unsuccessful, draft picks made by each franchise that grows the sample and weighs on the psyche of decision-makers selecting or not selecting certain players with their next pick, and definitions of how to draft look completely different than they did 15 years ago.

Framing Theory

Originally founded in 1982, the NFL Draft Combine was meant to be a more convenient means of getting medical information on prospective pros (National Scouting Combine, 2017). In the late-1970s and early-1980s, it became common practice for players to fly to teams and have one-on-one meetings. It worked well for the teams, but the draft hopefuls would have to do all the traveling, leaving many exhausted by the conclusion of the process. One story of this being the case took on a particular significance towards progress and change being initiated, a tale told by scouting legend Gil Brandt:

> "It all came about because of Nolan Cromwell. Nolan Cromwell was a Kansas running back, that was a great player and got hurt," Brandt recalled. "He was flying around the country and we were like the 14th stop, we the Cowboys, and he had all these envelopes under his arm, the guy looked all tired out. [Cowboys president and general manager] Tex Schramm and I happened to meet him on the elevator coming up to our office. 'Where've y'all been?' 'Oh, I've been to Seattle, I've been here, I've been there.' Tex said, 'There's got to be a better way.'" (Knaak, 2018, para. 10)

Schramm was one of the pioneers of bringing the Combine into existence, with this story playing a factor in the steps he would later take in modernizing and streamlining the idea. Schramm's Cowboys held a mini-Combine in the early-1980s with three other teams, Brandt confirming that the idea was to have prospects have to go through medical examinations only one time, and the idea caught fire, expanding to the entire league just a couple of days later (Knaak, 2018).

So how did medical exams and interviews turn into 40-yard dashes and bench press reps? Framing.

The psychological theory was developed by Gregory Bateson in 1972, stating framing was a "spatial and temporary bounding of set of interactive messages" (Arowolo, 2017). Two years later, Erving Goffman repurposed Bateson's Framing Theory for sociology, introducing Primary, Natural, and Social Frameworks, offering that people interpret what is going on around their world through their frameworks (Goffman, 1974). Further classifying Framing Theory, McCombs et al. (1997) found direct correlation between the news media's agenda-setting with political candidates, establishing framing as "second-level agenda setting", later defined by Balmas and Sheafer (2010) as the media telling us how to think about something, a step further than first-level agenda setting, which tells us what to think about.

While framing is not studied in sports as often as it is in politics, it exists on a game-in, game-out basis. Play-by-play broadcasters open their pregame monologues with first-level agenda setting, introducing the big storylines of the night to come. Throughout the game the analyst, sideline reporter, and others that may fill out the announcing crew give in-depth analysis at the second level of agenda setting, telling the viewer how to think about what they are seeing or listening to. In the print and digital media realm, columnists and beat writers deliver the same type of coverage on social media, websites, and in the various newspaper in which they are published.

While games draw the attention listed above, one doesn't have to look far to find the intersection of both levels of agenda-setting and the NFL Combine, as its popularity spike over the last 15 years came at roughly the same time media attention reached a new

milestone in 2004. That year, with the inception of the NFL Network, a television channel dedicated completely to National Football League programming, the decision was made to broadcast the Combine on linear cable TV for the first time in the event's history (Wood, 2004). Since the initial broadcast, the Combine has adjusted its schedule to better cater to the consumer's needs, moving to Friday-Monday in 2015 from a Saturday-Tuesday schedule in prior years, a positioning tact that logged the top single-day viewership in event history ("Saturday's NFL Network", 2015). In 2017, the event had its best overall showing, while 2018's viewership numbers were 19 percent higher than 2016's (Paulsen, 2018).

The NFL Network and NFL Media, the two parties responsible for the coverage of the event on television, were unlikely to have the kind of success they have by focusing on medical examinations and team interviews, so they needed to do some first-level agenda setting, as well as second-level agenda setting in order to put a successful media product on their airwaves. Considering NFL Network shows very few live football games because of its rights agreements with FOX, ESPN, NBC, CBS, etc., this task was of incredible import as NFL Network executives often described the Combine as one of their network's "tent poles" (Ourand, 2017), media-speak for the broadcasts being foundational in the success of their channel.

The first-level agenda setting involved identifying drills that had previously garnered interest and attention from the public, as well as played a factor in determining success or "draftability" of prospects. With the instant-gratification nature of today's society, attention spans shrinking to under eight seconds in the average American ("Microsoft attention spans", 2015), the fit could not have been better for the 40-yard

dash, which lasts from 4.2 to 5.5 seconds depending on position of the player running it. The vertical leap and bench press, the other two events focused on in this study, also are quick in nature, with all three drills mentioned playing a significant role in the "draftability" of the players, per research put forth in the literature review portion of this work. Other televised drills include the 3-Cone, Broad Jump, and a score of others that keep viewers attention by not demanding it for very long.

With the NFL Network and NFL Media showing, and telling, us what to pay attention to, their next task was to make the coverage relevant to interested viewers by telling them how to think about the performances by framing the topic in the lens they desired. This applies to the over 1,000 media members gathered in Indianapolis for the Combine as well, who take different stories that come out of the Combine and deliver them to their audiences under the guise of different frames.

John Ross is a recent example of framing with his 40-yard dash performance. In 2017, Ross broke the modern Combine record in the drill, running a 4.22, beating the previous record of 4.24 held by Rondel Menendez and Chris Johnson. NFL Network host Rich Eisen watched in amazement: "4.22. No Way! According to what we just timed, Chris Johnson is no longer the record holder." Another analyst chimed in: "I would go to the house, he can borrow my jet and go home." (White, 2017, sec. 21).

By immortalizing Menendez and Johnson's 4.24 40-yard dash the way the media did, breaking the record brought Ross from another face in the crowd of wide receivers hoping to be first-round selections into a household name with major expectations and excitement placed around him, despite the fact that previous record holders have spotty track records of NFL success. Of those that have run 4.30 or below in the last 20 years,

only two would be considered booming successes, those being long-time Pro Bowl cornerback Champ Bailey, the other being one of just six players to rush for over 2,000 yards in a single season, Chris Johnson. The 17 others (Fastest 40, 2017) with a time of 4.30 or below include Menendez, Dri Archer, and Josh Robinson, who were in and out of the league in just a few seasons, while many others have managed to continue their professional careers despite repeated unproductive years on the field. Early returns on Ross support the latter type of result rather than the Johnson or Bailey career path, as he has only caught 21 passes in the NFL since being drafted ninth overall in 2017 by Cincinnati.

Other examples of framing by the media effecting public perception include Byron Jones, who was rated the No. 25 cornerback in the 2015 Draft (Manfred, 2015) prior to the Combine. At the event, however, Jones leapt 44.5 inches in the vertical jump, NFL Analyst Mike Mayock stating that Jones was "gifted genetically" and that people need to pay more attention to him (NFL, 2017). Though Mayock's comments dismissed any hard work that Jones may have put into achieving such a top-end result, fans and talent evaluators did take notice after Jones performance garnered national attention, and he would end up as the fourth cornerback taken in the Draft. So far his career has featured a position change and three seasons that have fans of the Dallas Cowboys, the team he was selected by, waiting for Jones to make a major impact (Kohut, 2018).

Another recent example is current Jacksonville Jaguars cornerback Jalen Ramsey. In reviewing his work throughout the 2016 Combine drills, Mayock said Ramsey is "super athletic" and an "alpha male". Eisen then added that he was "sold" on Ramsey as a prospect after a drill that showed Ramsey on a field by himself catching a football and

returning it for a touchdown. Eisen then haphazardly compared Ramsey to Patrick Peterson during the drill, who has made seven consecutive Pro Bowls in the NFL, Ramsey at the time having played a total of zero snaps in pro football (NFL, 2015). These frames are meant to help the viewer place a player next to someone they are more familiar with, classifying Ramsey with someone that has been through the Combine process before and has showcased similar ability, but it paints an unrealistic and deceptive picture in a situation that showcases little about in-game performance. Making non-sequitir assessments of one's ability can mislead the public, and scouts as well, something that the Combine and its media have arguably been doing for years (Caputo, 2010).

The media framing of performances at the Combine largely represents and codifies the overall criticism of the event, with commentators focusing on athleticism, "genetic gifts", and largely meaningless numbers. Much like the drills themselves, the media focus very little on how these drills and the athleticism shown by participants can translate to football success and what one has to do with another, ignoring that many of the drills will never come into play on a football field during a game, and that many of the top performers in the drills have gone on to substandard NFL careers.

With the above in mind, this work sets out to determine the answer to these two research questions:

> RQ1: Which is the better predictor of NFL success – prospects in-game collegiate performance, or the three most scrutinized Combine drills - 40-yard dash, bench press, and vertical leap?

RQ2: Is there a significant advantage in drafting prospects from “Power 5” collegiate programs over “Other 5”, FCS, Division II, or Division III programs?

CHAPTER 3

METHODS

This study will examine three data sets, beginning with the NFL Combine. Data from the NFL Combine will include the 40-yard dash, bench press, and vertical leap of NFL Combine participants that were selected as first-round picks from 2007-2012. This data will be analyzed to determine if correlations exist between the drills performed and NFL success. This will be conducted positionally on both the offensive and defensive sides of the ball. According to previous research, the 40-yard dash is the most representative drill of NFL success (Kuzmits & Adams, 2008; Mulholland & Jensen, 2016; Park, 2016); 40-yard dash and vertical leap are the drills most often considered by NFL decision makers when drafting players (Mulholland & Jensen, 2016; Park, 2016; Robbins, 2010); and research performed in this study shows bench press is consistent with over- or under-valuing prospects.

The second data set will be collegiate statistical performance. Lyons et al. (2011) did not divulge which statistical categories they measured for collegiate, or NFL, performance, but this work will draw on the criterion different college, and NFL, position players are most often measured on via the five most popular sports websites according to Alexa's global traffic ranking. The websites are YahooSports.com, ESPN.com BleacherReport.com, CBSSports.com, and SportsIllustrated.com ("Top 15 most", 2018). Additionally, prior to data collection, it was discovered that over 95 percent of the websites used in data collection and fact-checking logged all of these defensive stats, those totals coming from software data-entry programs that have partnerships with institutions and large governing organizations like the NCAA and NFL. Because of the

deep-rooted nature of these statistics in the data-technology sector, and the obvious recognition by the NCAA and NFL of the importance of these statistics simply indicated by their partnerships with these statistical groups, there is no worry that data is being missed in collection that could be valuable in predicting success.

The third and final data set will be NFL statistics of the collegiate prospects, their entire career statistics collected and then cross-examined against Combine and collegiate numbers. The sample will be broken into 10 positional data sets with varying position-specific measurements determining in-game success, while all 191 athletes in the sample will also be judged off of height, weight, and years played. The collegiate and NFL data categories are as follows:

Table 1.

Collegiate & NFL Statistics Measured, by Position

POSITION	**STATISTICAL MEASURE**
Quarterback	Games Played, Completion, Percentage, Passing Yards, Yards Per Attempt, Rushing Yards, Touchdowns
Running Back	Games Played, Rushing Yards, Receiving Yards, Yards Per Carry, Touchdowns
Wide Receiver	Games Played, Receptions, Receiving Yards, Yards Per Catch, Touchdowns
Tight End	Games Played, Receptions, Receiving Yards, Yards Per Catch, Touchdowns
Offensive Lineman	Games Played, Pro Bowls, All-Pro Seasons
Defensive Tackle	Games Played, Tackles, Sacks, Tackles

	For Loss, Fumbles Forced, Fumbles Recovered, Interceptions, Passes Defensed
Defensive End	Games Played, Tackles, Sacks, Tackles For Loss, Fumbles Forced, Fumbles Recovered, Interceptions, Passes Defensed
Linebacker	Games Played, Tackles, Sacks, Tackles For Loss, Fumbles Forced, Fumbles Recovered, Interceptions, Passes Defensed
Cornerback	Games Played, Tackles, Sacks, Tackles For Loss, Fumbles Forced, Fumbles Recovered, Interceptions, Passes Defensed
Safety	Games Played, Tackles, Sacks, Tackles For Loss, Fumbles Forced, Fumbles Recovered, Interceptions, Passes Defensed

Collegiate In-Game Statistics

The statistics for collegiate game performance will be collected from sports-reference.com, the most comprehensive sports statistics database on the Internet and the 2013 Sloan Sports Conference award winner for Best Analytics Innovation/Technology. When additional resources are needed to verify statistics that may be unavailable from sports-reference.com, college football program's team websites will be consulted.

Table 2.

Collegiate In-Game Statistic Descriptions

STATISTIC	**DESCRIPTION**
Years Played	The number of years the subject played at his final Division I or FCS institution.
Games Played	The number of games played by the

	subject throughout his Division I college career.
Completion Percentage	For quarterbacks, the percentage of passes completed throughout the subject's FCS or Division I career.
Passing Yards	For quarterbacks, the number of passing yards accrued throughout the subject's FCS or Division I career.
Yards Per Attempt	For quarterbacks, the number of yards gained per passing attempt throughout the subject's FCS or Division I career.
Rushing Yards	For quarterbacks and running backs, the number of yards gained running the football during the subject's FCS or Division I career.
Touchdowns	For quarterbacks, running backs, wide receivers, and tight ends, the touchdowns from scrimmage (passing, rushing, receiving) scored throughout the subject's FCS or Division I career.
Yards Per Carry	For running backs, the yards averaged per running play throughout the subject's FCS or Division I career.
Receiving Yards	For running backs, wide receivers, and tight ends, the number or yards gained as the recipient of a pass from another player throughout the subject's FCS or Division I career.
Yards Per Catch	For wide receivers and tight ends, the average number of yards gained per reception throughout the subject's FCS or Division I career.
Tackles	For all defensive players, the amount of total tackles made throughout the subject's FCS or Division I career.

Tackles For Loss	For all defensive players, the amount of tackles behind the line of scrimmage made throughout the subject's FCS or Division I career.
Sacks	For all defensive players, the amount of times the subject tackled the quarterback behind the line of scrimmage on a pass play in the subject's FCS or Division I career.
Forced Fumbles	For all defensive players, the amount of times the subject stripped the ball from an opposing ball carrier throughout the subject's FCS or Division I career.
Fumble Recoveries	For all defensive players, the amount of forced fumbles possessed to complete a turnover throughout the subject's FCS or Division I career.
Interceptions	For all defensive players, the amount of passes caught to force a turnover throughout the subject's FCS or Division I career.
Passes Defensed	For all defensive players, the amount of pass breakups plus the number of passes intercepted throughout the subject's FCS or Division I career.

NFL In-Game Statistics

When collecting NFL statistics, Pro-Football-Reference.com will be the source for collection of data, under the umbrella of the aforementioned Sports-Reference.com, the company named in 2010 as having one of the top 50 websites in the world by TIME Magazine (Staff, 2010). On the rare occasion that a statistic may not available, ESPN.com will be consulted.

Table 3.

NFL In-Game Statistic Descriptions

STATISTIC	DESCRIPTION
Years Played	The number of years the subject played in the NFL.
Games Played	The number of games played by the subject throughout their NFL career.
Completion Percentage	For quarterbacks, the percentage of passes completed throughout the subject's NFL career.
Passing Yards	For quarterbacks, the number of passing yards accrued throughout the subject's NFL career.
Yards Per Attempt	For quarterbacks, the number of yards gained per passing attempt throughout the subject's NFL career.
Rushing Yards	For quarterbacks and running backs, the number of yards gained running the football during the subject's NFL career.
Touchdowns	For quarterbacks, running backs, wide receivers, and tight ends, the touchdowns from scrimmage (passing, rushing, receiving) scored throughout the subject's NFL career.
Yards Per Carry	For running backs, the yards averaged per running play throughout the subject's NFL career.
Receiving Yards	For running backs, wide receivers, and tight ends, the number or yards gained as the recipient of a pass from another player throughout the subject's NFL career.
Yards Per Catch	For wide receivers and tight ends, the

	average number of yards gained per reception throughout the subject's NFL career.
Pro Bowls	For all offensive linemen, the amount of Pro Bowl selections received throughout the subject's NFL career. *Note: This honor is voted on by NFL fans and awards 86 players.*
All-Pros	For offensive linemen, the amount of Associated Press All-Pro selections throughout the subject's FCS or Division I career. *Note: This honor is voted on by sportswriters and awards 28 players. Because of the voting population, and the significantly fewer amount of spots, it is considered a higher, and more rare, honor than Pro Bowl selections (Smith, 2018).*
Tackles	For all defensive players, the amount of total tackles made throughout the subject's NFL career.
Tackles For Loss	For all defensive players, the amount of tackles behind the line of scrimmage made throughout the subject's NFL career.
Sacks	For all defensive players, the amount of times the subject tackled the quarterback behind the line of scrimmage on a pass play in the subject's NFL career.
Forced Fumbles	For all defensive players, the amount of times the subject stripped the ball from an opposing ball carrier throughout the subject's NFL career.
Fumble Recoveries	For all defensive players, the amount of forced fumbles possessed to complete a turnover throughout the subject's NFL career.

Interceptions	For all defensive players, the amount of passes caught to force a turnover throughout the subject's NFL career.
Passes Defensed	For all defensive players, the amount of pass breakups added to the number of passes intercepted throughout the subject's NFL career.

Combine Drills

The Combine measures will be collected from Pro-Football-Reference.com, as their database contains Combine drill results on every player that attended the Combine beginning in 2000. Should Pro-Football-Reference.com lack any needed data, NFLCombineResults.com will be the secondary source to verify, as the website is devoted to the single purpose of housing results all the way back to 1987, the year the different Scouting Combines merged into one. In some cases, a prospect may choose not to participate in a drill at the Combine, therefore the prospects' Pro Day, which gives the prospect a private workout with scouts and a chance to do any drills in which they did not participate at the Combine, will be used to fill in any holes in this study's data. This was deemed a correct course of action because the Combine is simply the vehicle of conveyance for the drills that scouts most take into account, and if a prospect does not run, lift, or jump at the Combine, the prospect is still capable of doing the exact same drill at their Pro Day.

Table 4.

NFL Draft Combine Drill Descriptions

DRILL	DESCRIPTION
40-Yard Dash	The 40-yard dash is the marquee event at the combine much like the 100-meter dash at the Olympics. The drill

	measures speed, explosion, and burst. These athletes are timed at 10, 20 and 40-yard intervals. Scouts are looking for is an explosion from a static start.
Vertical Jump	The vertical jump is a test to measure lower-body explosion and power. The athlete stands flat-footed and officials measure his reach. It is important to accurately measure the reach, because the differential between the reach and the flag the athlete touches, placed directly above where the athletic begins his jump, is his vertical jump measurement.
Bench Press	The bench press is a test of strength – 225 pounds, as many reps as the athlete can get. What the NFL scouts are also looking for is endurance. Anybody can do a max one time, but what the bench press tells the pro scouts is how often the athlete frequented his college weight room for the last 3-5 years.

Note: These definitions were adapted from the NFL's official website describing NFL Combine workouts ("What goes on", 2019).

Mode of data Gathering

The data will be collected via secondary data analysis because of the rigorous collection process that has been proven by the already-existing data sources. In the face of the impressive tumult through which our online sources, as well as the Combine itself, go to when ensuring their data is correct, the authors could not have recreated as reliable of a process as was already in place for either phase.

As an example of the Combine's strenuous collection, the 40-yard dash, one of the drills examined in this research, uses a system of lasers set up at the beginning, 10

yards, 20 yards, and end of the 40-yard area in which a prospect runs to time their progress, while stopwatches operated by scouts are used as a backup timing method.

Additionally, the reputability of the Combine gives even more backing to the stance that using any other kind of method to collect this data and evaluate it would not be useful. The Combine has 36 years of results behind it that have not been questioned by pundits or teams selecting the players, so taking it at face validity was determined the best course of action by the authors.

Secondary data collection of collegiate and NFL statistics, much like with the NFL Combine numbers, once again came out as the predominant favorite in past studies, and the authors for the current study will use the same. Since game statistics have been the way that athletes have been evaluated over the life of sports, choosing to match those against each other, and against Combine measurements, will be a reliable and representative way in which to go about this study.

Reasoning for Collegiate & NFL Statistic Choices

The statistical categories measured for the collegiate and NFL portion of data collecting were used for a variety of reasons, from previous research all the way to modern-day reclassifications of important statistical categories according to top sources.

Defensive players were all tracked using the same statistics: Games Played, Tackles, Sacks, Tackles For Loss, Fumbles Forced, Fumbles Recovered, Interceptions, Passes Defensed. While defensive linemen, linebackers, and defensive backs all have different duties, by splitting players up into position groups, a median and standard deviations off that median create a baseline to compare each prospect's statistics. Because of this, while some position groups will have greater statistics than others

because of the nature of their duties, no danger exists in misidentifying a player's strengths or weaknesses based off these stats because they will draw direct comparisons to those that perform the same duties. These statistical categories were the ones chosen for defensive prospects because they have long been the most popularized, measurable, and opinion-determining factors in mass media and sports culture when it comes to defensive measurements, as discussed earlier in this section via the Alexa ranking and top sports websites statistical tracking of football players.

Similarly on offense, the same can be said for quarterbacks, running backs, tight ends, and wide receivers whose stats were taken into consideration. Nearly all of the stats measured for each position have long been engrained in the collective consciousness of those that follow football, so the choice was clear on completion percentage (QB), passing yards (QB), rushing yards (QB, RB), yards per carry (RB), touchdowns (QB, WR, RB, TE), receptions (WR, TE), receiving yards (WR, TE, RB), and yards per catch (WR, TE). Receivers, both wide and tight, have been judged on their ability to catch the ball consistently for eons, hence the receptions statistic. Those that average a high yards per catch are considered of high value because of their ability to pick up many yards on one play, while those with high yards and touchdowns show a penchant for reliability and big plays, respectively. Running backs not only are judged on rushing yards, touchdowns, and yards per carry, the three most representative popularized statistics of success, but also receiving yards because the added dimension of being able to catch the ball brings an extra threat for defenses to base their game plans around. Quarterbacks, much like running backs with receiving yards, are tracked with rushing yards as well, as the ability to run while also executing the top duty of a quarterback - throwing the ball for yards,

touchdowns, and at a high percentage – brings more to the position than the average quarterback may present. The one statistic included outside the normal range of measured success is one involving quarterbacks, yards per attempt, which directly correlates with winning perhaps more than any other long-examined stat (Barnwell, 2017).

Collection on these "skill" offensive players is the most straight forward, as their statistics are most easily quantifiable and measured most precisely and thoroughly of all positions because they are directly responsible for football's goal - yards gained and touchdowns.

The only group that presents significant statistical difficulty is offensive line. As Sports Reference's Director of Football Operations Mike Kania shared, with their contribution so hard to quantify because of a lack of knowledge about the blocking scheme or assignment on each play, statistics could be missing that a player that was judged to have missed on a block was actually doing the right thing. While sack rates, pancake blocks, and rushing yardage per side statistics may draw closer to effective, even those seem to have much dependence on the quarterback or running back's ability to recognize what's going on around him and adjust accordingly (Kania, 2016). Previous studies have excluded offensive linemen because of a statistical dearth, while Lyons et al. (2011) cited an abundance of negative performance information over positive performance information as the reason offensive linemen were excluded from their study. This work did not deem it necessary to exclude offensive lineman since they participated in the same drills and can be judged in the same baseline ways that other prospects may be (games played, years played, Pro Bowl appearances, All-Pro honors). While the information on offensive linemen will not be as in-depth as other prospects, height and

weight being measured may help in giving a size predictor towards success in the NFL, while Combine drills can be cross-examined against games played to extrapolate the predictor that best determines longevity, which can be correlated with success.

No information was collected on kickers or punters because none were selected in the first round over the sample period.

Sample Timeframe

The years in which data is collected had to be determined in order to obtain what was deemed a representative sample of the population. The timeframe of the event in its current form is 1982-2018, therefore the population is 36 years of NFL Draft first-round selections. Considering recent advances in the Combine and its evaluators, years 2007-2012 were chosen, this timeframe selected because the Combine began to be maligned and popularized in the mid-1990s, became the media event it is today in the late-90s and early-2000s, and only developed into the spectator event it currently is within the last 15 years. Prior to the mid-90s, the onus and expectation for a top performance at the Combine was not as prevalent as it is today because the Combine did not impact draft stock as much as it does now.

The sample, which covers nearly 20 percent of the population of first-round draft picks since the Combine began, will be large enough to extrapolate results on the entire population, and with the majority of careers in the sample having already reached their conclusion, the authors will be able to see how the standard first round draftee's career plays out and what indicators within collegiate game performance and Combine measurables predict that performance accurately.

Additionally, the analytics revolution in sports that is now used to judge prospects and current professionals has made significant progress in recent years (Clark, 2018), so to capture a population inside that revolution that will be representative of recent and future results would seem necessary to scrutinize the most recent draftees eligible for the study.

"Power 5" Conferences v Non-"Power 5" Conferences

Finally, when it comes to codifying conferences of prospects, we turned to the Lyons et al. (2011) explanation for why this step is needed:

> "This variable was controlled for because of the increased probability that high ability players would be more attracted to competing at a BCS institution and, in turn, a BCS institution would be more willing to offer these players scholarships (see Schneider, 1987). Further, players who compete within BCS conferences may face more competitive teams, which then may attenuate their collegiate performance—conversely, players of high ability competing at the non-BCS level may accumulate greater performance statistics than those at the BCS-level due to lesser competition." (Lyons et al., 2011, p. 164)

Lyons et al. (2011) dichotomously coded the value of a player being in a Bowl Championship Series (BCS) conference at the time of his study, simply assigning a 1 to players within a BCS conference and a 0 to players not within one. As Lyons et al. (2011) discussed above, the reason for this is because of the difficulty to amass significant statistics against better competition, as the BCS claimed to have, while the level of competition is perceived to drop at a prospect's school that is not within the BCS, therefore lessening the competitive barriers to success.

The BCS, though, was abolished in 2012 amidst controversy that it was not accurate in determining which teams should make the NCAA postseason and participate in its most prestigious and significant bowls. Having awarded the national championship in its most prestigious game to the Southeastern Conference (SEC) six years in a row, the final of which came about after questionable voting led to Alabama getting in over Oklahoma State of the Big 12, fans that long-wanted a College Football Playoff that was meant to level the playing field and stop favoritism and exclusionary practices that existed in the BCS got their wish (Staples, 2018). This type of playoff system existed at every level of college football and college basketball aside from the top collegiate division in the country, FBS Football, since its move to bowl alliances that first formed in 1992 opted for a postseason that penalized non-agreement conferences, creating a possible competitive imbalance (Eckard, 1998).

With the establishment of the College Football Playoff, while "BCS conference" is a term no longer used, the increased use of the term "Power 5" has taken over. This term recognizes schools in either the ACC, Big 12, Big 10, Pacific 12, or Southeastern, half of the conferences in the FBS (Eckard, 2018). These conferences still represent the majority of college football's power, occupying 190 of the 200 Associated Press' top 10 slots over the last 20 seasons at year's end. Additionally, current "Power 5" schools, including Notre Dame, an independent by choice that is in a Power 5 conference in every other sport, had a record of 87 wins and 15 losses against non-Power 5 FBS schools, a .853 winning percentage in 2017. The record against non-FBS schools was 39-1, a .975 winning percentage (Eckard, 2018). These statistics establish a competitive imbalance in favor of the FBS, as well as one within it, "Power 5" schools disposing of those outside

of the classification roughly 17 of every 20 times. Further, in 2014, the special status of "Power 5" conferences was recognized with a grant of significant autonomy in terms of governance and rule-making within the NCAA's overarching regulatory structure. Of this act, ESPN Senior College Football Writer Ivan Maisel (2014) levied the following:

> "The NCAA Board of Governors' vote to grant autonomy Thursday to the five biggest revenue-producing FBS conferences and Notre Dame should be remembered as a historic day in intercollegiate athletics. On this day, the NCAA voted that the strong shall inherit the earth.
>
> This means self-rule, and if you hear it and think of the downtrodden rising to smite their oppressors, then the spin of the Mike Slives of the world has achieved its goal. Slives, the Southeastern Conference commissioner, said last month, "If we do not achieve a positive outcome under the existing big tent of Division I, we will need to consider the establishment of a venue with similar conferences and institutions where we can enact the desired changes in the best interests of our student-athletes.
>
> In other words, if you don't grant us autonomy, we will establish autonomy." (Maisel, 2014, para. 1)

Indeed, autonomy, and continued power was handed to the five conferences.

Because of this autonomy, the statistics put forward by Eckard (2018), and Lyons et al.'s (2011) system, this study will measure success of both Power 5 and non-Power 5 prospects, all the way down to the individual school they attended, to see if Power 5 stats need to be weighted in later studies because of the difficulty that prospects facing the more impressive competition had to navigate. The former Big East (now AAC) will be

included amongst Power 5 schools because it was, at the time the prospects in this study were in college, a BCS school, therefore we must use the playing field that the prospects were competing on to impress the overall point that the top-level postseason models, once the BCS and now the Power 5, either present a poor or strong indicator of NFL success for players that attend those schools. Additionally, and for clarification purposes, the school's conference at the time of the sample, that being 2007-2012, was the one used. This may not be the conference that a school is currently in, as conference reformation as a result of the elimination of the BCS and other factors led to programs seeking different leagues, the case for 19 of the 65 schools that had first-round draft picks. This, though, will not have an affect on the author's work, as the school's ranking average from the eight-year ranking collection period will be telling and projectable regardless of conference, giving a definitive answer on the subject of if facing tougher competition in college is a successful determinant of future NFL success.

The process for determining which schools, and therefore conferences, were the strongest at the time of the sample was important to ensure schools were being ranked appropriately. To do this, the authors turn to the widely-respected Sagarin Rankings, which represent the average schedule difficulty faced by each team in the games that it's played to a given point in the season, the schedule difficulty of a game taking into account the rating of the opponent and the location of the game (Sagarin, 2019). The rankings are a combination of two computer-based point systems that are used to generate a final rating, and also log college football teams' record against top-10 and top-30 teams in the rankings. For nearly 50 years, these rankings have been part of the

mainstream consciousness and one of the most trusted ways to rank college football teams (Feng, 2019).

Founded by Jeff Sagarin during his time at MIT, the right to publish his schedule ratings was purchased by Pro Football Weekly in 1972, began to be used by college basketball's NCAA tournament in 1984, have been part of USA Today's college football coverage since 1985, and were one of just three original computer rankings used by the BCS in its inaugural year of 1998 (Niesen, 2018). Despite the BCS' downfall, Sagarin still has his rankings published by USA Today as of the conclusion of this study.

After the Sagarin Rankings were selected and reviewed for legitimacy, the question of timeframe measured arose. The rankings measure the college football season prior to the NFL Draft is conducted every season, so with the sample consisting of NFL first-round draft picks from 2007-2012, it became obvious that the Sagarin Rankings that were included must stop at 2011, as the 2012 rankings would be measuring the 2012 college football season that usually begins in August, the draft taking place roughly four months prior on an annual basis. Further, if this study was to capture sufficient data on players that were being selected in the first year of the sample, that being 2007, we could not simply take the 2006 Sagarin Rankings and apply them as holistically representative to the first year of our sample that was drafted in 2007. Rather, it would be necessary to travel back a couple of years before the sample began because the players selected in 2007 were playing significantly at their collegiate institutions beginning in either 2004 or 2005, with the rare exception amongst the sample seeing a freshman or redshirt freshman in the 2007 draft class stepping on the field in 2003. Thus, the period of Sagarin Rankings collected ran from 2004 through 2011. In collecting this data, the final rankings from

each season were the ones acquired, logged, and will be averaged to determine where each school was rated in relation to 238 others that the rankings cover over the eight-year period.

As an example, Louisiana State University, a member of the Southeastern Conference, which has been considered the top league in the nation eight of the last 13 years by the rankings (Sagarin, 2019) and has produced 10 national champions in the last 13 years, ranked numbers 18, 7, 3, 1, 21, 13, 8, and 2 in chronological order from 2004-2011 in the final poll of each year collected for this portion of the study. This produced an average Sagarin Ranking of 9.125 over the eight-year period studied, one of the best measured during that time. The process of data collection, logging, and averaging will be repeated for every other school that had a draft pick during our sample's 2007-2012 period, and studied based on conference and individual institution.

CHAPTER 4

RESULTS

Because of the different expectancies of different positions in the NFL, and the like-comparisons we can make between different prospects at the same position, the data was broken up by position, averages taken of the individual statistics amongst the groups, and results of individual prospects measured against the averages. There were 17 quarterbacks, 17 running backs, 21 wide receivers, four tight ends, 36 offensive linemen, 21 defensive tackles, 26 defensive ends, 19 linebackers, 22 cornerbacks, and 10 safeties in the six-year collection period. 86 of the athletes were still active in the NFL as of the collection data, which was just prior to the 2018 regular season, while 105 athletes had concluded their careers. Because the majority of the careers for the active players had concluded at the time of the collection process (based on the average of 9.3 years that a first-round pick lasts in the NFL), the fact that players were still active was not a concern in this study, as at least six seasons had elapsed for every player in the sample, enough time to determine a player's career trajectory. Notable in the sample outside of positional analysis of success based off combine and college performance were as follows:

-Only 15 of the 191 players were drafted during the sample period were selected from schools outside the aforementioned "Power 5" & Big East conferences. From this group came booming success stories such as Joe Flacco, Chris Johnson, Joe Staley, Muhammad Wilkerson, and Dominique Rodgers-Cromartie, but also some of the poorest performing prospects in the sample period such as Shea McClellin and Larry English.

- Despite there being significantly more offensive linemen on the field at any given time than any other position in football (always a minimum of five, no other position has a

traditional minimum of more than three), there were not a lopsided number of offensive lineman drafted in the first round as compared to other positions. While 36 was the most of any position, it was only 10 more than defensive ends (usually two on the field) and only 19 more than running backs or quarterbacks (almost always one on the field). While this could tell many things about the significance teams deem other positions to have over the offensive line, for the purposes of this study, it highlights, and perhaps correlates with NFL franchise decisions, that this is the most difficult position to measure. Statistics for offensive linemen are not kept publicly outside of the amount of games a lineman plays. Because of the collective nature and scheme of blocking, offensive line contribution is hard to quantify, dependent on play call, and less obvious in success comparatively to other positions (Kinia, 2016). This could lead to an uneasiness in spending significant amounts on linemen early in the draft, but more likely based on research done by SB Nation's Arrowhead Pride (What The Stats, 2015) lend credence to the theory that a quality lineman can be found throughout the draft.

-With six years of the 37 since the NFL Draft Combine came into existence covered, it seems apparent that our sample will be representative of the population, though two positions stand out that require further clarification. There were only 10 safeties drafted in the sample period, none selected in the first round in 2009 or 2011. Historically, though, this aligns with general draft practices, as only 45 safeties since 1982 have been drafted, covering roughly 18 percent of the population. Similarly, tight ends were few and far between amongst first round picks from 2007-2012, only Greg Olsen, Dustin Keller, Brandon Pettigrew, and Jermaine Gresham chosen with the first 32 picks those years. While 35 tight ends have been chosen since the Combine's inception, the sample still

represents 11 percent of the population, which admittedly leaves some level of desired assurance unmet, but will still serve as a reasonable representation for this study.

Statistics for both collegiate and NFL prospects, as well as Combine performance, were verified by a third party, giving this study inter-rater reliability and leading to a high level of confidence in the data throughout this work.

Positional Analysis

Quarterbacks. In order to determine which is a better predictor of NFL success, collegiate performance or the NFL Combine, we must be sure to define success. Our data can do this, but deciphering which quarterbacks have had the best NFL careers in our sample can also be assisted by expert opinion. Bill Bender (2018) of The Sporting News compiled a list of first-round quarterback selections since the year 2000, ranking them 1-48, and while this is far from exhaustive or conclusive of expert opinion, paired with the numbers collected from the sample period, it gives solid backing to preconceived statistical notions. Four from the sample period made the top 10 of Bender's list – Matt Ryan, Cam Newton, Joe Flacco, and Matthew Stafford - while six of the bottom 10 were in the sample – Jamarcus Russell, Brady Quinn, Brandon Weeden, Tim Tebow, Christian Ponder, and Jake Locker. The NFL numbers tell the same story the rankings do, with each of the six quarterbacks listed in the bottom ten lasting four years or less in the NFL, all at least five years less than the average first round draft pick, while the four in the top 10 of Bender's list are still active and in the top four statistically from the sample in passing yards, touchdowns, and games played. Within the bottom six quarterbacks, the high, and low, marks for collegiate completion percentage and rushing yards reside, while the top games played, passing yards and touchdowns all came from the six that

proved poor selections in the first round. Of the four that ranked in Bender's top 10, and were the best statistical NFL quarterbacks in our sample, the low mark for games played, passing yards, and touchdowns were found, while the high for yards per attempt was delivered by the same man responsible for those lows, that being Newton. The low for yards per attempt came from Locker, meaning the congruence between NFL success and collegiate game performance existed, at least in the extremes, most often with yards per attempt.

Evaluating Combine performance is more difficult with quarterbacks than other positions, as 15 of the 17 in this work's sample chose not to do the bench press, Weeden and Quinn the only exceptions, while five did not participate in the vertical jump. This is because a non-quantifiable element of pre-draft workouts, the quarterback's Pro Day and private workout, tend to mean more, and are where most of the evaluation of a quarterback is done (Gabriel, 2018). Based on the two drills the majority of quarterbacks did, the most prolific in them was Robert Griffin III, running the fastest 40-yard dash and leaping 39 inches, the highest amongst the 12 participating quarterbacks in the vertical jump. Griffin's marginal success put him 28th on Bender's list, and while he is still active in the NFL, has served as a backup in his most recent seasons. The slowest 40-yard dash times included Mark Sanchez, largely a backup in his NFL career, Ryan, who ranks in the top 10 in career passing yards in NFL history, Weeden, who played in just 35 games in his career, Josh Freeman, who does not stand out for the good or the bad amongst the sample, and Flacco, who finished last in vertical jump but has a Super Bowl victory, and a career that rivals Ryan's, to his name.

84 correlations were examined between the Combine as well as collegiate game performance and their predictive validity towards NFL success. Pearson's correlation coefficient was the equation used to study the relationship, or lack thereof, between the Combine and NFL performance as well as collegiate game play and NFL performance. Of the 84 possible correlations, only six showed significance. Of those six, four were negative, indicating that when one categorical statistic increased, the other being measured in the correlation equation decreased. For quarterbacks, this was the Combine drill vertical jump, a negative relationship significant at .001 with NFL games played, NFL years played, and passing yards, a negative relationship significant at .005 with touchdowns.

The negative correlation between vertical jump and NFL success in four of the seven categories measured in this study implies that athleticism does not correlate to NFL success at the quarterback position. Mcgee and Burkett (2003) showed interrelationships between the vertical jump and the sprint drills as well as the broad jump when testing variables of their study for correlation. This is to say, if a player performs well in the vertical jump, they should also perform well in the 10-, 20-, and 40-yard dash drills. Indeed, six of the top seven quarterbacks according to vertical jump in this study's sample also possessed the best times in the 40-yard dash. These quarterbacks would be considered "athletic" when placed against their peers, but four of the seven ranked in the bottom third in Bender's ranking of first-round quarterbacks listed above. Three of those quarterbacks are no longer in the NFL, all lasting four years or less, less than half the shelf life of the average first-round draft pick.

These findings further support the group of NFL enthusiasts that claim a team cannot achieve the ultimate goal, winning the Super Bowl, with a "mobile" or "dual-threat" quarterback. This study has just one Super Bowl winner in it, Joe Flacco, whose vertical jump was worst amongst the sample group and whose 40-yard dash was in the bottom third. Those that were successful in this sample's drills have rarely been successful in the NFL, with the lone exception being Cam Newton, who has made one Super Bowl, losing to veteran pocket passer Peyton Manning. While Newton has come close, only two Super Bowl winning quarterbacks in the last 20 years have rushed for more than 225 yards in a season, a negligible 15 yards per game, during their careers, those being Russell Wilson and Aaron Rodgers.

Quarterbacks rarely have to jump, but they often have to run, and with how the vertical is associated with running and athleticism, this study strikes another blow to the "dual-threat" quarterback, showing that the ability to pick up yards with your feet pales in comparison to the ability to consistently pick up big yards through the passing game.

Running Backs. The list of first round running backs is exactly as long as that of quarterbacks in the author's sample, and unlike the previous position, there are more successful cases once the prospects reached the NFL than underwhelming ones. NFL.com's Gregg Rosenthal (2012) listed the best first round running backs of the previous decade with four of the top six coming from the sample. Additionally, three of the running backs – Marshawn Lynch, Ryan Mathews, and Mark Ingram - that did not make the top six only improved their cases over the years with healthy and extended careers. Three of the sample's running backs finished in the bottom eight, comparatively small to this study's quarterbacks placing six in the bottom 10 of Bender's (2018) list.

The clear cut, top-performing backs were Adrian Peterson, No. 1 on Rosenthal's list, Marshawn Lynch, who, along with Peterson, is one of just five amongst the running backs that is still playing, and Chris Johnson, who, also with Peterson, is one of seven men in NFL history to rush for over 2,000 yards in a single season. Peterson led the sample in touchdowns and yards, Lynch coming in second in both rankings, while Johnson led in receiving yards and was third in rushing yards and touchdowns. Also having success were Ingram, Jonathan Stewart, and Darren McFadden. Contrarily, David Wilson lasted only two seasons in the NFL, collecting just 504 yards, narrowly trailing Jahvid Best, who found more success on Olympic sprinting tracks than on the football field (Kirshner, 2016). Trent Richardson, Beanie Wells, and Donald Brown round out others that did not produce to their draft position.

Collegiately, it seemed apparent that Peterson and McFadden would have success, marking the top two in rushing yards and accounting for two of seven in the sample to finish with more than 40 collegiate touchdowns. At the bottom of rushing yards production were Wilson, Best, Knowshown Moreno (who played the least college games of any in the sample), and Rashard Mendenhall, three of which finished in the bottom 10 of Rosenthal's running back list and all of which finished below the average yards gained in the NFL amongst the sample. Wells finished with the least collegiate receiving yards while CJ Spiller gained the most (while playing in the most games), Doug Martin topping touchdowns with Felix Jones, the collegiate yards per carry leader, coming in last in scores. While Brown's 5.4 yards per carry, the least amongst the 17 running backs, gives a hint at that stat projecting success well, Jones' top mark of 7.7 eschews that theory,

though rushing yards and touchdowns, with top collegiate numbers coming from the most productive NFL backs, generated encouraging feedback.

From the Combine, running backs represent one of the more athletic positional groups amongst the 10 measured, logging the fastest individual 40-yard dash time, second-highest individual vertical jump, and quality performances on the bench press. The 40-yard dash time came from Johnson, whose 4.24 was fastest in Combine history until 2017 when receiver John Ross ran a 4.22. Johnson's speed was the trademark of his career and contributed to his solid NFL career, though Ingram, who finished last in the drill amongst first round selections in the sample with a 4.62, has not seen his slower time hinder him in the NFL. Peterson and Lynch, the top producers amongst running backs, both finished middle of the pack of the 17 participants, signaling little connection between the drill and NFL success. Results from the bench press were mixed, with long-time NFL impressers Martin and Stewart tying for the group lead with 28, but McFadden and Jones, whose NFL success was mixed, coming up with a tie for least reps at 13. Initial reviews of vertical leap seem to suggest an inverse relationship, with Brown and Wilson marking the top two numbers by a significant margin, and Ingram, despite his 31.5-inch jump, lowest out of the backs, continuing his NFL career to this day.

66 correlations were examined between the Combine as well as collegiate game performance and their predictive validity towards NFL success. Pearson's correlation coefficient was the equation used to study the relationship, or lack thereof, between the Combine and NFL performance as well as collegiate game play and NFL performance. Of the 66 possible correlations, only one showed significance. That one correlation showed a positive relationship, significant at .005, between collegiate rushing yards and

NFL receiving yards, suggesting that a productive running back in college running the ball, even if they may not have large receiving numbers collegiately, have the ability to produce in a variety of ways in the NFL. This was seen with Peterson, Lynch, and Mcfadden, who were in the bottom half in collegiate receiving yards, but were second, third, and fourth in NFL receiving yards, productive enough to affect the game in a variety of ways.

These findings contradict those of Kuzmits and Adams (2008), who generally had similar findings to this study, with the exception of sprint times maintaining correlational significance to running backs NFL success. While Chris Johnson's 4.24 stands out as spectacular against, not only the sample, but the history of the Combine at any position, Ingram's 4.62 served as no barrier to having success of his own. Mcfadden's success was similar to Ingram's, though his 4.33 time was second-best amongst the sample, while four running backs ran a 4.46, Lynch and Stewart excelling in the NFL, Martin and Brown the opposite. These numbers do, however, support Robbins (2010) and Park (2016) in the finding that 40-yard dash time most influences NFL draft position amongst running backs. A study done by SB Nation's Mile High Report (Doll, 2013) of 40-yard dash times from NFL draftees between the years of 2000 and 2012 showed the average running back's 40-yard dash time was 4.49. Amongst the 17 running backs drafted in the first round between the years of 2007 and 2012 in this work, 15 of them ran faster than that time, nearly half coming in a full tenth of a second below the average mark on a scale in the sample that was less than four tenths wide.

Wide Receivers. With 21 wideouts in the sample, many of whom went on to tremendous success and continue their NFL careers today, wide receiver is a strong

position in the sample, and one of the three positions Mcgee & Burkett (2003) believed would have a strong correlation between Combine success and draft success. Along with running back and defensive back, the researchers found in their work that vertical jump, 10-yard dash (found to be highly correlated with the 40-yard dash measured in this study), and three-cone drill (not measured in this study) had a direct correlation with which round the prospects at the above positions would be selected during. While this differs from this study's ultimate goal of having the Combine predict NFL success, the connection is apparent that expected success is correlated with draft position, therefore forming a level of symmetry between the studies. Mcgee and Burkett stated that the three positions were most often affected by these drills in their draft position because they are the spots on a football field that most rely on explosive speed and agility. Their work guides this study to examine Combine numbers even closer, and one example that proves their theory is Darrius Heyward-Bey, who had the fastest 40-yard dash time amongst the 21 receivers in the sample at 4.3, leading him to be selected seventh overall in 2009 despite never breaking 800 yards receiving in a season at the University of Maryland. At the low end of the 40-yard dash time was Michael Crabtree, who led the receivers in collegiate touchdowns and remains a consistent presence in the NFL today despite his subpar run that saw him drafted 3 spots behind Heyward-Bay despite a far better college resume. Leading the receivers in bench press was Kenny Britt, putting 225 pounds up 23 times in his workout, while Kendall Wright was able to do so just four times to mark the low number for wideouts. The most successful professional receiver in the group, Calvin Johnson, leapt 42.5 inches, a half-inch clear of Jonathan Baldwin for tops at the position, with Dwayne Bowe coming up 9.5 inches short of Johnson to mark the low end.

In their collegiate careers, on the opposite end of Crabtree's 41 touchdowns (in just two seasons) was Craig Davis with seven, Davis lasting only four years in the NFL, one year ahead of Jonathan Baldwin, AJ Jenkins, and Justin Blackmon for fewest amongst receivers. Wright, despite his meager performance on bench press, led the position in games played, receptions, and receiving yards in college, his NFL career later ending after six seasons of up-and-down production. The low mark for receptions and receiving yards was Anthony Gonzalez, whose little collegiate production and average Combine numbers translated into a quiet professional career in which he played just 40 games. In yards per catch, the runaway leader was Demaryius Thomas, whose nearly 20 yards per catch hoped to offset a poor 40-yard dash of 4.52, while Jeremy Maclin, known for his NFL production down the field, only averaged 12.7 yards per catch, lowest in collegiate stats out of the receivers.

66 correlations were examined between the Combine as well as collegiate game performance and their predictive validity towards NFL success. Pearson's correlation coefficient was the equation used to study the relationship, or lack thereof, between the Combine and NFL performance as well as collegiate game play and NFL performance. Of the 66 possible correlations, only four showed significance. Those four all stemmed from body measurements, height of the receivers positively correlating at .001 to NFL yards per catch, while weight positively correlated at .005 to NFL receiving yards, touchdowns, and yards per catch. Interestingly, there was only one other positive correlation to a body measurement throughout the sample, defensive ends weight positively correlating to NFL games played.

The results suggest that size and strength are especially important at the wide receiver position, while the findings of Mulholland and Jensen (2016), which supported speed as mildly predictive of NFL success across their longitudinal study of receivers, seem secondary to the findings of this work. Dez Bryant and Demaryius Thomas, top-five in NFL receiving yards amongst the sample, each ran 4.52 40-yard dash times, second-worst amongst the 21 receivers, but weighed in within a pound, and an inch of each other, both roughly 225 pounds and 6'3". The sample's largest receiver was the aforementioned Calvin Johnson, who is the single-season record holder for receiving yards in NFL history and leads the sample in touchdowns, receptions, and receiving yards, weighed in at 239 pounds and measured 6'5", both sample-highs. Additionally, the other two in the top-five in NFL receiving yards amongst the sample were AJ Green, 6'4", and Julio Jones, 6'3", 220 pounds. Bryant, Thomas, Johnson, Green, and Jones were all above the average of 6'1.5", Johnson, Green, Thomas, and Jones measuring as four of the top five receivers. Additionally, with the average receiver in the sample weighing 210.5 pounds, Johnson outweighed the sample average by nearly 30 pounds, Thomas and Bryant by roughly 15 pounds, Jones by nearly 10.

The need for top-level size amongst receivers stems from the fact that they are, for the most part, matched up on cornerbacks. In this sample, corners average weight was 196 pounds, while their average height stood 5'11.5". Two inches and 15 pounds may seem miniscule, former Denver Broncos Head Coach John Fox summarized the simple premise behind the advantage wide receivers now have in the modern passing league the NFL has become: "This league is a bigger, faster, stronger league, and you win when you win matchups. If you're the bigger, faster and stronger guy, you're going to win more

matchups. That's not rocket science there. That's just the way it is." (Legwold, 2014, para. 4). While speed did not predict NFL success in the current study, receivers have the advantage there too, 21 running faster than a 4.49 40-yard dash, only 12 cornerbacks doing so at the 2014 Combine (Legwold, 2014). The combination of height, weight, and speed makes the point apparent that wide receivers that boast the size of those that have been tremendously successful in this work's sample hold a dynamic advantage, and have changed the game since the size differential was non-existent. In 1992, Pro Bowlers at the cornerback position and the wide receiver position were nearly exactly the same size, with cornerbacks even outweighing receivers by six pounds. One year after this work's sample was complete, 2013, receivers in the Pro Bowl were three inches and nearly 20 pounds heavier than their counterparts on the defensive side of the ball (Legwold, 2014).

A direct physiological advantage for the five success stories of this position, it's no surprise to see the six receivers that weighed in at less than 200 pounds average just over 500 yards per season, roughly 200 yards per year less than the average receiver in the sample.

Tight Ends. The smallest group within the sample, Greg Olson, Dustin Keller, Brandon Pettigrew, and Jermaine Gresham are the four tight ends drafted in the first round from 2007-2012. This position was studied by Mulholland (2014) in an attempt to better understand the changing nature of the position in a league that is using it more to pass than as a blocker as contrary to years past. The study found that the only predictors (amongst over 30 variables between both collegiate performance and Combine results that were measured) of both draft order and NFL success were weather a player attended school at a BCS (Power 5) school and the 40-yard dash. Predictive of NFL success only

was the broad jump, not measured in this study, and predictive of draft order was the bench press, but nothing aside from 40-yard dash time and BCS indicator were indicative of both a high draft position and NFL achievements. The reasoning put forth by Mulholland for the 40-yard dash matched exactly with the goal of the paper – to show that the evolution of the tight end as more of a pass catcher than a blocker was being reflected in tight end skill set and the way in which teams were drafting. Since it is important to possess speed in more of a pass-catching position than a run-blocking role, as tight end has shifted from, the results in the work matched the hypothesis and the NFL trend.

Those results, though, were mixed in this study's sample, with Greg Olsen representing the most productive NFL pro by a significant margin. Olsen ran a 4.51 40-yard dash, the fastest amongst tight ends, and was approaching 8000 receiving yards in his professional career at the time of this study, a number still growing as his career pushed into its 12th season. But while Olson's 40-yard dash did tell the story of a long and prolific NFL career, Dustin Keller, who ran a 4.53, narrowly behind Olsen, had the opposite result. Keller finished last in all but one category of NFL performance throughout the four tight ends measured, and had only a five-year career. Jermaine Gresham and Brandon Pettigrew, drafted in nearly identical locations in the first round exactly one year apart, made up the middle of the four tight ends in regards to pro production, their 40 times falling short by a sizeable margin to Keller and Olsen.

To believe that collegiate performance would help clear up any confusion on just how Keller and Olsen were physically similar in Combine performance yet so drastically different in their NFL careers would be a wise thought, but ultimately an unscrupulous

one. Keller was actually the most productive collegiate tight end of the four, leading the group in receptions and receiving yards, Olsen coming in last in games played, touchdowns, receptions, and receiving yards. Gresham had the most touchdowns and the highest yards per catch, while Pettigrew played in the most games collegiately.

66 correlations were examined between the Combine as well as collegiate game performance and their predictive validity towards NFL success. Pearson's correlation coefficient was the equation used to study the relationship, or lack thereof, between the Combine and NFL performance as well as collegiate game play and NFL performance. Of the 66 possible correlations, only five showed significance. All five of those were negative correlations, college games played significant at .001 to pro receiving touchdowns, also significant at .005 to pro games played, pro receptions, and pro receiving touchdowns. College receptions also showed a negative relationship with pro years played, statistically significant at .005.

These results are not a surprise considering Olsen was thoroughly and completely superior in the statistics measured in this study compared to the other three tight ends, and also played anywhere between eight and 14 fewer games collegiately than his position-mates in the sample.

This position, despite having a representative sample of the population, over 11 percent included in this study, needs further investigation to verify the findings because the sample does not have proportionality to the amount of tight ends in the NFL, and because of the continuing evolution of the position in a largely pass-heavy league.

Offensive Linemen. An often undervalued, overlooked, and forgotten about position in the public eye, the offensive line, as discussed above, present a number of

challenges in quantifying performance. This has led previous studies, most notably and recently Vincent, Blissmer, and Hatfield's (2018) work on this subject, to leave offensive linemen out all together. Mulholland (2014), in studying a position closely related to offensive line, studied height, weight, and BMI on top of performance measures at the Combine. While the author of this work has not discussed the significance of studying the physical measures of height and weight prior to this, in the conversation of offensive linemen, it is tantamount to this paper. This is true not only because measures of offensive line performance are sparse, but also because of the literal physical evolution of the position in the last five decades. In 1972, the average height of an offensive lineman was 6'4", the average weight was 249.6 pounds, and the body fat percentage was only slightly above the national average at 15.5 percent. In the most recent measure, height stayed consistent, but the average weight was up 61lbs to 310.6, while body fat percentage had nearly doubled, measuring 28.8 (Anding & Oliver, 2015). During the peak of growth amongst linemen, and players in general across different levels of football, Secora, Latin, Berg, and Noble (2004) found that player growth was contributing to a power and speed increase as well, with changes in power and speed drills coming with a statistically significant correlation to physical measurements 50 of 88 times in the study. With those positives for the athletes, though, come possible negative consequences, as Mathews & Wagner (2010) found that a large percentage of college football offensive linemen exceeded the at-risk designation of obesity. Given that offensive linemen are the largest specimens on the field, these size changes, along with the positive and negative effects stemming from them, are especially important for the 36 linemen in this study.

The largest in terms of height was Nate Solder at 6'8", five including Joe Thomas and Jake Long right behind Solder at 6'7". Ben Grubbs and Danny Watkins at 6'3" were the shortest offensive linemen. This is telling, as Solder, Long, and Thomas all had notable careers, while Watkins lasted just three years in the NFL. Mike Iupati and Andre Smith weighed in at over 330lbs, the heaviest amongst the 36 linemen, and continue playing to this day, though the lightest linemen, Mike and Maurkice Pouncey along with Joe Staley, have also had tremendous success in the NFL. In addition to years played, to measure NFL success, this study looks at Pro Bowl and All-Pro appearances for linemen, as those honors are considered the highest postseason accolades for each position (Rosenthal, 2013), but will specifically be focused on for lineman due to lack of other statistical measurement options.

Staley ran the fastest 40-yard dash of any lineman, 4.79, with six-time Pro Bowler Trent Williams right behind him at 4.81, the slowest runs emerging from Jeff Otah and Sam Baker, Otah also having the shortest vertical jump. Otah and Baker played just 10 combined seasons with no Pro Bowls made. Strength is synonymous with the offensive line position, and this study's measurable for it, the bench press, saw Long, a one-time All-Pro and four-time Pro Bowler, bench 225 pounds 37 times, setting the pace for the linemen. Smith was on the other end of the spectrum, doing so only 19 times. As for collegiate game performance, the only measurable kept was games and years played, and Otah, James Carpenter, and Watkins all played just 2 years, having marginal-at-best success in the NFL, while the majority of prospects played all four years. Leading in games played was Mike Pouncey, four-time Pro Bowler Duane Brown trailing by only two games, while Otah and Watkins played in just 25 games. Amongst the group,

Thomas led in Pro Bowl selections, All-Pro honors, and games played in the NFL, while Derek Sherrod, Otah, and Watkins were by far the bottom in games played and received none of these honors. Sherrod was a four-year collegiate with slightly below average Combine numbers.

Despite a lack of in-game data to measure, offensive linemen had the highest percentage of statistically significant correlations in relation to correlations possible amongst the sample. With only 28 correlations calculated, nine came back with positive returns, six of which were significant at .001, the other three significant at .005. Most notably, the results suggest that being athletic, rather than large, is the most important factor to NFL success. 40-yard dash was significant at .001 to NFL years played, NFL games played, and Pro Bowls, while vertical jump was significant at .005 in predicting NFL games played and Pro Bowls. The other positive correlations revealed the longer a player remained in college the more ready they were to excel in the NFL, college games and years played predicting longer NFL games and years played as well.

Athletically, while offensive linemen have appeared to grow to unhealthy sizes and body fat percentages (Anding & Oliver, 2015), they have also turned into modern day elite-level athletes (Shook, 2017) that need to be capable of being mobile in the run game while also stopping much quicker defensive linemen and linebackers coming towards their quarterback in the pass game. On the ground, there are three popular running schemes in the NFL (Shook, 2017). The zone-blocking scheme requires linemen to work upfield rather than simply power block whoever is in front of them, while also being mobile enough to get to the sidelines if necessary (Bullock, 2015). This, at times, means linemen will be blocking multiple players of different sizes and at different levels

of the field during the same play. In so doing, while they will generally never run 40 yards, their ability to move quickly from level-to-level of the defense and keep up with the play is vitally important to the fastest-rising run-blocking scheme in the NFL (Shook, 2017). The power running game, while it sounds figuratively, and literally, straight forward, in fact features guards "pulling" to create deception across the defensive line. This means that the biggest players on the field are on the move from one spot along the line to another once the ball is snapped, needing to cover upwards of 20 yards when doing so, meaning straight line speed is pertinent to ensure success. Finally, the counter blocking scheme not only brings guards from their original position to pull, but does so with a tackle too, creating multiple moving parts that requires exceptional timing and quickness by the linemen up front to meet their responsibilities before the ballcarrier gets to the hole he needs to run through (Shook, 2017).

In the passing game, linemen must face opposing defenses that blitz defensive ends that averaged a 40-yard dash time nearly a half-second faster than that of their position group in this work's sample, defensive tackles that averaged roughly the same weight and a quickness advantage of nearly a quarter of a second, linebackers that were over a half-second faster than the linemen, and occasional defensive backs that outpace the linemen by even more. All this while the opposing players are free to get a running start, building momentum to further their force against the offensive linemen, who are stationary until snap. Slower offensive linemen can struggle to keep up with the amount of defenders rushing the passer, the schemes designed to confuse and misdirect the protectors of the quarterback, and simply be beaten one-on-one by a more agile athlete, where those performing well in the athletic drills at the Combine do not have that issue.

Much like quarterbacks, jumping is not something an offensive lineman will often be asked to do, and running 40 yards in a straight line falls into the same category, but as demonstrators of athleticism, they give a look into what makes a behemoth along the offensive line successful, or the opposite. There were six linemen that ran below five seconds in the 40-yard dash, accounting for 28 Pro Bowl appearances of the 68 the sample accrued, a disproportionate amount leaving the other 30 offensive linemen in the sample with just 40 Pro Bowl appearances combined. Additionally, Williams, Thomas, Staley, and Solder all ranked in the top-seven of the sample. Based off this study, a strong baseline for selecting an offensive lineman in the first round would be a prospect that has played four years of FCS or FBS college football, leapt 30-plus inches in the vertical, and run a sub-five second 40-yard dash at the Combine.

Defensive Tackles. Those closest in size to offensive linemen are the defensive tackles across from them, this group of 21 weighing in between Nick Fairley's 291 pounds and Dontari Poe's 346. The reason for this 57-pound range, the largest variance amongst any position group in this study aside from wide receiver, which stands at 61lbs, is because of the prevalent defensive scheme difference in today's NFL. All teams in the league line up in different defensive formations, but all will have a "base" package, which either possesses three defensive linemen or four, labeled the 3-4 or the 4-3. In the 3-4, the larger, space-occupying defensive tackles are selected because they need to occupy blockers in order to free up linebackers, the level behind the defensive line, to make plays. In the 4-3, smaller, more fleet-footed defensive linemen like Fairley are taken, as they are expected to free themselves and make more of the plays than a 3-4 lineman would be expected to make (Tanier, 2005). The reason for the wide receiver

range being even larger is the varying positions demanded from receivers, with larger wideouts playing the furthest away from the quarterback while the quicker, faster, and generally slimmer receivers playing closer to the quarterback in the "slot". The largest receiver in the group was Calvin Johnson, a dominant outside receiver weighing 239lbs, very large for a receiver, Ted Ginn Jr., a predominantly slot-style receiver weighing just 178lbs., exceptionally small for a receiver. This case could be considered an outlier because Ginn and Johnson represent significant departures on both ends of usual receiver weight, defensive tackles often having the largest variance in different samples. Because of the different schemes and roles of defensive tackles, size is not expected to play a significant factor in determining success amongst the interior linemen.

Amongst college performers, Ndamukong Suh, the highest pick of any defensive tackle in the draft during the sample period after being selected second overall by Detroit in 2010, led six of the eight performance categories, logging the most games played, tackles, sacks, tackles for loss, interceptions, and passes defensed. The other categories - forced fumbles and fumbles recovered - were led by Ziggy Hood and Sedrick Ellis, respectively. On the low end, Fairley and Michael Brockers played in just 27 games, Marcell Dareus tackled just 71 ball carriers, Brockers accumulated only two sacks, Justin Harrell can claim only one tackle for a loss, while a bevy of prospects tied for fewest fumbles recovered, fumbles forced, interceptions, and passes defensed with zero. The most impressive pro careers in the sample came from Suh and Muhammad Wilkerson, both generating over 400 tackles and 40 sacks in careers that are still active.

At the Combine, Suh led prospects in the vertical jump, though Suh's run was roughly average amongst the sample. The lowest vertical jump was Glenn Dorsey's at

just 25.5 inches compared to Suh's 35.5, while the massive Poe led prospects in the bench press with 44 repetitions, sixth-most in draft history (Kaylor, 2017), more than doubling Brockers' low mark of 21. Brockers also ran the slowest 40-yard dash, just ahead of Ellis and Kentwan Balmer, who stuck in the NFL for only nine combined years. Fletcher Cox, whose year-by-year NFL numbers are amongst the best in the sample, ran a 4.77 40-yard dash to lead all participants.

As was the case with every position on the defensive side of the ball, 126 correlations were examined between the Combine as well as collegiate game performance and their predictive validity towards NFL success. Pearson's correlation coefficient was the equation used to study the relationship, or lack thereof, between the Combine and NFL performance as well as collegiate game play and NFL performance. Of the 126 possible correlations, 18, the most amongst any position, showed positive significance, while only one showed a significant negative relationship. Of the 18 relationships that showed positive significance, 17 came from collegiate game performance data while only one of a possible 45 Combine correlations came back positive.

Notable amongst the positive collegiate in-game significance is that neither years nor games played correlated positively with NFL success. Rather, the five collegiate categories that were predictive of NFL prosperity were college tackles, college sacks, college tackles for loss, and college passes defensed. This showed that simply playing a significant amount in college did not prepare a defensive tackle to be successful at the next level, as the most successful defensive tackles varied from two to four years of collegiate experience. Simply being on the field was not enough, though producing once

on it showed that college success brings defensive tackles to the NFL ready to make an impact. Also, it should be noted that NFL front offices became more adept, at least during this study's sample, at drafting defensive tackles in 2010, 75 percent of them ranking above the average for career tackles amongst the sample, the same amount doing so in sacks, while the 2007-2009 first-round defensive tackles didn't have any in the sample reach the sample average for sacks or tackles for loss, only two eclipsing it in tackles.

The transition from college to the NFL being as directly correlated as it is originates from job responsibilities staying uniform from college to the NFL. Scouts Inc., the preeminent recruiting service used for years by ESPN to supply high school football rankings that were widely accepted as fact by the general public, states the top two duties of defensive tackles that they look for when judging who will make a good player at the position are toughness and control of the line of scrimmage (Scouts Inc., 2009), which most often means beating the offensive lineman across from the prospect in question to gain penetration towards the ballcarrier or quarterback. Dennis Dillon (2004) describes it in the NFL as "lots of exertion, body trauma, and grunt work…plug the gaps on either side of the center." (Dillon, 2004, para. 5). With the duties being largely the same and schematic changes from college to the NFL, unlike other positions, being relatively minimal, seeing defensive tackles statistics from college translate to the NFL better than any other position in this study is not a surprise, since the successes at the position have been doing their job at a high level during college and require little adjustment in the professional game. Other positions, even the offensive linemen discussed above that have to stop the defensive tackles, have to learn new offenses and responsibilities. While there are subtleties in defensive tackle play, it, unlike any other position, stays the same from

college to the NFL, especially with teams drafting defensive tackles at the size needed to fit their base defense.

Defensive Ends. In a virtual tie with quarterbacks and defensive tackles in our sample for shortest career lifespan is the defensive end position, the 26 in our sample lasting 6.84 years in the NFL. The conclusion one can draw from this fact is that defensive ends, along with defensive tackles, are being hit by the largest athletes on the field, offensive linemen, on every snap, leading to more injuries, quicker body breakdown, and shorter careers. Quarterbacks, similarly, are standing relatively still behind their offensive line and had a median time of 2.7 seconds to get rid of the ball in the 2018 season (Passing, 2018) before being hit by an oncoming rusher that averages over 300 pounds in weight. The target of men that size, it's no surprise to see quarterbacks in this conversation with defensive ends and defensive tackles. Still, the 6.84 years defensive ends taken in the first round from 2007-2012 average is more than double the career expectancy of the normal NFL player, a number that dipped from 4.99 years to 2.66 in the middle of the 2010s (Arthur, 2016). Only two players in the sample at the time of data collection had a career last double figure seasons, those being Brian Orakpo, whose prolific production placed him third in the positional sample in NFL tackles, sixth in sacks, and fourth in passes defensed, and Chris Long, who led the sample in NFL games played. These numbers show why they made it 10-plus years, Orakpo retiring after the 2018 season, Long soldiering on. Three others concluded the 2018 season with nine years of service, including the sample leader in tackles and passes defensed, Jason Pierre-Paul. Drafting teams struggled to identify worthy first-round picks at this position early in the sample, only Long and Tyson Jackson of the first nine ends

chosen remaining in the NFL after six seasons. Gaines Adams, the second-highest draftee in the sample, and Vernon Gholston, the third-highest who logged lows in NFL games played, tackles, sacks, forced fumbles, and passes defensed, lasted just three seasons apiece and were amongst the aforementioned first nine. Since then, only three of the ensuing 17 first-round picks have not made it to the sample average of career length, teams showing a penchant for better decision-making at the position once following the ill-advised drafting of Aaron Maybin by the Buffalo Bills. Good arguments can be made that Long, Pierre-Paul, J.J. Watt, the sample leader in NFL sacks and fumble recoveries, Ryan Kerrigan, the sample leader in NFL forced fumbles and interceptions, and Cameron Jordan have been the most impactful NFL ends of this six-year period.

Pierre-Paul accomplished this despite playing just 13 games of NCAA Division I football, transferring to South Florida after two years at a junior college. Because of this, Pierre-Paul ranks last in collegiate games played, tackles, and sacks amongst the sample. Conversely, Kerrigan led his 25 counterparts in collegiate tackles, sacks, tackles for loss, and forced fumbles. Between the two were collegiate performances that impressed, like Lawrence Jackson of USC, who finished second in sacks and tackles for a loss before going on to have a pedestrian five-year pro career, and those that lacked, Adams averaging just two tackles per game and generating little in the way of impactful plays over four years with Clemson before just three seasons in the NFL with Tampa Bay.

At the Combine, two that have nearly identical statistical resumes in the NFL put up the low and high numbers in the 40-yard dash, Bruce Irvin running a 4.41 while Cameron Heyward ran a 4.95, the two drafted seven picks apart in 2011. Adams was .05 seconds from matching Irvin, his 4.46 contributing heavily to Tampa Bay selecting him

as highly as they did in 2007. Orakpo's athleticism was displayed in the vertical jump, leaping nearly 40 inches, 2.5 inches higher than any other defensive end in the sample, while Jackson and Derrick Harvey mustered only 28.5 inches at the bottom of the defensive end list. Gholston, whose Combine numbers were well-rounded in the three areas measured in this study, benched the desired weight 37 times, tops amongst prospects, while Jarvis Moss, who did not stand out in any area aside from height (6'6" the tallest of any draftee) in his drills or measurements, lifted the weight only 16 times.

126 correlations were examined between the Combine as well as collegiate game performance and their predictive validity towards NFL success. Pearson's correlation coefficient was the equation used to study the relationship, or lack thereof, between the Combine and NFL performance as well as collegiate game play and NFL performance. Of the 126 possible correlations, a meager five came back significant, three signifying a positive relationship and two signifying a negative relationship.

Most notably, the height and weight measures suggested a certain body frame of player is fit to be an NFL defensive end. Height, which negatively correlated to NFL games and years played, was dwarfed by weight, which positively correlated with NFL games played, leading to the conclusion that a tall, comparatively lanky defensive end would not last a significant amount of time in the NFL. Already being outweighed by an average of 36 pounds by offensive linemen (Blender, 2019), defensive ends that have a higher center of gravity and, while being presumably more athletic than a shorter and heavier defensive end, weigh less, run the risk of being severely outmuscled by the heavier linemen across from them. The 2015 weights of select NFL defensive lines saw Dallas have a combined weight of 243 pounds at their end positions, finishing 2015 in the

bottom 10 in the NFL in rushing yards allowed, also allowing the fifth-most rushing touchdowns and tying for the seventh-fewest sacks in the 32-team league. Also standing out as being exceptionally slight at the end position was Miami, allowing the fifth-most rushing yards that season while tying Dallas in quarterback sacks with 31 (“Ranking NFL”, 2015). While these examples are neither complete nor exhaustive, it gives a real-world snapshot into how lacking a stout figure at defensive end can hurt team success.

The sample showed the same, as players in the 26 defensive end group that weighed 290 pounds or more all played in the NFL at least eight years, more than a year above the sample’s career average. Edge rusher Elvis Dumervil, 6’0” in height, four inches shorter than the average defensive end in the sample, had over 60 sacks in his six first seasons with the Denver Broncos, and believes leverage is the reason height can work against a player coming off the edge of the defensive line against an offensive lineman:

> "The bigger the lineman, the better. I don't like going against the shorter guys, because I lose my leverage advantage. When I see the opponent's depth chart and the offensive tackle is 6'7", I get way more excited. I know at the end of the day, he prepares for those defenders who are 6'4" or 6'5". He's got to get out of his technique against me. He's accustomed to blocking taller players. When I get lower, the blocker gets out of his comfort zone. That's when they have issues." (Sobleski, 2016, para. 44).

The scientific concept of leverage, a higher center of gravity vs. a heavier object, and power, which is equal to force multiplied by velocity, help explain why a defensive end with a larger mass given a running start would prefer to be heavy rather than tall.

Linebackers. Aligned between the defensive line, tasked with stopping the run and rushing the passer around the line of scrimmage, and defensive backs, asked to stop the pass and guard eligible receivers, linebackers are required to do both, meaning the multi-faceted position requires a hybrid athlete. Because of this, perhaps more than any other position, the Combine demands strong performances from those that will play the middle level of the defense. That is evidenced in Vincent, Blissmer, and Hatfield's (2018) study of the Combine from 2005-2010 in which linebackers accounted for the most participants in the four drills the study measured, including 40-yard dash. In the study, the 40-yard dash was significantly correlated with three of the four on-field statistical categories measured. The concluding statement on defensive player success in the NFL from Vincent et al.'s (2018) work is that the benefit of the current testing battery for defensive player success was modest, but no player in this work's sample was willing to omit any of the measured drills aside from Jon Beason, who decided to forego the vertical jump, and Donta Hightower, who declined the bench press. Linebackers, however, were not alone in participating in every drill they could in this work's sample, with all but 10 of the drills skipped coming from the offensive "skill positions" of wide receiver, running back, and quarterback, which lends itself to differentiation between this study and Vincent et al.'s (2018), in addition to the fact that the only like-drill that was measured in the studies was the 40-yard dash.

The fastest in the 40-yard dash is the man that has gone on to the most dominating NFL career, outside linebacker Von Miller, who led the sample in sacks and forced fumbles. Miller's specialty is rushing the passer, and he was named the top player in that area across the NFL ahead of the 2018 season (Mcginest, 2018), speed to get around the

outside edge against offensive tackles being integral in that dominance. Slowest in the run at the Combine was Larry English, who led prospects in the sample in collegiate sacks, but finished last in tackles once in the NFL of those measured. Leaping higher than any other linebacker at the Combine was Keith Rivers, jumping 42 inches, though his sacks and forced fumbles would prove to be last amongst the sample once he got to the NFL, collecting just three and one, respectively. On the bench press, Nick Perry who weighed in as the heaviest linebacker at 271lbs., reached 35 reps, helping to counteract a career in which he had just under three tackles per game in college, Green Bay selecting him as the last linebacker in the sample in 2012. Interestingly, Clay Matthews and Luke Kuechly, two of the five most accomplished linebackers in the sample, found starkly different success in college, Matthews finishing last in tackles for loss and tackles despite playing the second most collegiate games in the sample, while Kuechly led the sample in collegiate tackles, fumbles recovered, interceptions, and passes defensed. Kuechly has been revered as the best linebacker in the league's best core (Davis, 2017), while Matthews had the longest active career at sample collection, trailing only Miller for NFL sacks amongst the 19 researched.

126 correlations were examined between the Combine as well as collegiate game performance and their predictive validity towards NFL success. Pearson's correlation coefficient was the equation used to study the relationship, or lack thereof, between the Combine and NFL performance as well as collegiate game play and NFL performance. Of the 126 possible correlations, only two returned a positive correlation, while 17, 14 of which were from collegiate in-game performance, returned a negative correlation. The only other negative correlations, weight at the combine forming a negative relationship

with tackles, interceptions, and passes defensed, shows the need for a linebacker to be agile in pass defense and to chase down ballcarriers, as heavier linebackers generally run slower than smaller linebackers.

The 14 negative correlations saw seven of the nine collegiate in-game statistics involved in negative relationships with six different NFL statistical categories measured in the sample. With this wide-sweeping data covering the large majority of both collegiate in-game performance and NFL success, the simple generalization that exceptional collegiate statistics do not lead to strong NFL statistics can be stated. Those that have had success in the sample can be split into two categories – pass rush specialists, like Clay Matthews and Von Miller, and middle linebackers who amass huge tackle numbers, like Luke Kuechly, Patrick Willis, and Lawrence Timmons. While some benefitted from blazing speed, such as Miller and Willis, all five mentioned benefitted from being lighter than the average linebacker in the study, which was 250 pounds, Timmons the lightest at 234. One National Football Conference, one of the two conference's in the NFL, general manager addressed the shift away from heavier linebackers that some teams have adopted: "Teams have gotten away from those big 'backers because there's more emphasis on speed and blitzing and coverage and not taking on blockers." (Sando, 2007, para. 7). While not all the linebackers listed above will pile up sacks because of their role, and not all possess top-level speed, being able to shift and not take on blockers is something that lends itself well to a man of less mass, as is seen in the NFL statistics in the sample. Additionally, "size is only a plus if you are athletic." (Sando, 2007, para. 7). Indeed, if 40-yard dash has an interrelationship with vertical jump (Mcgee & Burkett, 2003) that forms a cogent definition of athleticism, then

even if a player does not run a top time in the 40-yard dash, they can help even out the predictor of athleticism with a strong vertical leap. While Matthews, Timmons, and Kuechly did not run standout times, they outperformed the average in vertical leap, atoning for their relative sluggishness in the run. The need for more agile and athletic linebackers is only to grow as the NFL continues to go towards more pass-heavy offenses, with larger, less shifty, downhill runners at the linebacker outpaced by running backs, slot receivers, but of most concern, more athletic tight ends that they could previously cover effectively (Sando, 2007). The only thing, so it seems in the sample, that can stop these smaller, athletic, shifty linebackers, is injury, as Sean Weatherspoon, Keith Rivers, and Nick Perry put forth three of the four best vertical leaps amongst the 19 linebackers, and also had strong showings in the 40-yard dash, but averaged playing just 11 games of the 16 per year that are played in the NFL. The other top vertical leaps were the ultra-productive Willis, Kuechly, and Miller. This data shows NFL franchises that seeking out lighter linebackers whom show the speed, vertical jump, or a balanced combination of both, and also display a level of durability to avoid injury, will lead to a more successful linebacker than one that is simply productive in college.

Cornerbacks. Amongst the 20 cornerbacks in this study's sample, three of them were from non-Power 5 schools, tied with offensive linemen, which there were 16 more of in the positional sample, for most amongst positions. Leodis McKelvin, Dominique Rodgers-Cromartie, and Kyle Wilson made up the three, though of those, only one was still active at the time of data collection, while they led two different NFL statistical categories in the sample but finished last in four others. While the odds are stacked against these prospects in terms of exposure, level of competition, and resources (Eckard,

2018; Maisel, 2014), Abbasian, Sieben, and Gastauer (2016) find that players that attend a non-Power 5 school face no disadvantage or bias in being drafted. In his work revolving around high school football players and their "star" rating in recruiting, the authors explored if players rated with different "stars" by independent recruiting services had a better or worse likelihood of being drafted depending on which conference the school they attended resided within. Abbasian et al. (2016) discovered that not only does the particular school and conference not make a difference in being drafted, but it also showed no difference in how early or late a player was drafted. While the sheer number of draft picks from Power 5 schools was significantly higher, in some cases as many as 17 times the amount for a particular "star" rating, the study showed the non-Power 5 "starred" players in the draft from 2002-2013 did roughly as well, or better, in terms of being drafted as well as what position they were taken. While that study shows the lack of difference in conferences and schools for the aforementioned groups of prospects, this study shows both the success, and the failure, the non-Power 5 group can have once they arrive in the NFL, no position in this study speaking to this point quite like cornerback.

Whatever school the sample attended, the majority of those studied still have the chance to improve their statistics, as cornerback is the position that averaged the longest NFL lifespan in this study at nearly nine years. 14 of the cornerbacks' careers were still active, only two of the 20 total finishing their careers before they reached eight seasons.

Predicting their success, and longevity, off of college performance proved more difficult than most positions, as the man to lead the sample in three separate collegiate categories was one of the two men to last less than eight years in the NFL, Antoine Cason. Aqib Talib, Devin McCourty, Leon Hall, and Stephon Gilmore led the other

categories, while numbers say Morris Claiborne and Dre Kirkpatrick amassed the statistically least impressive collegiate careers.

At the Combine, Dominique Rodgers-Cromartie and LSU's Patrick Peterson ran the fastest 40-yard dashes while also grabbing two of the top three heights in the vertical jump. Mcgee and Burkett (2003) showed a strong correlation between the sprint drills and the vertical jump at the Combine as interrelated measurements of athleticism, so to see these numbers lead to Rodgers-Cromartie and Peterson having NFL success validates their research, as does their conclusion that cornerback, running back, and wide receiver are the three positions that Combine numbers tell the most about. Contrary to the vertical and sprint drills, cornerback is not a position known for upper-body strength, and Kyle Wilson, the player with the shortest NFL career, led the sample with 25 bench press repetitions, though Vontae Davis, whose NFL numbers are rated above average in the sample, also had 25.

126 correlations were examined between the Combine as well as collegiate game performance and their predictive validity towards NFL success. Pearson's correlation coefficient was the equation used to study the relationship, or lack thereof, between the Combine and NFL performance as well as collegiate game play and NFL performance. Of the 126 possible correlations, 10 returned a positive relationship, while six returned a negative relationship.

Most notably, of the 10 positive correlations, the similarities between offensive linemen and cornerbacks continued, as corners joined offensive linemen as the two positions to have definitive results showing Combine drills as a predictor of NFL success. The aforementioned offensive linemen saw 40-yard dash predict three NFL categories

positively, vertical jump positively correlating two, while cornerbacks raised those numbers, positively correlating 40-yard dash to NFL games played and vertical jump to six different NFL statistical categories, for seven total positive correlations.

Historically tasked with defending a large amount of deep passes (Mays, 2017), cornerbacks, who line up opposite wide receivers, have been given the job of winning one-on-one battles down the field on passes being dropped in from extreme vertical angles that require impressive leapers to break up the passes. With those responsibilities on this position, vertical jump correlating strongly to NFL success logically follows. Corners, though, to be able to make the play on the deep ball, which can be game-changing if successful, must be able to keep up with the receiver across from them in order to be in a position to break up the pass. In order to do this, they need a strong 40-yard dash time, as receivers and cornerbacks are the positions running in a straight line for an extended distance most often. To that point, the 40-yard dash correlating positively to NFL games played makes sense as well, as speed is difficult to gain if it is not already possessed by a player, while technique and fundamentals are more easily taught. Those with a strong 40-yard dash therefore are more likely to be given additional opportunities in the NFL because their quality is more rare to find, and these players are also more likely to succeed according to this study. Wide receiver versus cornerback evolution will be worth monitoring, as wide receivers, discussed above, are having success when bigger and stronger, and NFL teams are throwing the ball downfield less, opting for the more high percentage short passing game (Clark, 2018). To this point, cornerbacks that test well at the traditional responsibilities of their position are showing those areas still count, however, with the most successful receivers in the NFL being the largest, as shown

earlier in the sample, and the largest bodies on the football field residing closest to the line of scrimmage, NFL teams using more short passing routes may lead to leaping and straight-line speed becoming diminished qualities to possess at this position, while strength and agility could be more in-demand. This, though, is not the case in this work, as the traditional cornerback still has an important and prevalent place on the field.

Safeties. The last line of defense in football, safeties play furthest from the line of scrimmage and are cornerback's partners in the defensive secondary. Despite their importance on the field, not a single safety was amongst the 50 highest-paid players during the 2017 season (Gunter, 2017), the only other positions measured in this study having that dubious distinction being running back and tight end. Perhaps even more damning to safeties' worth were the findings of Kutz (2017) when examining the highest paid player at every NFL position, with the highest paid running back, Le'Veon Bell, and the highest paid tight end, Jason Witten, ranking above the league's highest-paid safeties at the strong and free positions, Barry Church and Devin McCourty, respectively. The only positions garnering lower numbers for their top-earners were Kyle Juszczyk at fullback, a specialty position that is no longer used in the NFL by many teams because of teams' propensity to pass, and Jared Veldheef at right guard, making slightly below McCourty but well clear of Juszczyk. With the average first-round pick getting a $16 million deal in 2018 (Belzer, 2018) and ensuing rounds getting at-most $5.3 million contracts (Gaines & Yukari, 2017), the financial importance of being a first-round selection speaks for itself. The league's teams are also speaking for themselves with their selections by position, as only 10 safeties were drafted from 2007-2012 in the first round, leaving many of the best at the position with contracts a fraction the size of others that

may have ranked lower at their respective position, but were playing a more desirable role in the eyes of drafting teams. The only position with fewer draftees, as discussed earlier, was tight ends, with four taken during this study's sample years. With the demands of the tight end position in flux and running backs used less in the modern passing league that the NFL currently employs, their wage scale and diminished value amongst positions seems to follow, though safeties seem undervalued considering they are under fire now more than ever with the prevalence of passing. Sports analytics giant FiveThirtyEight expands:

> "Teams are certainly passing more often than they used to. Leaguewide passing attempts per game have risen from 32.3 in 2008 to 34.2 last year, and the increase in volume has not been accompanied by a decrease in efficiency. Leaguewide yards per attempt have increased slightly from 6.9 to 7.0, and more touchdowns are being scored by passing relative to running than at any time in league history. Completion percentage is up from 61.0 percent to 62.1 percent, and the interception rate has fallen from 2.8 percent to 2.5 percent." (Hersmeyer, 2018, para. 4)

Further, one of the players in the safety sample was drafted as a cornerback, Malcolm Jenkins, before being moved to safety after he was drafted. Still, Jenkins is included in the safety position because he only played one season at cornerback in the NFL, and to normalize stats, as they skewed heavily towards that of a safety, with more tackles and sacks, as opposed to a cornerback, who would have more passes defensed. Devin McCourty, discussed in the cornerback sample, spent more time than Jenkins at

the cornerback position in the NFL before moving to safety, so his stats were kept with cornerbacks.

Of those remaining in the 10-safety group, Laron Landry ran the fastest 40-yard dash, a 4.35, while Eric Berry, just five hundredths of a second behind Landry, lept 43 inches, 5.5 higher than Landry's vertical jump that was good for second in the sample. Landry and Berry were thus the two highest-drafted safeties, though both had off-field issues derail their careers, Landry suspended indefinitely after eight NFL seasons for a violation of the NFL's performance-enhancing drug policy (Bieler, 2015), Berry sidelined by, amongst other less serious injuries, a bout with cancer, during his eight-year career that he hopes to continue (Teicher, 2018). The safeties drafted most recently in the sample, Harrison Smith and Mark Barron, ran 4.54 40-yard dashes, slowest in the group, while also logging two of the four shortest vertical leaps, but have had careers on-par with the rest of the sample. The only player whose career lasted fewer than eight seasons and is no longer active amongst the 10 studied was Kenny Phillips, whose vertical leap and 40-yard dash were lacking, while college stats were middling. Phillips lasted only six NFL seasons and was last in five of the seven statistical categories throughout the sample when in the NFL.

Collegiately, Michael Griffin paced the group in three of the eight statistical categories before posting average Combine numbers, while Reggie Nelson finished last in six of the eight, his numbers at the Combine resembling Griffin's closely. Barron led the sample in collegiate games played, though his production did not follow, generating substandard collegiate stats comparatively. Landry led the sample in sacks and passes defensed, Brandon Merriweather in tackles for a loss, and Berry in interceptions.

126 correlations were examined between the Combine as well as collegiate game performance and their predictive validity towards NFL success. Pearson's correlation coefficient was the equation used to study the relationship, or lack thereof, between the Combine and NFL performance as well as collegiate game play and NFL performance. Of the 126 possible correlations, four returned positive correlations, while seven returned negative correlations.

Most notably, the negative correlations rejected both height and weight at the Combine predicting NFL success, negatively correlating with both NFL games and years played, along with NFL passes defensed. This was the only position group in which both height and weight were negatively correlated with NFL success, wide receivers being positively correlated with both. Conversely with the other defensive secondary position, cornerback, which is striving to be larger to match the growing size of receivers (Birkett, 2017), the work done in this study shows safeties assuming the traditional role of cornerbacks – to be able to cover lots of ground and keep up with receivers on long passing plays, lending the position to a smaller player that can more easily change direction and adjust his mass who will need to play further from the line of scrimmage, as opposed to some safeties that have historically played more towards the defensive line and linebackers to act as a quasi-extra linebacker. The ability to do a wide variety of things for the modern safety has been a key, and while straight-line speed did not correlate to NFL success with safeties, their average vertical jump was the highest on the defensive side of the ball, only wide receivers offensively topping the 35.9 average inches leapt, showing that athleticism is high across the sample at the position. This is important because of jump balls downfield and the need to compete with the statistically

top athletes in the sample, wide receivers. The emphasis seems to be shifting from safeties being the more physical, hard-hitting of the two defensive secondary positions to cornerbacks being the more physical of the two, which follows the logic discussed in the wide receiver and cornerback portions of this results section stating that NFL teams are throwing more short passes, meaning those closer to the line of scrimmage need to be able to fight through bigger bodies to make plays. Should this trend continue, the results in this study show that safeties would turn back into the players they were designed to be at the outset of football's modern defensive schemes – the last line of defense that needs to be able to jump with receivers and stop the big passing play. Andy Benoit (2014) of Sports Illustrated discusses the multitude of responsibilities safeties may have:

> "Offensive coordinators have been widening the field and featuring athletic tight ends to create favorable mismatches against safeties. Often run at no-huddle tempo, spread sets typically require man-to-man coverage, which means defenses are demanding more out of their safeties. Cornerbacks and pass rushers remain essential. If your corners can't cover, you're hamstrung. If your pass rushers can't generate pressure, you're playing uphill. But if you don't have quality safeties, you're ultimately at a creative disadvantage." (Benoit, 2014, para. 4)

Defense is clearly a team effort, and one slight adjustment to Benoit's reasoning may be vital in the coming years, with cornerbacks still needing to cover, but also needing to be physical and attack the short passing game so safeties can patrol the back half of the defensive secondary. Safeties have often needed to be the do-it-all player on defense, but this study reveals that, while having a hard-hitting, fast, intelligent safety is ideal, if you can pick only the most important quality, finding the smaller, shiftier safety

and putting your larger, more physical players at the cornerback position sets a defense up for success. The size matchup will continue to intensify between wide receivers and cornerbacks, while safeties show the trend of turning into more of a pass support role that NFL defenses need in the modern day.

Power 5, Big East and Notre Dame v Non-Power 5. The goal of this portion of the author's work is to determine if attending a school inside the Power 5, plus the Big East Conference, and independent Notre Dame, is predictive of NFL success, or if attending a non-Power 5 school gives a prospect as much of a chance to have a prolific NFL career. The process for determining which schools, and therefore conferences, both inside and outside of the Power 5, were the strongest at the time of the sample was important to ensure schools were being ranked appropriately. To do this, the authors used the Sagarin Rankings, which represent the average schedule difficulty faced by each team in the games that they played to a given point in the season, the schedule difficulty of a game taking into account the rating of the opponent and the location of the game (Sagarin, 2019). The rankings are a combination of two computer-based point systems that are used to generate a final rating, and also log college football teams' record against top-10 and top-30 teams in the rankings. For nearly 50 years, these rankings have been a part of the mainstream consciousness and one of the most trusted ways to rank college football teams (Feng, 2019).

After the Sagarin Rankings were selected and reviewed for legitimacy, the question arose of what timeframe to measure. In order to ensure every prospect in the 2007-2012 sample was accounted for, the period of Sagarin Rankings collected was 2004-2011, the timeframe adjusted to cover prospects that entered the 2007 draft and would have played

collegiately during the 2004-2006 seasons. In collecting this data, the final rankings from each season were the ones acquired, logged, and averaged to determine where each school rated in relation to 238 others that the rankings covered over the eight-year period.

This method of data collection and determination of top teams was successful in when comparing it to a few other ways of doing so. The AP Poll, for decades the most trusted arbiter of college football's national champion (Tracy, 2016), had 190 of the 200 top-10 slots over a two-decade period occupied by Power 5 teams, equaling 95 percent of those spots available (Eckard, 2018). Over the eight years of collection for the Sagarin Rankings in this study, nine of the 10 teams in the top-10 came from Power 5 conferences, 90 percent, the exception being Boise State, who ranked ninth thanks to their status as one of the most improbable Cinderella stories in NCAA history (Fornelli, 2017). Further, 23 of the top 25 programs in the averaged Sagarin Ratings were from Power 5's, 92 percent, inching closer to Eckard's (2018) AP Poll number. Further reinforcement comes from the national championship game, which during the Sagarin Rankings collection timeframe pitted the nation's top two teams in the BCS rankings against each other to determine the best team in the country. Over the eight years of collection, nine programs played in the game - USC (2), Texas (2), Oklahoma (2), Florida (2), Ohio State (2), LSU (2), Alabama (2), Auburn (1), Oregon (1) – seven different ones winning it with only Alabama achieving multiple titles. The position of the programs appearing in the national championship game during that time in the Sagarin Rankings average of the 65 schools that data was collected on was first, second, third, fifth, sixth, seventh, eighth, 11th, and 13th. Oregon and Alabama were 8th and 13th, respectively, only halted from being higher in the rankings because of the first few years of the collection

period, both going through a coaching transition that would lead to the programs ascending in the latter half of the sample, Alabama on their way to a dynasty that has garnered five national championships in the last 10 years. Additionally, the schools outside Notre Dame, the Power 5, and the Big East had an average program rating over the eight years of 94.95 and an average rating amongst the 65 schools to have a player drafted of 52.16, only brought to that peak by Boise State and TCU who ranked in the top-20, the non-Power 5 teams filling nine of the bottom 10 positions in the 65-team rankings.

The program with the best score over the eight years measured was the PAC-12's University of Southern California, averaging 8.125. USC also accounted for half of the 20 prospects drafted during the 2007-2012 sample period, 10 ranking second amongst the 65 schools to have a player drafted during the six-year sample, Alabama garnering one more first-round draftee. Despite ranking fifth across conferences with only 20 prospects drafted during the sample period, the PAC-12 did place three schools in the top quarter of the 65 schools average scores from 2004-2011.

Placing second amongst the 65 programs was the BIG-12's University of Oklahoma, averaging 8.375. The Sooners tied for seventh amongst the measured institutions in prospects drafted during the sample with five, the BIG-12 tying the Southeastern Conference for the most individual programs to have a player drafted with 11. The BIG-12 finished behind only the SEC for most prospects drafted, sending 34 first-rounders to the NFL over the six years of the sample, the SEC accounting for more than a quarter of the 191 prospects in the sample, claiming 51 first-round draftees.

The top SEC school in the program rankings was LSU, finishing third overall amongst the 65 schools while averaging a score of 9.125. The Tigers finished second in the conference in first-round picks, the aforementioned Alabama leading the conference and the entire sample with 11, while the SEC placed five programs in the top 13 in average score over the eight years of Sagarin Ratings collection. The proliferation of SEC schools towards the top helps qualify the conference Sagarin Rankings, also kept by MIT-graduate and founder Jeff Sagarin in addition to his individual program rankings. Since the conclusion of the 2005 rankings, the SEC has finished in the top spot in the final poll eight of a possible 13 times. No other conference in the 15 years since this work began to average the Sagarin Rankings in 2004 has had any string of dominance even approaching the SEC's, the four other Power 5 conferences (ACC, BIG 12, BIG TEN, PAC-12) logging either one or two years at the top of the rankings to make up the seven years the SEC did not take the top spot.

In-depth calculations are not needed to determine whether attending a Power 5 school gives a prospect a higher chance of being selected in the first-round, as the most basic numbers act as overwhelming evidence on their own. Of the 191 players drafted in the first round from 2007-2012, 176 of them attended either independent Notre Dame, long considered one of the best programs in the country, an SEC, ACC, BIG TEN, BIG-12, PAC-12 or Big East program. The split amongst non-Notre Dame, Power 5, or Big East attendees broke down into three from the Mountain West Conference (MWC), three from the Mid-American Conference (MAC), three from the Western Athletic Conference (WAC), two from Conference-USA (C-USA), one from the Big Sky Conference, one from the Sun Belt Conference, one from the Ohio Valley Conference (OVC), and one

from the Colonial Athletic Conference (CAA). The sheer number, over 90 percent in the sample, of Power 5, Big East, and Notre Dame players selected in comparison to those outside of this group, seems to introduce bias and an unfair advantage to those in the majority, as suggested by Ivan Maisel (2014) regarding the vote of autonomy that passed for Power 5 schools referenced towards the end of the Methods section of this work. Abbasian et al. (2016), though, found that players that attend a non-Power 5 school face no disadvantage or bias in being drafted. Abbasian et al. (2016) discovered that not only does the particular school and conference not make a difference in being drafted, but it also showed no difference in how early or late a player was drafted. While the sheer number of draft picks from Power 5 schools was significantly higher, in some cases as many as 17 times so, the study showed the non-Power 5 players in the draft from 2002-2013 did roughly as well, or better, in terms of being drafted as well as what position they were taken in the draft. The distinction in Abbasian et al.'s (2016) study is an important one – non-Power 5 prospects are at a disadvantage in being drafted, but that is not the case when factoring in proportionality of those that are drafted for each group.

Rather than dissect whether attending a Power 5 increases the chances of being drafted in the first round, as in sheer number it clearly does, Research Question No. 2 focuses on if players that attend a Power 5 conference program have a better chance of NFL success. In order to do this, two separate data sets were examined and correlated with the average score of the university the sample attended. The first set measured university attended against collegiate game performance to determine whether those that attend non-Power 5 schools put up disproportionately larger statistics because of facing inferior competition. This would mean that, in future studies, weighting data would be

important in trying to correlate collegiate in-game performance to NFL success, leveling Power 5 stats to non-Power 5 stats to have them on an even plane. Robbins (2010) has tried to explore this previously with Combine data, using ratio-scaled data versus raw data, and while his study had interesting findings, that aspect of it failed. The second data set measured university attended against NFL statistics, both data sets broken down by position, to see if the university a prospect spent their collegiate career gave them a better chance of NFL success. Pearson's correlation coefficient was the equation used to study the relationship, or lack thereof, between university attended and collegiate in-game stats as well as NFL statistics. In data set one, 52 correlations were calculated, while data set two harbored 68 correlations.

In the first data set, only three correlations of the 52 calculated were significant, with no consistent patterns emerging across the 10 positions that the sample was broken into. As was the theme for this work, quarterback, running back, and wide receiver, the most studied positions in studies similar to this one, showed little return, with only wide receivers having a negative correlation between university attended and collegiate receiving yards. This means that the better school the receiver attended, the more difficult it was for him to amass that statistic. That though, was the only correlation of those three positions in data set one addressing Research Question No. 2, joining linebackers, those attending schools with better Sagarin scores logging fewer tackles for loss, and defensive ends, who forced fewer fumbles the higher their school rated in the Sagarin Rankings from 2004-2011. Most notable from the first data set is that there are no correlations signifying that statistics are more difficult to achieve at non-Power 5 schools, though the three significant correlations of 52, while they all show statistics are more difficult to

procure at schools rated better in the Sagarin Rankings, equal just over five percent of the correlations calculated, a very slim number.

In data set two, across 68 possible correlations, 11 were significant, four forming a positive relationship, while seven formed a negative relationship. Similar to data set one, zero correlations were significant in determining quarterback, running back, or wide receiver success. The correlations, rather, came from the defensive side of the ball, defensive ends seeing their NFL tackles for loss, sacks, and forced fumble statistics suffer as they moved closer to the top of the Sagarin Rankings, cornerbacks finding it difficult to amass NFL games and years played, passes defensed, and interceptions, while safeties proved to be the only position that registered correlations between university attended and NFL stats that indicated it was less difficult to amass stats in the NFL if the prospect attended a program ranked higher in the Sagarin Rankings. It should be pointed out, however, that the 10 safeties in the sample all attended Power 5 schools, many of them highly successful ones, all ranking in the top-half of the 65-team rankings, an average rank of 15.1 of the eight schools represented. This correlation, then, does not directly indicate that safeties at non-Power 5 schools will be devoid of success in the NFL, only that there is variance among Power 5 schools at the safety position.

CHAPTER 5

DISCUSSION

Discussion of Findings

This study of NFL first-round draft picks from 2007-2012 set out to discover which was more predictive of NFL success amongst the sample - the NFL Draft Combine, an allegedly key determinant of selection in the NFL draft, or collegiate in-game performance, the proving ground where prospects battle against each other for program, and individual, success and accolades. This study was the first to measure only first-round draftees as a population, doing so because of the enormous wage gap between first-round picks and the rest of the draft. The tremendous financial burden attached to being selected with one of the first 32 picks of each draft means the choices made by NFL teams with their first-round picks is of heightened importance, and determining how to select those players is of extreme significance. The study also explored if attending a larger, more successful, highly recognized program in one of the Power 5 conferences, the Big East included because of timeframe and Notre Dame included because of lineage and past triumphs, is more indicative of NFL success. In order to delve into these topics, the author used Pearson's correlation coefficient to study the relationship, or lack thereof, between the Combine and NFL performance, collegiate game play and NFL performance, and school of choice and NFL performance. In Research Question No. 1, the bench press, vertical jump, and 40-yard dash were the drills of measure at the Combine, while varying statistical categories dependent on position were chosen to quantify collegiate and NFL performance. In Research Question No. 2, in order to determine which individual schools, and therefore conferences, were the strongest during

the sample period, the authors turned to the widely-respected Sagarin Rankings which represent the average schedule difficulty faced by each team in the games that it's played to a given point in the season, the schedule difficulty of a game taking into account the rating of the opponent and the location of the game (Sagarin, 2019). These rankings have been a part of the mainstream consciousness for nearly 50 years and one of the most trusted ways to rank college football teams (Feng, 2019), the final rating of each year averaged from 2004-2011 for each of the 65 schools that had a player selected in the first-round of the NFL draft from 2007-2012 in order to come up with a ranking for each team.

Research Question No. 1. 940 total correlations were equated with Pearson's correlation coefficient, broken down into quarterback, running back, wide receiver, tight end, offensive line, defensive tackle, defensive end, linebacker, cornerback, and safety position groups. 126 correlations were calculated for each of the five defensive positions, while 84 were logged for quarterbacks, 66 for wide receivers, tight ends, and running backs, and 28 for offensive linemen. Of the 940 total, 95 showed significance, 53 with a positive relationship, 42 with a negative relationship. Quarterbacks showed a negative relationship between vertical jump and NFL career length as well as statistical output in key categories, suggesting that athleticism, based of Mcgee and Burkett's (2003) interrelational understanding of vertical leap, 40-yard dash, and athleticism, is not important in having NFL success. Running backs rejected the findings of Lyons et al. (2011) as well as Kuzmits and Adams (2008), as the backs in this sample did not show 40-yard dash times maintaining correlational significance to the position's NFL success, unlike the study done by the duo in 2008. The numbers did, however, support Robbins (2010) and Park (2016) in the finding that 40-yard dash time most influenced NFL draft

position amongst running backs, 15 of the 17 in the sample running faster than the 13-year average of the drill across the entire draft (Doll, 2013). Wide receiver results suggest that size and strength are especially important at the position, while the findings of Mulholland and Jensen (2016), which supported speed as mildly predictive of NFL success across their longitudinal study of receivers, were rejected. Tight ends, despite having a representative sample of the population, over 11 percent included in this study, needs further investigation, as only four were selected from 2007-2012, in-game collegiate performance correlating negatively with NFL success for the smallest positional group. Offensive linemen, despite having the least data to analyze, had the highest positional percentage of correlations across the study, showing the importance of linemen needing to be modern day athletes amongst the all-positive correlations gleaned from the group. Defensive tackle had the most positive correlations of the 10 different positions, showing a direct relationship with prolific collegiate performance and NFL success stemming from the job responsibilities of the position being most similar from college to the NFL across all positions measured. Amongst defensive positions, defensive ends shed the most light on how body frame can affect NFL success, showing that a heavier end was more likely to be on the path to a long and stable NFL career than one that is a more tall, slim, and presumably athletic defensive end because of the scientific concepts of power, leverage, and gravity center. The linebacker sample rejected the premise that collegiate in-game performance leads to NFL success for the position, while it showed a need for a lighter, more agile, athletic linebacker who can shift quickly but also be durable and reliable. Cornerbacks, given positional responsibility, had the most expected of results, with the Combine 40-yard dash and vertical jump correlating

positively to NFL success, though this is a position that is going through a fundamental shift with their counterpart in the secondary, that being safeties, whose NFL success correlated negatively with height and weight. Those two positions, in an NFL that is relying much more on the pass (Hersmeyer, 2018), are taking on different roles, teams looking to add size at the cornerback position to help defend an increasing amount of short passes (Clark, 2018), while successful safeties are growing lighter and smaller to be able to cover much of the defensive secondary that is becoming theirs more and more with every passing season, and every opponent's passing attempt.

With the varying positional results, this study rejects all generalizations about Combine drills being predictive of NFL success regardless of position. With the in-depth positional look at all 10 groups inspected in this work, it should be overwhelmingly apparent that each position on an NFL team requires different things and must be evaluated independently of one another. As an example, this work supports the athletically inclined drills studied by the author, those being 40-yard dash and vertical jump, as predictive of NFL success for cornerbacks and offensive linemen, though the work done by Lyons et al. (2011), Kuzmits and Adams (2008), and Mulholland and Jensen (2014, 2016) that suggested varying skills positions, those being running backs, wide receivers, and tight ends, will have success based off a strong 40-yard dash at the Combine, are rejected. One aspect of Lyons et al.'s (2011) work not discussed to this point is supported by this study, as the authors of that study did a post-hoc analysis of the bench press, finding that it does not predict NFL success. The author agrees with this conclusion, as bench press correlated just once throughout the calculation of the collected secondary data, that a negative correlation to NFL success at the cornerback position.

Overall, 19 of the 95 total correlations that showed significance in this study came from the Combine drills, 17 emerged from the height and weight measurements, and 59 came from collegiate in-game performance. Of the 95 correlations, 70 were from the defensive side of the ball, nearly triple the amount of correlations sprouting from the offensive positions, with only 25 found amongst quarterbacks, running backs, wide receivers, tight ends, and offensive linemen, nine coming from the latter. These numbers help this study support Lyons et al.'s (2011) conclusion that "samples", in this case collegiate in-game performance, are more predictive than "signs", those being Combine drills. Height and weight accounting for the other 17 correlations was an unexpected event, but can help bolster, and extend, Teramoto, Cross, and Willick's (2016) study, as well as Mcgee and Burkett (2003) work, Teramoto claiming height was most predictive of NFL success for wide receivers, Mcgee and Burkett (2003) finding height and weight were predictive of a receiver being drafted. This study concurs with Teramoto et al. (2013), adding that weight is right alongside height, if not exceeding it, in predictive validity at the receiver position, while this work furthers the assertion from Mcgee and Burkett (2003) about draft position and adds that NFL success at the receiver position is predicted by height and weight as well. While this study did not scrutinize the relationship between Combine drills and being drafted, a tertiary finding of the study supports that 40-yard dash can predict a positive result in the NFL draft, with 15 of the 17 running backs in this study that were selected in the first round from 2007-2012 running better than the average 40-yard dash time at running back already in the NFL from 2000-2012 of 4.49 (Doll, 2013). This reinforces the data put forth by Robbins (2010), Park (2016) and Mcgee and

Burkett's (2003) studies that focused more extensively on the predictive validity of draft success coming from Combine performance.

Research Question No. 1's ultimate goal was to determine which was a better predictor of NFL success, and as mentioned above, collegiate in-game performance ultimately proved to be the more predictive of the two. While that fact cannot be disputed, just how predictive either actually is, at least measured with the drill and statistical testing battery used in this study, is highly questionable. With 940 correlations possible and only 95 correlating significantly, 10.1 percent in total, that including height and weight correlations that were not thought to be a focal point of either data set focused on in this study, the temptation is to suggest a drastic overhaul of scouting practices, determinants of drafting decisions amongst first-round selections, and a new Combine testing battery, as many that have done studies similar to this have (Kuzmits & Adams, 2008; Robbins, 2010; Vincent et al., 2018). This is especially the case considering the most optimistic attitude of any study contained within this work was Vincent et al. (2018) who claimed the Combine as a "modest" predictor of NFL success, this study only beginning to approach that level of buoyancy about the Combine's drill effectiveness. But rather than suggest a new testing battery or dismantle the event as a sham, this study does not overreact to the lack of predictive validity amongst the Combine drills, the three most visible and recognized amongst those performed by prospects looked at in this work, contrastingly encouraging fans, academicians, and media to view the Combine as a media event created by the National Football League to keep its brand relevant in a time which the organization may otherwise fade from the collective sports consciousness. With the Super Bowl having concluded the league's schedule three weeks earlier, Major

League Baseball starting its spring training, the National Basketball Association and National Hockey League pushing towards their postseasons, and college basketball approaching the conclusion of its regular season and beginning of its trademark event, "March Madness", the NFL could otherwise be forgotten about. Instead, wisely placed at the end of February in the lead up to late April's NFL Draft, the televised workouts allow a look at players that fans may know from their college careers, speculation to build around the work done by prospects at the Combine and their ensuing Pro Days a few weeks later, and mock drafts from experts to prognosticate the results of the late spring event. Rather than a failure of predicting NFL success, the Combine is a booming success of brand and media strategy by the most profitable sports league in the United States. Monitoring if this strategy continues to be strong going forward with the emergence of the Alliance of American Football (AAF) in 2019, which begins play right after the NFL season concludes, and the Xtreme Football League (XFL), yet to release a schedule at the time of this work but slated for a 2020 kickoff, will be intriguing, with a portion of the Combine moved to network television for the first time in 2019 (Hofheimer, 2019).

While this study's work on the Combine resembled Kuzmits and Adams (2008) findings for predictive validity, both studies gaining significance on roughly 10 percent of the possible correlations calculated, there were three or more significant positive correlations between in-game collegiate performance and NFL success for four of the five positions on the defensive side of the ball, defensive tackles posting 11, linebackers not far behind with 8. In the secondary, there were seven positive correlations, therefore this study can partially support Mcgee and Burkett's (2003) work, though the findings were not consistent enough to fully do so. Rather, safeties showed more conclusive

measurements between height and weight to NFL success, cornerbacks revealing rather definitive evidence of athletic drills predicting their NFL outcome. Considering the drastic difference in the number of positively correlated defensive statistics predicting NFL success to the miniscule amount of statistics doing so for the skill positions on the offensive side of the ball, this study shows the traditional stats kept on defenders still serve as a good measuring stick in the college game and can be trusted for predicting NFL success. Contrarily, with just three positive correlations for the skill position players from collegiate in-game performance, the traditional statistics examined in this study cannot be trusted, and in evaluation of quarterbacks, running backs, wide receivers, and tight ends, must be abandoned. Previous studies have not been nearly as transparent with their statistical testing battery as the current work, and in so doing, this study hopes to allow academicians and talent evaluators the understanding of what works and what does not in judging predictive validity in statistics, and will hopefully lead others to be as transparent with their statistics, many previously not doing so likely hurting the past advancement of NFL statistic development. Now that some of that development has happened in the modern day sabermetric statistic era that sports is currently in, plus the discrediting of traditional statistics has occurred in this study amongst the oft-evaluted skill position players, there is ample opportunity to study alternative, in-depth, and exploratory statistics. Some options are put forth in the Limitations and Directions for Future Research portion of this work.

Table 5.

Research Question No. 1 Significant P-Values – Offensive Positions

Variable	NFL Years Played	NFL Games Played	NFL Pass Yards	NFL Rush Yards	NFL Total TD	NFL Recep-tions	NFL Receiving Yards	NFL Yards Per Catch	NFL Receiving TD	NFL Pro Bowls
40-Yard Dash	-.466** (OL)	-.537** (OL)								-.523** (OL)
Vertical Jump	-.717** (QB)	-.642** (QB) .334* (OL)	-.621** (QB)		-.545* (QB)					.385* (OL)
Bench										
Height @ Combine								.674** (WR)		
Weight @ Combine							.460* (WR)	.463* (WR)	.478* (WR)	
College Years Played	.398* (OL)	.427** (OL)		-.664** (QB)						
College Games Played	.434** (OL)	-.960* (TE) .476** (OL)				-.968* (TE)	-.963* (TE)		-.995** (TE)	
College Yards Per Attempt				.489* (QB)						
College Rush Yards							.488* (RB)			
College Receptions	-.952* (TE)									

Table 6.

Research Question No. 1 Significant P-Values – Defensive Positions

Variable	NFL Years Played	NFL Games Played	NFL Tackles	NFL Tackles For Loss	NFL Sacks	NFL Fumbles Forced	NFL Fumbles Recovered	NFL Intercep-tions	NFL Passes Defensed
40-Yard Dash		-.553* (CB)					-.613** (DT)	-.512** (DE)	
Vertical Jump	.615** (CB)	.501* (CB)	.547* (CB)	.473* (CB)				.614** (CB)	.632** (CB)
Bench				-.450* (CB)					
Height @ Combine	-.413* (DE) -.704* (S)	-.423* (DE) -.636* (S)				-.748* (S)			-.644* (S)
Weight @ Combine	-.785** (S)	.760** (DE) -.708* (S)	-.650** (LB)				-.500* (DT)	-.669** (LB)	-.633** (LB)
College Years Played			-.493* (LB)		.636* (S)			-.550* (LB)	
College Games Played			-.541* (LB)	.648* (S)	.690* (S)			-.466* (LB)	
College Tackles	-.477* (LB)		.441* (DT)		-.525* (LB)	.609** (CB)			
College Tackles For Loss		.483* (DT)		.520* (DT)	.440* (DT)	.548* (CB)			.454* (DT) -.668* (S)
College Sacks			-.539* (LB)	.476* (DT)	.444* (DT) .477* (LB) .705* (S)	.458* (LB)		-.585** (LB)	.450* (DT) -.495** (LB)
College Fumbles Forced	.571** (DT) -.510* (CB)	.573** (DT) -.544* (CB)	.443* (DT) -.503* (LB)	-.469* (CB)		.493* (DE)		-.518* (LB) -.531* (CB)	.439* (DT) -.466* (CB)
College Fumbles Recovered									.447* (CB)

College Interceptions	-.566* (LB)				-.474* (LB)		
College Passes Defensed	.443* (DT) -.465* (LB)	.471* (DT)	.547* (DT)	.481* (DT)			.654** (DT)

Research Question No. 2. 120 total correlations were calculated in two different data sets. In the first data set, the goal was to find a relationship, or lack there of, between amassing large collegiate stats and the program a prospect attended in college. This meant that the Sagarin Rating average that was calculated from 2004-2011 by the author was examined against the in-game collegiate statistics the prospect accrued to determine if statistics amongst first-round picks got smaller as the prospects in question attended better schools. That, though, was not the case. Once again broken into positional groups, of the 52 possible correlations within the calculation of data set one, only three were significant, and while they all indicated that statistics were more difficult to stockpile at schools rated better by the Sagarin Ranking, the significance was isolated and did not withstand scrutiny, showing that the top players are just as likely to build statistics at a Power 5 school as opposed to a non-Power 5 school. In the larger picture, this shows that it is not appropriate to normalize or manipulate data, but rather it should be taken at face value because level of competition did not have an impact on the statistics amassed by first-round picks. Robbins (2010) used ratio-scaled and allometric tactics to attempt to normalize Combine data to produce a better predictor of draft success, and that element of Robbins study failed. With the findings of collegiate statistics not being affected by school, this study shows similar methods would not be necessary with collegiate in-game performance data.

The second data set cross-examined the same Sagarin Ranking calculated in the first data set of Research Question No. 2 with NFL in-game statistics to determine if attending a school with a better ranking, therefore facing better competition, would lead to greater NFL success. This time, the results were mixed. Of the 11 correlations, seven, at the defensive end and cornerback positions, showed NFL statistics actually suffered as the Sagarin Ranking vaulted towards to the top of the 65-team sample. The other four correlations were at the safety position, and showing that the better competition a prospect consistently faced the more ready he was for the NFL, the better Sagarin Ranking led to more NFL games played, tackles, forced fumbles, and fumbles recovered for the players. It is worth noting that none of the safeties attended schools outside of the Power 5, so while a relationship cannot be directly drawn from the sample to non-Power 5 prospects, it can be inferred that if the Sagarin Ranking continued to drop, the safety would be less likely to succeed in the NFL. Quite simply, for defensive ends and cornerbacks, the worse the school's collegiate competition the better the player ended up being in the NFL, and with safety population, the better program the player attended, the better he turned out in the NFL. While the result is split, and seemingly leaves some room for doubt, in reality it does the opposite because of the variance of positional results. This casts more certainty on Abbasian et al.'s (2016) findings that non-Power 5 schools faced no disadvantage or bias in being drafted, while the position in which they were taken during their sample also was not affected by the conference their school resided within. This study comes to the same conclusion, with the exception of the safety position, and adds that NFL success can be found in a variety of different places throughout college football. The Pearson correlation coefficient shows that through this work, and the

individual players do as well, with Chris Johnson, one of only seven athletes in the history of the NFL to rush for over 2,000 yards in a season, Joe Flacco, who has thrown for the 22nd-most career yards in NFL history, and six-time Pro Bowler Joe Staley headlining the 15 non-Power 5 players in the sample. The three correlations in data set one indicate that players from all different walks of college football can assemble noteworthy statistics, and while it may be tempting to forego positional analysis because of that, data set two shows that, much like Research Question No. 1, the truly definitive significance in this study lies on the defensive side of the ball, showing that positional specification is needed in Power 5 v non-Power 5 studies as well. Within that positional analysis, no weighting of statistics is needed because of the findings within data set one discussed above, though skill position results once again speak loudly by providing no significance at all, a need for alternative examination of quarterbacks, running backs, wide receivers, and tight ends necessary to verify the findings in this study.

Table 7.

Research Question No. 2 Significant P-Values – Power 5 v. Non-Power 5

Variable	Non-Power 5----------	----------University Attended----------	----------Power 5
College Receiving Yards		.445* (WR)	
College Tackles For Loss		.630** (LB)	
College Fumbles Forced		.499** (DE)	
NFL Games Played	.554* (CB)		-.675* (S)
NFL Years Played	.464* (CB)		
NFL Tackles			-.836** (S)
NFL Tackles For Loss		.446* (DE)	
NFL Sacks		.511** (DE)	
NFL Fumbles Forced		.563** (DE)	-.751* (S)
NFL Fumbles Recovered			-.688* (S)
NFL Intercep-tions	.456* (CB)		
NFL Passes Defensed	.575** (CB)		

Limitations, Directions for Future Research

This study is not without issue, and there is also room for further advancement following the conclusion of it. In measuring only first-round picks in six years of a total 36 of the Draft process having a Combine, this study evaluates a representative sample of first-round picks, but not NFL players as a whole, with the league containing nearly 1,700 players (Wilco, 2018), only 85 of which were still active from this study in the league's nearly 1,700. Other studies similar to this work (Kuzmits & Adams, 2008; Lyons et al., 2011; Mcgee & Burkett, 2003; Mulholland & Jensen, 2016; Park, 2016 Robbins, 2010; Vincent et al., 2018) have examined full draft classes or positions over multiple years to gain a larger number of subjects, which leads to avoiding issues like this study had with tight end, in which only four were selected in the first-round in the six-year sample. There is value in sampling the way the aforementioned studies did, though for this study it would have fundamentally changed the basis of it to do so. First-round picks were chosen because of the great financial investment, at least triple the amount of the rest of draft picks (Belzer, 2018; Gaines & Yukari, 2017) depending on round, first-round selections have on their teams. There is not as much risk in mistaking a player in the final six rounds for a future star as there is in the first round, hence the sample selection. While the sample could've been extended to cover more years to gather more subjects, reliable collegiate data began to become an issue when the author looked into including years back to 2002. With interrater reliability, this study has six years of unquestionable data, but venturing back to the mid- and early-2000s found different sources stating different statistics for the same player. This was not the case for the sample in this work, and to put reliable data at risk by contaminating it with factually

questionable statistics was a risk deemed fruitless. Should the choice have been made to use more recent years in which data is reliable and complete, much like the 2007-2012 sample was, the study would run into problems with careers that would be too young to quantify. Some players peak later in their careers, and should players from the 2013 NFL Draft and on have been included, there would not have been enough data to fulfill one of this study's goals – to show the career-long impact of a player in the NFL. Lyons et al. (2011) circumvented this road block by studying only four years of a player's NFL career, but with the average NFL career down to 2.66 years (Arthur, 2016) and the range of the shortest careers to longest careers as wide as ever, not taking the entire career of a player into account leaves incomplete areas and room for oversight. While this study eliminates six rounds per year, roughly 200 collegiate prospects per season, from inclusion. While the author believes limiting this study to first-round picks overcomes some of the root problem in evaluation of prospects by classifying first-round picks as their own subset of the Draft and evaluating them as the gold standard for this type of study, there is still some degree of discomfort with a sample size that it was not possible to expand without putting the data in peril.

In answering Research Question No. 2, struggles came about when attempting to measure the current Power 5 system against the previous Bowl Championship Series (BCS) system that was in place at the time of the sample. With conference reformation taking place through the latter half of the sample and on through the creation of the College Football Playoff that replaced the BCS in 2014 (Rittenberg, 2014), 19 teams moved conferences of the 65 that selected a player in the 2007-2012 NFL Drafts. Now that the dust has settled, to have a strong grasp on the current conference layout and if it

has changed competition, diminished or elevated certain conferences, or simply been a change in affiliation only with no ancillary effects, an update to Research Question No. 2 needs to be done with a newer sample and the College Football Playoff format, rather than having to retroactively use the Big East as a power conference, as it no longer sponsors football.

In some cases, prospects did not participate in drills at the Combine, leading the author to have to turn to the athlete's Pro Day to collect the data for a given drill. This was the case for 33 of the 191 prospects studied in this work, most often factoring into the Vertical Jump measurement. There were also uncollectable data points, 47 of the 573 in the sample, as a select few prospects did not participate in a drill at either their Combine workout or their Pro Day. These data points were removed from the study and assigned no value since they did not exist.

Injuries and off-field events, as is the case in sport and life, can change the trajectory of careers. In this study's sample, as pointed out in the Results section, linebackers Keith Rivers, Nick Perry, and Sean Weatherspoon saw varying injuries affect their careers varying amounts, but certainly enough to affect their statistics measured in the secondary data. Laron Landry had his career halted early because of multiple suspensions (Bieler, 2015), quelling a career that would've otherwise been near the top of the safety sample, while Justin Blackmon received an indefinite suspension from the team that drafted him, the Jacksonville Jaguars for repeated drunken driving arrests (Breech, 2015). Worst of all, Gaines Adams died of cardiac arrest at the age of 26 just three years after being the highest-selected defensive end in the sample (Autopsy: Adams, 2010). Some of these unforeseen circumstances may emerge in interviews with

those that suffer from addiction or erratic behavior, and some medical tests may be able to give an in-depth look at injury susceptibility, but to a certain point, especially in the case of Adams, there is an element in studies such as this that will not show up in statistics and can not be controlled for. One possible place to start would be using per-game measures instead of total statistics, showing a player's ability when on the field, though this would lead to a lack of understanding about the statistics he is truly capable of putting up should he not being able to stay active for the bevvy of issues that can arise.

In the future, expanding the Combine testing battery that is examined could attempt to gain a more holistic idea of what leads to NFL success, rather than using just 40-yard dash, vertical jump, and bench press. The three-cone drill and shuttle run, designed to measure agility, and the broad jump, a test of an athlete's explosion and lower-body strength (Workouts, 2019) were the three quantifiable physical drills omitted from this study, but considering the findings of it, to see if any of the three predict NFL success better than the three correlated in this study would be a worthwhile endeavor.

Similarly with the statistics that were gathered, using a different set of more in-depth statistics may find different results than what this study did. Using the most basic of measurables as the author did gives a general understanding of how a player impacted his team and the game, but Pro Football Focus, NFL Next Gen Stats, StatsLab, amongst others, are generating statistics far more advanced than the traditional statistical battery. Defense-Adjusted Value Over Average, Catch Rate, Air Yards Per Target, and Sacks Per Knockdown are a few of these (Barnwell, 2017), though the author did not have access to these statistics and therefore were beyond the scope of this study.

In measuring only Secondary Data, an outsider's point of view is taken since no one directly involved with the NFL and its scouting process is interviewed or surveyed in this work. One area to further this research in the future would be to include a survey, focus group, or interview with scouts from NFL teams across the league to share what they think is most important when evaluating a player. This could lend an extra layer of expertise to studies of this kind and bring a mixed-method approach that could be viewed as more reliable than only incorporating statistical analysis of Combine measures v. collegiate in-game performance.

CHAPTER 6

CONCLUSION

In this study, in-game collegiate performance has shown to be a better predictor of NFL success than NFL Draft Combine drill performance, though across all positions included in this study, generalizing that statement proves suspect at best. Whether discussing collegiate in-game or Combine performance as predictors of NFL success amongst the highly coveted first-round draft picks discussed in this study, the overarching takeaway from this work is that intricacies are present with every position, unique skill sets required to have success at each, just as unique evaluation processes are required in order to confidently determine top talent. This work suggests a new in-game statistical measuring stick for quarterbacks, running backs, wide receivers, and tight ends during the evaluation stages in order to create a confident assessment of what a player can achieve at their position. While in-game collegiate statistics can not be used at the skill positions on offense, this work shows significant statistical predictive validity on the defensive side of the ball via statistics amassed by four of the five defensive positions measured, most substantially defensive tackle and linebacker. In addition, this study suggests that cornerbacks and offensive linemen can be accurately rated via the athletically rooted 40-yard dash and vertical jump Combine drills. Outside of those positional findings, bench press is rejected across all positions as predictive of NFL success, and other drills are suggested for inclusion in future studies to further this work's assertion that the NFL Combine is a brand and media positioning event, rather than one designed to uniformly determine those that will have success in the NFL. Additionally, the findings of Research Question No. 2 show that normalization or weighting of data is

not required when analyzing Power 5 prospects against non-Power 5 prospects. Further, the study showed no definitive advantage to attending a Power 5 school, outside of the safety position, in terms of draft status or future NFL success, with players showing the ability to succeed from all walks of college football.

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