AGE VS. WEAR AND TEAR:
THE DETERIORATION OF AN NFL RUNNING BACK

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ABSTRACT:

This study examines the deterioration of an NFL running back. The two factors examined in this study are the age and wear and tear of a running back. Age is examined by comparing the affect of one additional year of age on running back production, during their ages of decline. Wear and tear is examined by comparing the affect that an additional season's workload has on production. Results show a non-linear relationship between both age and career workload with production. Running back production is shown to gradually decline at higher ages as well as higher career workload levels. There is also evidence to dismiss the possibility of an age threshold for running back production. Interestingly, however, there appears to be a possible threshold in career workload and its affect on production.

INTRODUCTION

The National Football League (NFL) is a multi-million dollar industry within the continental US that garners the attention of millions worldwide. In 2009 the NFL was once again the best attended domestic sports league in the world by far, with an average attendance of 67,509 fans per game according to sportingintelligence.com. The current NFL consists of thirty-two teams from across the US split into two even conferences known as the American Football Conference (AFC) and National Football Conference (NFC). The champions from each conference play each other in the NFL Championship Game, more commonly referred to as the Super Bowl. The Super Bowl is annually the most watched American television program of the year. It is this popularity that has allowed professional football to become a mainstay in American culture.

The game of football is played with eleven players from one team on offense, versus eleven players from the other team on defense. Each player has a different position with its own different and specialized role. Of these positions, the one that this study will focus on is the running back position. The running back position is one of the more utilized positions on the football field. An integral part in a team's offense, the running back is utilized in many different fashions. The three most common uses are receiving, rushing, and blocking. An effective running bend must possess a superior blend of speed, power, and agility. This superior blend of athleticism is the key competent that determines in a running back's success.

The nature of the position however requires the running back to take on a very physical role within the offense, often resulting in increased wear and tear. NFL running

backs take a physical beating week in and week out. The average NFL running back is roughly 5'10'' 215lbs., the opposing players they are matched up against often weigh in excess of 300 lbs. This among other things contributes to running backs being the offensive skill position[1] that begins to show signs of decreased production at the earliest age[2].

In recent history NFL teams have become more inclined to part ways with aging running backs. Regardless of past accolades and success, the leash on an aging running back is becoming shorter and shorter, while players at other positions continue to play well into their thirties. Concerning the position of running back, the prevailing wisdom is that they "hit the wall" at age 30. This has led teams into a continual search for new and young talent at the running back position in order to hedge their team against a decline in production from their aging running backs.

It is this ever growing NFL trend of replacing aging running backs that sparked the study of a running back's deterioration over his career. This study will analyze the careers of running back's that have entered the NFL from 1970-2008. The study will compare the effect of age and career workload entering a season, on a running back's production levels throughout his career. This will hopefully indicate if there is a threshold for change in running back production, as well as provide more information about running back production trends.

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[1] Skill position refers to the three positions on a team's offense—quarterback, running back, and wide receiver—that accumulate statistics which can be used to determine a player's value.

[2] According to a study conducted by Doug Drinen titled "How Important is Age?" the age of statistical decline means 28 for a running back, 30 for a receiver, and 32 for a quarterback
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LITERATURE REVIEW

The body of literature that deals with running back deterioration in the NFL can be considered limited at best. While some research has been done in the area, each study has found difficulty accounting for the various factors of a running back's decline. As a result, most studies have been rather specialized, including only a small sample of running backs. As a whole, these studies performed on running backs have been relatively informal.

Michael Fabiano (2009) of nfl.com wrote a piece in which he suggested that running backs hit a wall in terms of production once they reach their 30th birthday. To test whether a running back's 30th birthday is an automatic statistical death sentence, Fabiano conducted a study on the 10 running backs that have averaged the most carries from their rookie season until their 29th birthday. Fabiano observed the difference in statistical production of each running back between the season of their 29th and 30th birthday. His examination concluded that the average decrease in fantasy points[3] for the running backs in the sample from age 29 to 30 was *41* fantasy points.

One of the problems with Fabiano's study is the size of the sample used. In looking at a select subset of running backs, the results are less generalized to running backs as a whole. The study eliminated backs that didn't see a lot of carries in their first few seasons. As a result of the smaller career workload, Fabiano suggests certain runners were able to find a higher level of success beyond the age of 30.

[3] Fantasy points are a univariate measure of a running back's production. For every ten yards a running back gains, rushing or receiving, they gain one fantasy point. Each touchdown scored is worth an additional six fantasy points.

In addition to a limited sample, Fabiano also failed to account for any decrease in production prior to the age 30 season. Doug Drinen's article *How Important is Age?* examines the aging process and its effects on player production in terms of fantasy points. Drinen conducted a study of running back production from one age to the next using running backs from 1998 and on that accumulate at least 50 fantasy points in one of the two seasons. Using this sample, Drinen calculated the percentage of running backs that were better at age N than age N+1. The results of Drinen's study tend to suggest that running back's peak at around age 27-28. In response to Fabiano's study, running backs actually begin showing signs of decline well before turning 30.

When Drinen sorted his data into larger groupings the age of decline became even more evident. 55% of running backs under the age of 27 improved in the following season. 38% of running backs over the age of 27 improved the following season. This study suggests that running backs begin to decline once they turn 28. If Drinen's findings are correct, then Fabiano's study only indicates that running backs will continue to show signs of decline at age 30. Any decline in production previous to running back's turning 30 serves to disprove the notion of a "wall" in running back production. Drinen's study brings to question the broad claims made by Fabiano's results.

Fabiano however is not the only one convinced that a running back faces a significant decline in production at the age of 30. Tristan H. Cockcroft (2008) claims that he's rarely seen a theory in sports with stronger statistical evidence than a running back facing near certain statistical decline in production when he reaches the age of 30. Looking at the top 50 running backs in NFL history, Cockcroft hoped to prove that 30-year-old running backs indeed have it rougher than younger players.

Cockcroft found that running backs lost 20.4 percent of their touchdown production[4] from their age-29 to age-30 seasons. In a matter of three years, from their age-29 through age-32 seasons, running backs lost 39.5 percent of their touchdown production. In addition, these same 50 running backs lost at least 10 percent of their scrimmage-yard production[5] each year beginning with their age-30 season. These results support the notion of statistical decline at age 30.

There are a few problems within Cockcroft's study that leads to hesitation in the acceptance of his results. First off, Cockcroft groups together running back's that are 28 and 29 into one group called age28-29. This is a problem because Drinen's study showed that running backs begin to decline at age 28. By grouping together 28 and 29 year old running backs, the statistical production is thus higher than it would be for the age 29 season itself. This leads to a larger drop-off in production between the age28-29 variable and age30 variable, which accounts for only 30 year-old running backs. In addition, Cockcroft's study also indicates significant drop-off in production between running backs age 26-27 and running backs age 28-29 -- 9% decrease in scrimmage yards, 20% decrease in 1000yd rushers[6].

Cockcroft, along with Fabiano, fails to account for other factors that might contribute to change in a running back's production from one year to the next. Cockcroft and Fabiano focus their studies on finding a correlation between turning 30 and a decline in production. One possible factor of production missing from their studies is career

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[4] Touchdown production refers to number of touchdowns scored. Touchdowns are worth six points during an NFL game.

[5] Scrimmage yard production refers to the number of combined rushing and receiving yards a running back accumulated.

[6] 1000yd rushers refer to the number of running backs that amassed 1000 rushing yards for a season.

workload which could be used to account for a change in production resulting from wear and tear over a career.

In 2006 Doug Drinen did just this and conducted a study titled *Running back deterioration: age or mileage?* In this study Drinen tried to determine if NFL running backs wear down because of age, or if they wear down because of mileage. Drinen thought it best to study all pairs of running back seasons where two backs had very similar production at the same age, but where the previous mileage of the two backs was significantly different.

His results concluded that the backs with the higher mileage averaged 775 carries during the rest of their careers, while the backs with the low mileage averaged only 529. These statistics would indicate that running backs with more wear and tear will are predicted to play longer. This is the opposite of what Drinen expected to find. This surprise result could be accounted to Drinen's inability to find comparable pairs of running backs. Since no two running backs are the same, treating them the same in a study can lead to inaccurate results.

Drinen, unsatisfied with the results of his first study, conducted a new study shortly thereafter titled *Running back deterioration II.* This time he used a sample of 28 running backs that finished with the 12 most fantasy points in a season at least four times. He then counted up each of their career-to-date rushes through (and including) their age 27 season. Ordering them from least to most career-to-date rushes he was able to divide them into three groups: low mileage, medium mileage, and high mileage.

The study once again resulted with running backs that had more rushes before the age of 28 having more rushes after the age of 28. Drinen hoped that by altering the

parameters for the study he would become able to achieve new results; however his study faced the same problem as the last. Drinen is still assuming that each grouping-- low mileage, medium mileage and high mileage running backs-- is comparable. The problem in his study is that only running backs that continue to be productive will reach high mileage levels, therefore the running backs included in the high mileage subset are the most successful running backs. His results therefore continue to suggest that high-mileage running backs will receive more rushes after the age of 28. Drinen's study once again showed no evidence of running backs having their careers shortened due to a higher workload early on in their career.

Drinen made a third and final attempt titled *Running Back Deterioration: III.* This time he asked the general question: "Assuming age and talent are equal, does previous workload help us predict future career length?" The model in this study used two performance statistics, age, and career workload to predict the number of future rushes a running back would receive. Accounting for all running back seasons since 1978 by running backs age 27 or older, the model predicted that each career rushing attempt prior to the start of a season will result in .13 less future rushing attempts. This would have indicated that past wear and tear does impact a running back's future career length; however these results were not statistically significant from zero.

DATA ANALYSIS

The data for this project is compiled from the season-to-season database available from pro-football-reference.com. This information was used to construct a dataset consisting of each running back season from 1960-2008. All running backs that began their career prior to the AFL-NFL merger in 1970 were omitted from this study. The AFL-NFL merger led to the development of a 26 team league consistent with the structure of today's NFL. Running back seasons dating from 1970-2008 experienced similar external factors and thus are comparable within this study.

To most accurately assess running back deterioration in the NFL a clear decision had to be made on what running back seasons to include. This study intends to look only at highly-used running backs so the effect of wear and tear can be determined. The measure of usage for this study will be the number of touches a running back received. Running backs that did not accumulate at least 100 touches in a particular season were omitted from the study. The dataset is further limited to include only running backs that saw a high level of usage throughout their career. Running backs that did not accumulate at least six seasons of at least 100 touches in their careers were omitted. The final dataset includes 801 running back seasons amassed by 96 different running backs.

Running back production is measured by six different yearly statistics-- rushes, rushing yards, rushing touchdowns, receptions, receiving yards, and receiving touchdowns— in the pro-football-reference.com database. From these statistics, the production statistics used in this study are derived. The NFL switched from a 14 to 16 game regular season in 1977, and also suffered two strike shortened seasons in its history.

In addition, there are running backs included in the data set that did not play all games in a particular season. Instead of adjusting yearly statistics to a 16-game season, the study will only utilize per game measures of production.

The first production term constructed for a running back is fantasy points per game (FPG). Fantasy points are the measure of production used in Fantasy Football. As of 2007 over 19 million people participated in fantasy football, and that number continues to rise (Sweet, 2007). Fantasy football is a competitive league in which each participant selects real-life players from the 32 NFL teams and earns points based on their weekly production. Within fantasy football, the running back position is the most highly valued position. This causes fantasy owners to closely analyze a running backs past production in an attempt to make an accurate future projection. This study will therefore utilize fantasy points because of its high popularity and it being a univariate measure of production. Fantasy points per game is calculated as follows:

FPG=[(rushing yards + receiving yards)/10 + (rushing touchdowns + receiving touchdowns)*6] / games played

The 801 running back seasons in the dataset have a mean of 11.31 fantasy points per game, ranging from 2.76 to 26.78. One weakness, however, to using fantasy points as a measure of production is that fantasy points award a significant amount of value to touchdowns scored. A statistic of inflated value within fantasy football leagues.

To account for this, another statistic is introduced that does not value the number of touchdowns a running back has scored. Total yards per game will serve as the other measure of a running back's production in this study. Total yards per games is calculated as follows:

TotalYdG = (rushing yards + receiving yards) / games played

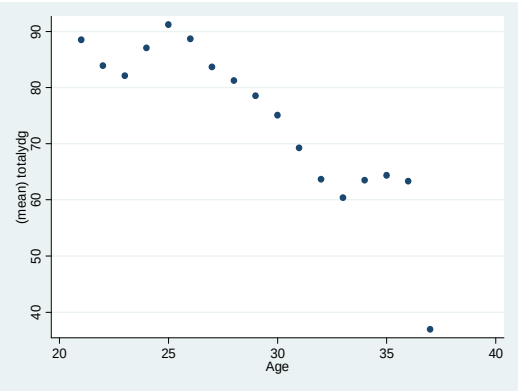
The mean value of total yards per game is 82.18 and the value ranges from 22.81 to 163.36 in this study.

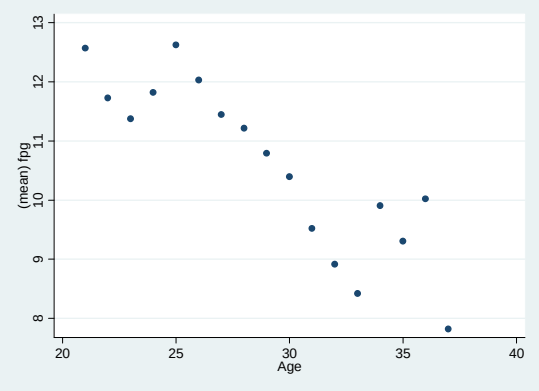
This study compares the impact of two different factors on a running back's production. Those factors are age and career workload. It must be noted that there are a variety of other variables that could affect a running back's production. Factors such as injuries, changing teams, a change in surrounding personnel or coaching staff can all affect a running back's production for a given season. This is why a large dataset should be used; to limit the impact of these external factors.

To examine the effect that certain factors have on a running back's production different models will be utilized in this study. The first series of models is used to analyze the affect that age has on production. The second series of models analyzes the affect that a running back's workload from previous seasons has on production. Within these models player fixed effects are included to account for individual differences between running backs.

The first generated model examines how age affects the production trends of running backs. For running backs with six seasons of at least 100 touches, the average age of running back seasons in the dataset is 26.65 years, ranging from a minimum of 21 to a max of 37. The study begins by examining the mean production levels for each age of running backs (Figure 1).

Figure 1: (mean)TotalYdG and (mean)FPG v. Age





Age	# of seasons	TotalYdG	FPG
23	73	82.095	11.375
24	93	87.063	11.817
25	93	91.168	12.622
26	98	88.676	12.026
27	97	83.650	11.444
28	88	81.253	11.214
29	68	78.546	10.788
30	54	75.052	10.392
31	39	69.263	9.521
32	24	63.630	8.914

The summary statistics for age, in addition to the scatter plot, in Figure 1 depict a gradual increase in average production up to age 25 and a gradual decline for each age after. From this, it becomes evident that age is a determining factor of a running back's production. These findings might also be understated. As age increases the number of seasons decreases. This is the results of unproductive running backs dropping out of the study at higher ages. By the age of 32, the 24 running backs remaining are those who have been the most productive over their careers. As a result, the decrease in productivity with age might be larger than figure 1 suggests. The data does not, however, show any evidence of a threshold age for decline in production.

To find the appropriate model to describe the relationship between a running backs age during a season and his production, three different models using player fixed effects were used. The first model treated age and total yards per game as a linear relationship. The second model included a variable for age squared, while the third model compared production to the natural log of age. Each test produced results statistically significant at the 95% confidence allowing the study to reject the null hypothesis that age has no affect on production. The study that produced the highest adjusted r-squared (0.4197), thus making it the best statistical fit, was the one that included age squared. The results of this model are recorded below (Figure 3).

Table 2: Model of Best Fit for TotalYdG v. Age

Independent Variable	TotalYdG
Age	27.830 (0.000)***
Age^2	-0.555 (0.000)***
Constant	-259.820 (0.000)***

p-value in parentheses
* indicates statistical significance at 90% confidence
** indicates statistical significance at 95% confidence
*** indicates statistical significance at 99% confidence

The significant coefficient of age squared in Table 2 shows that age and production have a non-linear relationship. This non-linear relationship follows the form of a parabola, which can be seen in Figure 1. For the ages below 25, production increases. After the age of 25 a running back's production begins to decrease. The varied production for ages below 23 and above 33 (Figure 1) is the result of the limited number of running back seasons in the dataset for these ages.

Now that there is statistical evidence to support age as a determinant of running back production, another model is needed to determine its impact. The literature on this subject is concerned with the change in production at age 30. To therefore test the hypothesis that running back production hits a wall at age 30, the study analyzes the decline in production associated with turning the ages 28 through 32 (Table 3).

Table 3: Production v. Change of One Year in Age

Age	# Seasons	FPG	TotalYdG
27-28	164	-.647 (.131)	-4.705 (.057)*
28-29	126	-1.148 (.033)**	-8.082 (.011)**
29-30	90	-.841 (.140)	-5.924 (.092)*
30-31	66	-1.446 (.012)**	-10.256 (.005)***
31-32	44	-2.208 (.002)***	-15.420 (.001)***

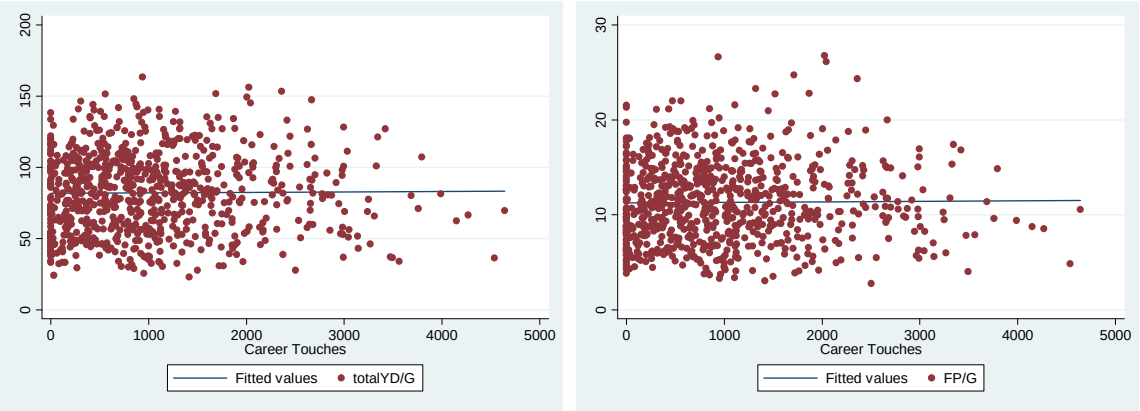
p-value in parentheses
* indicates statistical significance at 90% confidence
** indicates statistical significance at 95% confidence
*** indicates statistical significance at 99% confidence

The model described by table 3 measures the change in production that running backs experience after becoming one year older. A different model is used to examine the change in production for each age. To measure the change in production that occurs when a running back turns 28, the model only includes running backs in the dataset with season entries for both age 27 and 28. This ensures that the study examines the same number of seasons for each successive year. The coefficient for 27-28, thus refers to the predicted change in production for running backs during their 28 year old season compared to their 27 year old season.

The results in Table 3 show that running backs in this dataset suffer a statistical decline in production upon turning each age 28-32. This gradual decline in production intensifies once the running back reaches the age of 31. Upon turning 31, a running back is expected to produce 10 less total yards per game and almost 1.5 less fantasy points per game than he did at the age of 30. The scale of this decline in production increases even further when the running back turns 32. The steady decline across all age changes also provides evidence against the possibility of an age threshold for running back production within this sample.

The other factor of decline that this study seeks to test is a running back's previous career workload. In order to measure the impact of a running back's career workload a new measure is generated, career touches. Career touches measures the number of touches, combined rushing attempts and receptions, a running back has accumulated in his career prior to a given season. Within this dataset running backs have a mean career touches of 1003.86 at the beginning of a particular season. Players range anywhere from 0 to 4642 career touches at the beginning of a year in the study.

Figure 4: Career Touches v. Production



Looking at the scatter plot of career touches and production (Figure 4), there is no distinguishable relation between the two at first glance. If anything the fitted line suggests that production will increase very slightly as career touches increase. To compare different levels of career workload we need to measure the marginal effect of a season's worth of touches on a running back's production. Since the mean number of touches per season for the 801 seasons in the study's dataset is 248, the study will use increments of 250 career touches. These increments represent the mean change in career touches that corresponds to one additional season; similar to what was done with one year of age. Career workload is, therefore, grouped into different intervals of 250 career touches. The study also limits its analysis to the change in production that occurs after 1000 career touches and before 3000 career touches. The study is thus contained to running back seasons of average age roughly 27 through 32 (Table 5), keeping consistent with the ages used in analyzing the affect of one additional year of age.

Table 5: Mean Production for Career Touches Intervals

Career Touches	# of seasons	TotalYdG	FPG	Avg. Age
1000-1250	84	79.885	11.027	27.488
1250-1500	65	84.905	11.800	28.046
1500-1750	49	86.910	11.719	28.693
1750-2000	37	77.585	10.874	29.378
2000-2250	21	87.393	12.155	29.952
2250-2500	22	93.837	13.338	29.955
2500-2750	19	83.776	11.306	30.842
2750-3000	16	78.584	10.739	31.313

Table 5 compiles the average number of total yards per game and fantasy points per game for all running back seasons that began within the certain career touches intervals. Notice that under 2500 career touches there is no general trend between the

production values of each career touches interval. This is the result of the selection of running backs changing at the higher career workload. Only running backs that are highly productive reach levels of career touches above 2000. The large drop-off in number of seasons after the 1750-2000 may suggest that the running backs that performed poorly were not able to reach the next career touches interval. This could lead to an overvaluation in production at later workloads than those at the beginning. The study is thus unable to conclude at this point any relation between career touches and running back production.

Correctly determining the relationship between career touches and production requires the use of player fixed effects. Similar to the age model, adding an independent variable for career touches squared results in the highest adjusted r-squared value (0.4186). This regression is described below.

Table 6: Model of Best Fit for Career Touches v. TotalYdG

Independent Variable	TotalYdG
Careertouches	0.005 (.062)*
Careertouches^2	-5.14 e-06 (.000)***
Constant	86.489 (.000)***

p-value in parentheses
* indicates statistical significance at 90% confidence
** indicates statistical significance at 95% confidence
*** indicates statistical significance at 99% confidence

The significant coefficient on career touches in Table 6 shows that the number of career touches entering a season does have an affect on a running back's production. The significant coefficient on career touches squared also indicates a non-linear relationship between career touches and total yards per game. This suggests that running back

production will increase with the addition of touches but at some point in a running back's career an increase in workload begins to result in a decrease in production. Using the statistics from table 6, it is estimated that production will begin to gradually decrease at about 1000 career touches and continue to do so throughout the remainder of their career.

To measure the change in production from one career touches increment to another, the study must be limited to include only two successive increments. The study is limited to include only running backs within upper and lower bound of a certain interval of 500 career touches. The study then proceeds to compare the production of running backs in the top half of the interval to those in the bottom half. For example, measuring the affect of reaching 1250 career touches will compare the production of running backs with 1250-1500 career touches to those with 1000-1250 career touches. Only running backs from these two career touches intervals are used in that particular study. This same test is run comparing each successive increment in the study (Table 7).

Table 7: Change in Production Resulting From Increased Career Touches

Career touches	# of seasons	FPG	TotalYdG
1000-1250	185	-0.633 (.118)	-6.617 (.014)**
1250-1500	149	-1.009 (.075)*	-9.257 (.006)***
1500-1750	114	-1.202 (.045)**	-7.491 (.032)**
1750-2000	86	-1.507 (.030)**	-14.734 (.001)***
2000-2250	58	-.198 (.861)	-.349 (.965)
2250-2500	43	-.832 (.413)	-.8.667 (.045)**
2500-2750	41	-2.246 (.029)**	-8.493 (.165)

p-value in parentheses

* indicates statistical significance at 90% confidence
** indicates statistical significance at 95% confidence
*** indicates statistical significance at 99% confidence

This analysis supports the claim that an increase in career workload will lead to a decrease in production at the latter stages of a running back's career. The most significant result of this analysis pertains to running backs who achieve 1750 career touches. The study suggests with at least 95% confidence that once running backs reach 1750 career touches, they will produce 14 less yards per game in addition to 1.5 less fantasy points per game over their next 250 touches compared to their previous 250 touches. When running backs reach 2000 career touches, however, the analysis becomes cloudy. Table 7 expects a very small decline in production, but the coefficients are not significantly different from zero. Looking back at the mean values described in Table 5, running back production increases from 2000-2500 career touches. Because average production is higher at between 2000-2500 career touches than it as at between 1750-2000 career touches it could suggest a threshold for career touches at around 1750. This threshold would indicate the number of career touches at which most running backs hit the wall, with only the most productive running backs continuing to reach the higher career touches intervals.

The analysis of the previous models indicates that running back decline is most pronounced at age 31 and 1750 career touches. To determine which factor, age or career workload, contributes most to a running backs decline, an interaction term is introduced. This model uses an interaction term to represent running backs at least age 31 with at least 1750 career touches to find the marginal effect of being at least 31 versus the marginal effect of having at least 1750 career touches. This calls for the regressions using

age 31 and career touches of 1750 to be re-run with the inclusion of this interaction term (Table 8).

Table 8: Impact of Age v. Impact of Career Touches

Independent Variable	Mean(TotalYdG)	TotalYdG
1		
Age31	69.263	-7.008 (.193)
Age31careertouches1750		-22.871 (.000)***
Constant		84.866 (.000)***
2		
Careertouches1750	81.225	-12.919 (.000)***
Age31careertouches1750		-19.544 (.000)***
Constant		86.060 (.000)***

p-value in parentheses
* indicates statistical significance at 90% confidence
** indicates statistical significance at 95% confidence
*** indicates statistical significance at 99% confidence

The results seem to indicate that the marginal effect of having at least 1750 career touches is slightly greater than the marginal effect of being at least 31 years old. The impact of having at least 1750 career touches on running backs 31 years old is greater than the impact of being at least 31 on running backs with at least 1750 career touches.

CONCLUSIONS

At the beginning of this study the ever growing NFL trend of replacing aging running backs was discussed. This fueled the study of different factors of running back decline. The two factors that were analyzed in detail throughout this study were age and wear and tear. From this, two main questions were posed. Do age and career workload factor in determining a running back's production? And if so, does there exist a certain benchmark at which one can claim a running back "hits the wall".

There is statistical evidence to conclude the age and wear and tear impact a running back's production. It was determined that running back production as well as career touches (Tables 2& 6) have a non-linear relationship with production. From this, it was concluded that running back production decreases gradually from the age 27-32. Results also showed that running backs turning 31 or 32 can expect to experience the greatest decline in production from the previous year.

In the literature review, a few articles were discussed that claimed running backs "hit a wall" in terms of production at the age of 30. When looking at total yards per game and fantasy points per game in this study, two strong production statistics, it was determined that no such wall existed. In fact, there is no evidence pointing towards a production threshold at any age. All of the results analyzing the impact of age on production (Figures 1-3) conclude that production decreases steadily each year from the age of 27-32.

The study also set out to determine if wear and tear could be used as a determinant of expected future production. Using career touches at the start of a

particular season, it was established that career workload does serve as an indicator of a running back's production. Increases in career workload also proved to produce some promising results. Once a running back reaches 1000 career touches, according to those used in this study, total yards per game and fantasy points per game will begin to decline. For every 250 more career touches a running back receives the model used expects production to continue to slip. Upon reaching 1750 career touches, production shows its largest expected decline.

Interestingly, this trend does not continue when running back's reach 2000 carries (Table 7). At 2000 career touches, the coefficients pertaining to expected change in production from reaching this career touches interval become very unreliable. The mean values of the production terms are also higher at 2000 career touches than at 1750 (Table 5). This could be the result of 1750 career carries being the threshold at which most running backs see their career end due to decreased productivity. This allows one to conclude that most running backs "hit the wall" at 1750 career touches.

Now that the impact of both age and career workload on running back production has been discussed, one might wonder which plays a more important role. One can conclude from this study that the marginal effect of having at least 1750 career touches is slightly greater than the marginal effect of being at least 31 years old. This suggests that for running backs in this study that are at least 31 and have at least 1750 career touches, the career workload has a slightly greater impact on production (Table 8).

The analysis in this study marks an attempt to study and define the general decline in production trends that result from the aging and wear and tear a running back endures. From this attempt, one finds that running backs will continue to deteriorate over time;

however the rate of this decline is much more gradual than the constant turnover at the position would lead one to believe. In addition, some running backs have continued to be productive well into their thirties. As far as determining when is the right time to cut ties with a veteran running back, the answer is still up in the air.

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