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THE RISK OF SIGNING PREVIOUSLY-ARRESTED NFL PLAYERS

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ABSTRACT

With an increasing amount of attention being placed on quantifying the value a player can bring to a team through his on-field contributions, this report examines an off-the-field risk that teams may face by acquiring a player. Using a data set of NFL player arrests since 2000, this study calculates the likelihood that a previously-arrested player will be arrested an additional time in a given number of years.

It is determined that variables such as elapsed time since a player's last arrest, number of prior arrests, years of NFL experience, the presence of a punishment affecting his playing career, and a misdemeanor versus a felony charge appear to affect the likelihood of a repeat arrest. These factors are used to develop a model that helps teams classify the risk that a player experiences future legal trouble based on the circumstances behind his arrest history.

Furthermore, events transpiring during the 2014 NFL season and resulting changes to the NFL player conduct policy have brought an increased focus on arrests involving violence. An additional analysis finds that several of the variables that influence general recidivism have a similar effect on predicting violence-related arrests. The report concludes by considering other ways in which the methods that are discussed can be used to give teams a fully comprehensive evaluation of the risks involved with signing a particular player.

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Chapter 1

Introduction

When an NFL team signs a player who has been arrested in the past, it can be taking on a risk. An individual with a prior arrest may face greater future legal trouble than someone with a clean record. If the player does get arrested again, it creates negative publicity for his team, could bring negative energy into the locker room, and may hurt on-field performance if he faces a suspension. However, the front office must weigh these unwanted consequences with the potential benefits to be gained from adding that player to its roster.

In today's age of sports, analytics are playing an increasingly large role in teams' decision-making. As Benjamin Alamar writes in his book *Sports Analytics: A Guide for Coaches, Managers, and Other Decision Makers*, "The push in sports—as in business—to use analytic tools comes from advances in computing power and the availability of massive amounts of data to both teams and the public, which create an opportunity for competitive advantage."

Currently, much of the focus in sports analytics is on quantifying the value that a player could bring to a team through his on-field contributions. In this report, we will use analytics in a different regard by attempting to quantify the risk that comes along with signing a previously-arrested player, which could allow a team to better assess the risk and reward of acquiring the player's services.

Using a database of NFL player arrests since 2000, we will first determine the probability that a player who has been arrested in the past will run into further legal trouble in a given number of years. This will involve analyzing specific factors that could make certain players more likely than others to be arrested again in the future. After assessing whether each of these factors has shown to impact recidivism, we will build a model that classifies the risk that a player experiences future legal trouble, dependent on the conditions of his previous arrest(s).

In addition, some arrests will be more detrimental to a team than others. Due to changes in the NFL player conduct policy, violations of the policy that involve violence will receive harsher punishments. Therefore, players who have previously been arrested for a violence-related incident could be at increased risk for behavior that may lead to a lengthy suspension. As a result, we will also examine recidivism trends specifically for these types of arrests to assist teams in making informed decisions on signing such players.

Chapter 2

Defining Recidivism

Recidivism is defined in the *Merriam-Webster Dictionary* as “a tendency to relapse into a previous condition or mode of behavior.” The term is typically associated with some type of criminal behavior.

One common motivation for studying recidivism is an attempt to create a system that minimizes the chances of repeated criminal behavior for an individual. For example, the National Council on Crime and Delinquency completed a study in Michigan analyzing the recidivism rates for offenders admitted to a community treatment program instead of jail (“The Community Treatment Project for Repeat Offenders”). The Illinois Criminal Justice Information Authority compared recidivism rates of offenders on parole to those on other types of releases (“Repeat Offenders in Illinois”).

In those situations, it has already been determined that an offense has been committed, and the question being answered is what actions should be taken to most effectively discourage future criminal behavior. However, from the perspective of an NFL team, its primary concern likely is not figuring out how to prevent future legal trouble, since the team has no control over the decision that the legal system or the NFL makes regarding the case.

This is not to say that teams take no interest in reforming a player who has been arrested, as they may very well have internal procedures for dealing with such situations. However, the practical use of the analysis in this report is to help a team assess the risk of signing a previously-arrested player, and that will often involve decisions being made on players that were on a different team at the time of their arrest. In these cases, the team considering acquiring the player will have had no opportunity at all to change the player’s behavior after an arrest.

Therefore, the team would instead be concerned with predicting whether or not recidivism will occur. This is another common reason for studying recidivism---taking the circumstances surrounding an individual's past legal history into account to assess the likelihood of similar behavior in the future. Often, such analyses will also consider the individual's demographic information, though that data was not available for this report.

Since the definition of recidivism does not specify what kind of criminal behavior constitutes recidivism, the term can be applied in several different ways. Some studies examine behavior of individuals after they are released from jail or complete an alternative program, while others use prior arrests. Similarly, the study can be set up to examine factors that predict future arrests, future incarcerations, or both.

In this report, we will define recidivism as a player who has been arrested in the past getting arrested an additional time. First of all, there are very few NFL players who were imprisoned for a significant amount of time and later continued their career, so the sample size would not be nearly large enough to do any analysis if only previously-incarcerated players were considered. Furthermore, it makes sense to examine individuals who faced jail time (or were placed in an alternative program) if the purpose of your study is to assess how that requirement reforms their behavior. But since our study focuses on predicting rather than preventing future legal trouble, it is more advantageous to instead utilize all available information and consider all previous arrests.

Chapter 3

Arrests in the NFL

According to databases of NFL player arrests compiled by *USA Today's* Brent Schrottenboer and *The San Diego Union-Tribune's* Merrie Monteagudo, 571 players combined for 758 arrests that were more serious than a common traffic violation from 2000 to 2014.

At first glance, this seems like a large number of arrests. It is the most of any professional sports league, but keep in mind that an NFL roster is more than twice the size of any other professional sport.

Furthermore, research has shown that NFL players are actually arrested at a lower rate than the comparable general population. A *Washington Post* article by Sally Jenkins says that 2 to 3 percent of NFL players are arrested in a year, whereas the 2009 national arrest rate for males between the ages of 22 and 34 was 10.8 percent, based on FBI statistics.

As a result, this report is not meant to suggest that NFL players in particular have a tendency for run-ins with the law. That being said, it is certainly not uncommon for teams to have to make a decision on signing a previously-arrested player, and the weight of such decisions has been magnified following the 2014 season. The goal of this report is to aid teams through that process.

2014 NFL Season

The 2014 NFL season is one that brought the subject of NFL player arrests squarely into the public spotlight. NFL arrests often receive a large amount of media coverage, but that is even more so the case when high-profile players get into trouble with the law.

In September 2014, information came out regarding legal trouble from Ray Rice and Adrian Peterson, who are two of the league's more well-known running backs. A graphic video surfaced showing

the incident that resulted in Rice's arrest for domestic violence in February, and Peterson was indicted on a felony charge for injury to a child.

The Baltimore Ravens immediately cut Rice, and the NFL suspended him. The Minnesota Vikings retained Peterson but suspended him, and he was later suspended by the NFL as well. Neither player participated in the remainder of the 2014 NFL season.

New NFL Player Conduct Policy

The Rice and Peterson cases brought negative attention to the NFL, due to both the actions taken by two of the league's key players and for the way the Rice situation was handled by the NFL. "It's been a year like no other," said New York Giants co-owner John Mara, who was one of two people that oversaw the investigation into the NFL's handling of the Rice case, to *Monday Morning Quarterback*.

The fallout from the Rice and Peterson cases spurred the NFL to adopt a new player conduct policy in December 2014. One key change is that players who are charged with a violent crime will be put on paid leave while investigations are ongoing.

Also, if an independent league investigation finds that a violation has occurred involving domestic violence, child abuse, sexual assault, assault, or battery, the policy calls for a baseline six-game suspension. A second violent offense will result in a lifetime ban. These punishments can still be enforced even if the player is cleared of legal wrongdoing, pending the results of the NFL's investigation. As NFL Commissioner Roger Goodell said in a memorandum to NFL executives, "We recognize that the standards that apply in a workplace are substantially different from those that apply in the criminal justice system."

Even before these policy changes, teams were faced with a difficult decision of whether keeping or acquiring a previously-arrested player is worth the risk, especially if the player is well-known and/or has a violent arrest on his record. For one, teams could face an immediate public relations hit just by

choosing to have the player on their roster. Plus, an additional arrest from the player could bring about a stronger storm of criticism, as well as a major distraction.

But now, with the new policies raising the possibility of longer suspensions---and perhaps even a lifetime ban---it has become increasingly important that teams can accurately evaluate the likelihood of recidivism for a particular player. Therefore, this report will aid teams in classifying whether a player is of a relatively high, moderate, or low risk of a future arrest, which can help them make their decision on whether or not to have the player on their roster. Furthermore, we will specifically apply the model to Rice and Peterson to evaluate their recidivism risk.

Chapter 4

Data

As mentioned earlier, the data used in this report has been gathered from databases compiled by *USA Today* and *The San Diego Union-Tribune*. These resources include all NFL player arrests more serious than a common traffic violation since 2000. Players who were free agents at their time of arrest are included in the data set if they were signed by a team at some point after their arrest.

Both websites caution that the arrest data has been gathered from public records and media reports, meaning it is possible that some arrests are not included in the database if they weren't reported or the public records couldn't be accessed. Therefore, our analysis reflects publicly available knowledge but should not be considered complete.

However, since two different databases are being referenced, it should minimize the chances that certain arrests may have been overlooked and excluded from the data set. The two databases were nearly identical, with only a handful of arrests noted by one data set but not the other. As a result, the two websites appear to have had similar success in tracking down arrest information.

The San Diego Union-Tribune's database warns that "increased media coverage also probably accounts for more incidents listed in recent years." To test this claim, we will now examine the number of arrests per year that were recorded in the database.

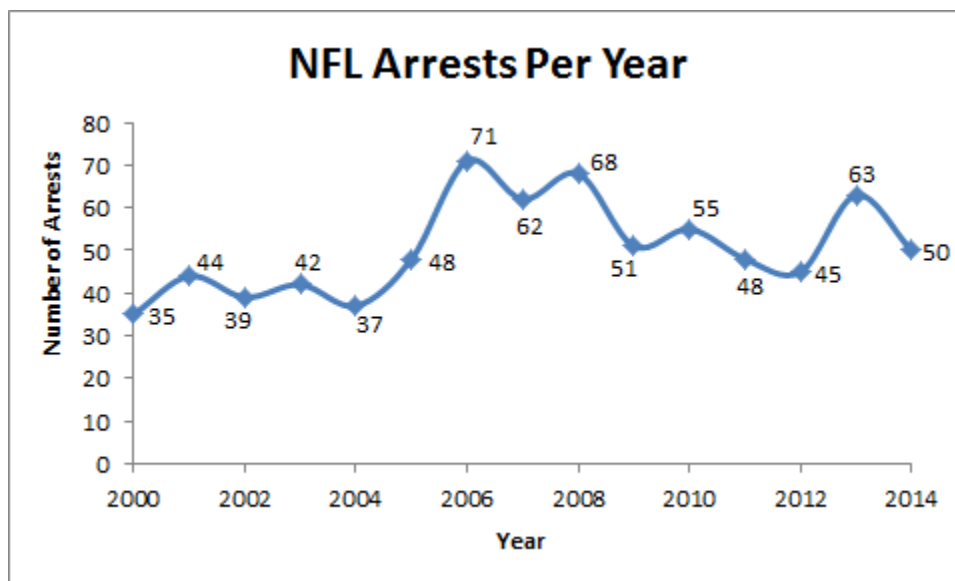


Figure 4.1 NFL Arrests Per Year

Figure 4.1 shows what appears to be some validity to the conjecture that increased media coverage has led to more NFL player arrests being made public. The five lowest arrest totals occur in the first five years, with more arrests being reported each year starting in 2006.

That being said, media coverage of the NFL has seemingly been increasing over time, but the reported number of arrests has not been steadily increasing. Instead, the most pronounced spike occurs in the middle of the timeframe, with arrest numbers falling a bit over the last four to six years when media coverage has been the most intense. Therefore, while media coverage may be impacting the number of arrests being reported, it is not the driving factor. In fact, one could argue that media attention has played a role in bringing the arrest numbers back down by putting arrests in the public light, perhaps providing an extra incentive for players to avoid such behavior.

Even if some data may be missing, we can proceed with the analysis. We have no evidence to believe that having any missing arrest data would inherently increase or decrease the recidivism rates.

For example, there could be players with one recorded arrest who get arrested a second time, but the second arrest isn't noticed by the public. In that case, the recidivism rates should be higher than this

analysis will show. Yet, there could also be players who were arrested once and avoided recidivism, but they never made it into the data set in the first place because their lone arrest was not recorded. Cases like these would make the recidivism rates lower than they appear.

In conclusion, the potential of leaving out undiscovered arrests does not necessarily favor recidivism or non-recidivism. Instead, it just makes our sample size a bit smaller than it could have been, but the sample size is still sufficient to conduct the analysis.

Chapter 5

Method of Analysis

Having used the two data sources to compile a database on NFL player arrests since 2000, we will calculate the probabilities that after a player gets arrested, he will get arrested again within a given number of years. For now, the event of interest is simply any arrest; the player does not have to be convicted of either offense, and the two arrests do not need to be for the same type of offense. Later on, we will focus on arrests related to violence.

As an example of how the analysis is conducted, we will step through the process for finding the probability that an arrested player will be arrested at least once more within three years.

For the purpose of this calculation, there are two primary types of players: those who played a full three years after their most recent arrest, and those who did not. For the former group, if the player did get arrested again, we take the difference between the dates of the two arrests. If it was within three years, then the player failed to meet the condition of being arrest-free for the given time period. If the date difference was more than three years, or if the player was never arrested again, then he did meet the arrest-free condition.

However, there would be several problems with only using this data to develop the final probabilities. First, it significantly lowers the sample size, as it excludes all players who either retired within the three-year time period or were last arrested after 2011 and therefore haven't yet completed the time period. This issue gets exacerbated as the time period of interest is lengthened.

In addition, doing the calculation in this fashion ignores the fact that some players might have only played a year or two after a certain arrest, but still got arrested again during that abbreviated time period. In this case, they wouldn't even need to finish out the three-year time period for us to know that they did not meet the condition of going three years without an additional arrest.

If we include these players in the calculation, we also need to incorporate the players who don't play out the three years but haven't yet been arrested again. They now have an improved chance of finishing the three-year time period arrest-free. Therefore, going back to the segment of the data that only included players that did play out a full three years after their arrest, we calculate the probability that a player who was "clean" (arrest-free) for the first year got arrested in the second or third year, as well as the odds that a player who was clean for two years got arrested in the third year.

By applying these updated probabilities to players in the midst of their time period of interest, we can project the number of players who would make it through the full three years without a further arrest and the number who would not. This is very similar to a concept used by reserving actuaries where they utilize historical claim completion patterns to project the amount of future claims in a contract that is currently ongoing. In this analysis, the event of interest is a future arrest rather than a future paid claim, but in both cases, the method reflects behavior that has occurred thus far to give an updated prediction of future behavior, using trends of previous players or claimants.

Using this method, the only players not included in the calculations are those who haven't played a full season since their most recent arrest. Given that they haven't accumulated a full clean year after being arrested, we would not project that their likelihood of making it through the time period of interest without an additional arrest is any different than a player who has just been arrested. As such, there is no updated probability that could be assigned to them that would impact the final recidivism rates, and they are best being left out of the data set.

Realistically, a player who has gone six months without an additional arrest probably is more likely to be arrest-free for the time period of interest than someone who was just arrested, but our calculations do not account for partial years. Furthermore, in many cases, the reason that a player didn't play a full year since his last offense is that he was cut when the arrest occurred and was never re-signed again. Of course, there would be no need to use a career-ending arrest to predict if another arrest would occur in a given number of years, simply because the player's career would already be over at that point.

It is also important to note that in many cases, the same player will be included in the data set multiple times. Each arrest is a new observation that allows us to see if that most recent arrest will lead to an additional arrest. Therefore, if a player has been arrested once, the event of interest will be whether he is arrested a second time; if he's been arrested twice, that allows for a separate observation examining whether he is arrested a third time; and so on. Later, we will isolate the factor of how many arrests a player has accumulated and show how the probabilities change.

Chapter 6

Recidivism Rates and Potential Impacting Factors

Using these methods, Figure 6.1 gives the results for the probability that a previously-arrested player faces an additional arrest within a given number of years.

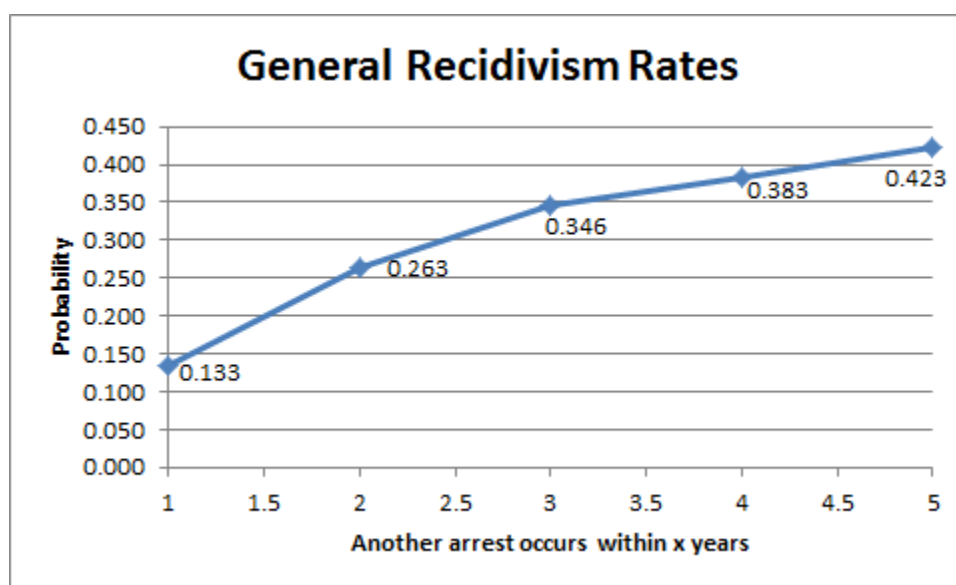


Figure 6.1 General Recidivism Rates

It can be seen that the probability of getting arrested twice in a year is relatively low (about 13 percent), but the risk doubles when looking at the probability of an arrest occurring within two years of the previous offense. The recidivism rate then increases to about 35 percent when the time period of interest is three years, and the rate continues to rise but also begins to level off when examining four and five year periods. Therefore, this seems to show that if a player is going to be arrested an additional time, more often than not it occurs within the first three years.

In the following sections, we will examine some specific factors to see whether they appear to impact recidivism rates.

Time Since Last Arrest

As mentioned above, players who have already gone through one or two years without facing an additional arrest are more likely to make it through a three-year time period while remaining clean. Of course, part of the reason for this is that they have less time remaining to potentially get arrested again, but another reason could be that the elapsed time without an offense may demonstrate a change in behavior. Perhaps they learned their lesson from their previous offense and/or they do not want to face the potentially harsher consequences that could come from another violation.

In the previous calculation, if a player was arrested on 1/1/2006, the question of interest was whether he made it to 1/1/2009 without being arrested an additional time. However, to examine the possible impact that being clean for a period of time could have on the chances of a future arrest, we will now look at how the recidivism rates change when measuring the probability of being arrested again in a certain number of years after a given number of arrest-free years. In other words, if the player was arrested on 1/1/2006 and has not been arrested again as of 1/1/2007, then how does the probability of going three years without an arrest (until 1/1/2010) change?

For these calculations, the time period of interest is now four years long, but any player who is arrested again within a year of his prior arrest (before 1/1/2007 in this example)---and therefore didn't meet the qualification of being clean for a year---is removed from the data set.

We then follow a similar process as before, where we first find the recidivism rate for players who played a full four years after their most recent arrest and were clean in their first year. Then for those who completed their one clean year but didn't play an additional three years after that, we can project the number of players that would and would not make it through the time period of interest without an arrest.

As before, this is based on updated probabilities reflecting how far into the three-year time period they had gone without an offense.

The results are displayed in Figure 6.2. To avoid clutter, the percentages are shown only for when the time period of interest is an additional three years.

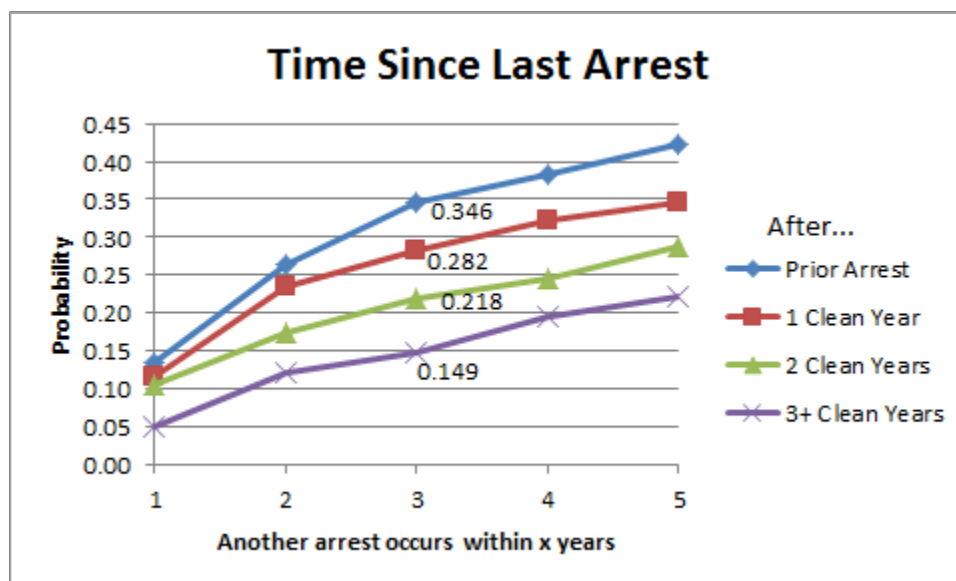


Figure 6.2 Time Since Last Arrest

We see that the longer the period of time a player has been arrest-free, the less likely it becomes that he will be arrested again in the next x years after the clean period. In fact, the probability of another arrest within three years after the clean period decreases almost uniformly, falling by about seven percent for each year added onto the clean period.

This finding follows the hypothesis that a player being arrest-free for a period of time may indicate a change in behavior, making him less likely to commit a future offense. Therefore, teams should exercise caution when signing a player who has just been arrested, but should feel more comfortable about the signing with the longer it has been since his last arrest.

Number of Arrests

Another factor that could impact the likelihood that a player will be arrested an additional time is the number of arrests he has accumulated throughout his NFL career. For example, if he has recently been arrested for the first time, perhaps the incident will serve as a wake-up call and/or provide enough of a negative consequence to steer the player away from such behavior in the future. On the other hand, if the player's most recent arrest was his third or more, this may be a sign that his behavior is unlikely to change.

The following calculations revert back to the original process of finding the probability of an additional arrest occurring within x years immediately after the prior offense. In other words, if the player was arrested for the first time in his career on 1/1/2006, our question of interest is whether or not he gets arrested again by 1/1/2009---the data set is not broken down by number of clean years as in the previous graph, thereby allowing us to focus on one variable at a time. This probability would then be compared to the situation where the most recent arrest was the player's second, third, etc. of his career.

Limitations

For players whose career began before 2000, their first and second arrests cannot be included in this data set because it is unknown whether those are actually the first and second arrests of their NFL career; they could have also had one or more arrests before 2000, which would not have been recorded in this database. However, since our analysis groups together any arrests that are the third of a player's career or more, those arrests can be included in the data set for any player, because regardless of what happened before 2000, we know that at that point, the player has had at least three arrests.

Even after removing the players whose career began before 2000 when calculating the probability that a first or second arrest leads to an additional arrest, there still remains a sample size of 322 players who were arrested once, and 85 of those players were arrested twice in their career. 52 players faced at least three arrests.

The results are given in Figure 6.3, and again, the probabilities are only labeled when the period of interest is three years.

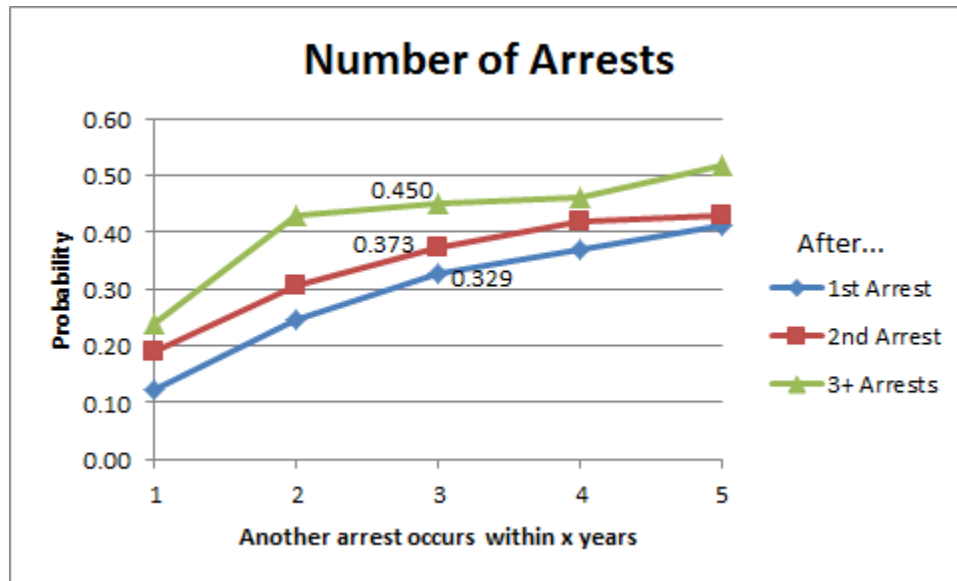


Figure 6.3 Number of Arrests

To clarify, the 0.329 means that about 33 percent of the time, a player who just incurred his first arrest will get arrested again within the next three years. This increases up to 45 percent for players who were arrested for the third time or more. So, as expected, the likelihood of a future arrest increases as the player accumulates more and more offenses, showing that players arrested for just the first time may learn from their mistake, while those with three or more arrests may be less likely to change their behavior.

Years of NFL Experience

An additional factor that was examined is how the number of NFL seasons a player has accumulated at the time of his last arrest impacts recidivism rates. For example, if a player comes into the league and gets arrested within his first season, perhaps that could be an early warning sign of his

behavior to come, and he also may lack the maturity to learn from his mistake and alter his actions in the future. Conversely, veteran players who are arrested might be able to handle the situation more maturely and change their behavior going forward.

Furthermore, the lifestyles of players with multiple years of experience can differ from new players in the league in ways that could make their recidivism rates relatively lower. As one example, older players are more likely to be married and have children and may feel a greater sense of responsibility to avoid legal trouble.

Figure 6.4 displays the probabilities that an additional arrest occurs within x years of the last arrest for a sample size of 70 rookies, 103 second-year players, and 385 players with three or more years of experience. Again, the values are labeled for when the time period of interest is three years.

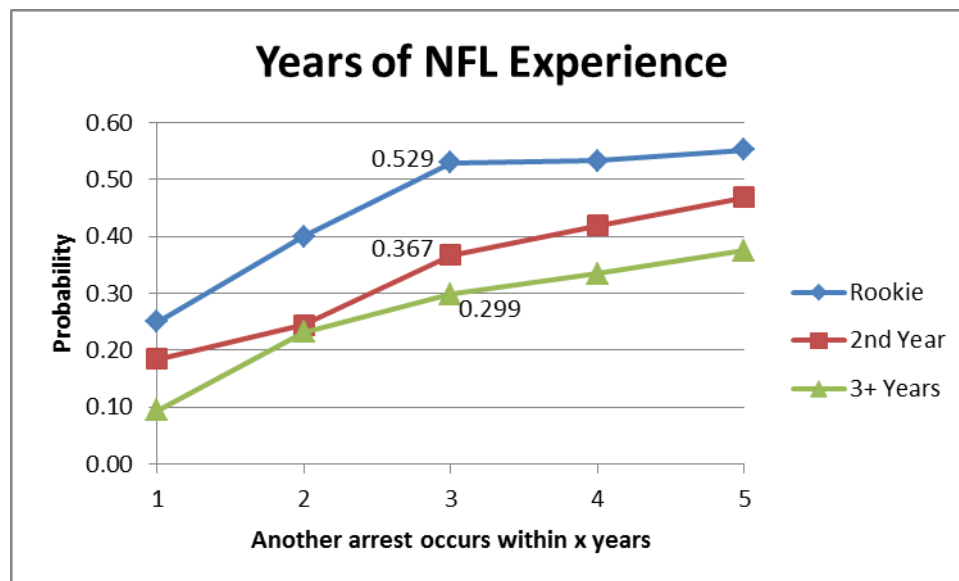


Figure 6.4 Years of NFL Experience

These results are rather drastic, as a player who was arrested as a rookie is nearly 1.8 times as likely to be arrested again in three years as a more veteran player. This follows our hypothesis that more experienced players are more likely to avoid future arrests, perhaps due to maturity and family

responsibility. A study done by the State of Wisconsin Department of Corrections found similar results, stating that “younger offenders exhibited consistently higher recidivism rates than did older offenders,” (Jones and Rogers 8).

To clarify, the calculations in this section follow the same method that was discussed earlier to account for players who didn't play out a full three years after their most recent arrest. Therefore, the lower recidivism rates for more experienced players are not due to the fact that they could retire within the three-year period whereas the rookies would likely still be playing.

It is interesting to consider these results in conjunction with the prior section, which examines how the number of arrests affects recidivism rates. There is probably some overlap between the two measures, as players with three or more arrests need to be in the league long enough to do so and are more likely to be veterans. Yet, recall that the subset of players with at least three arrests also had the highest recidivism rate, even though they were likely older and more experienced. This seems to indicate that a history of multiple arrests may outweigh the age/maturity factor.

A recidivism study by the Ministry of Correctional Services in Ontario, Canada reaches a similar conclusion. This study found a similar trend of younger offenders being more likely to become recidivists, but the author explains that “it is not age itself which accounts for the difference in recidivism,” (Madden 5). Instead, he says the increased recidivism rates come from a “more troubled background and more extensive prior criminal involvement,” (5). Our results in the previous section, where a history of arrests (when it exists) appears to overpower the factor of NFL experience, would agree.

The same argument can be used in reverse, however, in that rookies are more likely to have only been arrested once than veteran players would be, yet rookies have the much higher recidivism rate. This would seem to indicate that being a rookie outweighs the effect of having an arrest history.

Overall, though, the fact that players with multiple arrests have higher recidivism rates in spite of likely being more experienced, and the fact that rookies have higher recidivism rates in spite of likely

having fewer arrests only serves as further evidence that each of these characteristics does seem to have a relevant impact on recidivism. Therefore, it worth considering both factors together. Players who are young and already have an arrest history would probably be at especially high risk for recidivism, while those who are experienced and have just been arrested for the first time would be much less likely to recidivate. For those who possess one characteristic that is less associated with recidivism but not the other, the factors will likely cancel each other out to some degree.

Presence of Punishment Affecting Playing Career

We now look into whether a player being punished as a result of an arrest affects his probability of a future arrest. We will only consider punishments that resulted in the loss of playing time, due to either a suspension, jail time that overlaps with an NFL season, or the player being cut. A fine was one of the more common types of punishment, but with NFL players generally making very high salaries, a monetary punishment on its own may not be enough to impact a player's future behavior. However, when a player is not allowed to be out on the field, it may cause him to really regret his actions and deter him from exhibiting similar behavior in the future.

The sample size of players who missed playing time due to an arrest is 84, which does not include players who never resumed their careers after they were cut, suspended, or faced jail time. The results are given in Figure 6.5, again highlighting the three-year recidivism rates.

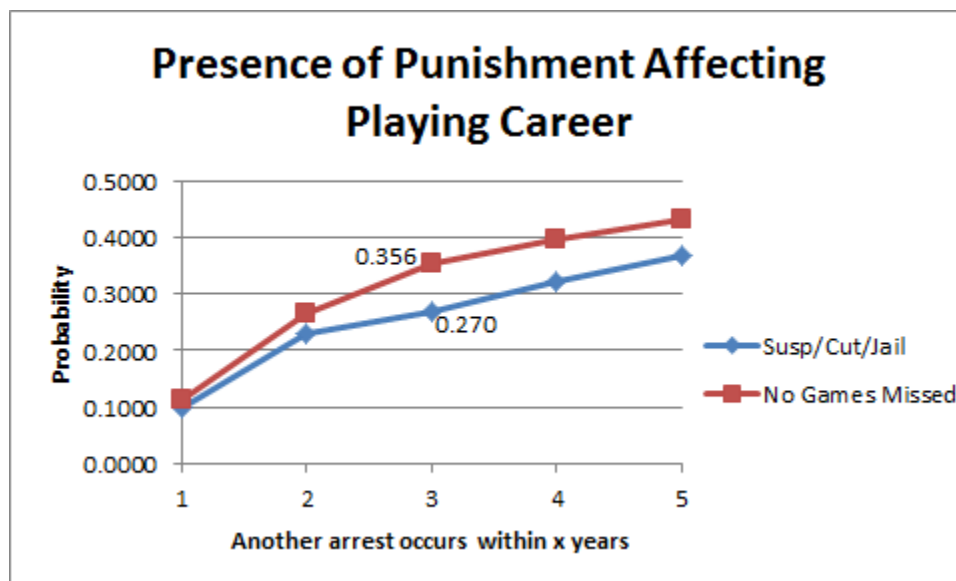


Figure 6.5 Presence of Punishment Affecting Playing Career

The results show that players who were forced to miss playing time or were cut due to an arrest exhibit lower recidivism rates. This could be an important conclusion for teams to keep in mind when considering a previously-arrested player in free agency. Often, the players who get suspended or cut as a result of an arrest make the most headlines, and therefore may carry a more negative perception. However, this analysis shows that these players are no more likely---and in fact, appear that they may be less likely---to run into future legal trouble than a player who might not have received a newsworthy punishment.

Verdict Following Arrest

Next, we will examine whether the verdict stemming from the charges associated with a player's arrest impacts the recidivism rates. Players were separated into two categories. The first is any player who was considered guilty, pleaded no contest, or received some type of punishment or required action; this could include a fine, community service, probation, mediation, counseling, or a diversion program. Each

of these verdicts implies that there was some type of behavior that either requires a punishment or a course of action to help resolve an issue and/or deter the player from similar actions in the future. The other category includes acquittals and dropped charges.

There are several hypotheses that relate to how this factor could affect the probability of a future arrest. One is that for the players who were acquitted or had their charges dropped, it hasn't been proven that they committed any wrongdoing, and they therefore shouldn't be treated as players with any kind of legal history. In this case, the recidivism rates for these players should be lower.

Another hypothesis is that a dropped charge doesn't necessarily mean that there was no wrongdoing, as charges can be dropped for a multitude of reasons. So, if there was, in fact, some type of wrongdoing, this means that the player faced no consequences for it and he may not have had the chance to learn his lesson---something that, as demonstrated in the prior section, does seem to affect future behavior. In addition, punishments tend not to be as harsh for a first-time offender, so those who had an arrest wiped off of their record may not have as large of an incentive to avoid legal trouble as someone with a legal record who could get into even more serious trouble if he adds a second offense to his record.

Limitations

In some cases, the resolution of an arrest could not be found in either the USA Today or The San Diego Union-Tribune database. For the more recent cases, this is likely because a decision has not yet been made. However, there are also some older cases where no verdict is available, so in those situations, it seems that the media did not publicize the results. Either way, cases with an unknown resolution were omitted from the calculations.

Even with these omissions, we are still left with 291 cases in the guilty/no contest/penalized/required action category and 156 cases in the dropped/acquitted category. In Figure 6.6 are the results, with labels for the recidivism rates when the time period of interest is three years.

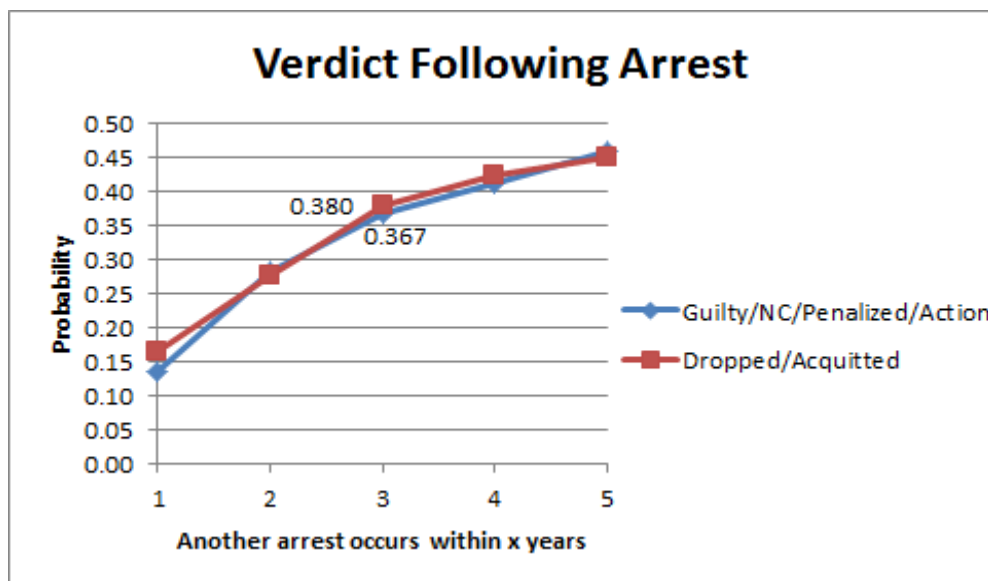


Figure 6.6 Verdict Following Arrest

The results show that the legal ruling on charges associated with a player's arrest appears to make no difference in the probability of a future arrest. This can still be valuable for teams to consider though, as it demonstrates that they shouldn't automatically over-penalize players who faced some type of legal consequence following an arrest, nor should they brush aside an arrest just because it led to no legal consequences. Similarly, these results seem to support the NFL's decision to not necessarily stop investigating a case even if no legal action is taken.

Severity of Charge Associated with Arrest

An additional factor considered is whether a player being arrested for a felony, as opposed to a misdemeanor, affects the recidivism rates. This particular analysis only refers to what the player was charged with at the time of arrest; if a felony gets downgraded to a misdemeanor when the verdict is reached, it is still included as part of the felony category since the original accusations were enough to

warrant a felony charge. Also, this calculation does not consider the eventual outcome of the case, since it was shown above that this doesn't appear to impact rates of recidivism.

Of course, committing a felony generally involves highly egregious behavior, so one hypothesis is that a player who is accused of doing something so serious would be more likely to continue to run into legal trouble in the future. Although, another hypothesis could be that a felony charge may lead to a life-altering punishment that would change the offender's behavior after he learns from his mistake.

Limitations

There are cases in which the databases did not comment on whether an arrest was made for a felony or a misdemeanor; those cases are not included in the data set for these calculations.

The sample size is still very large for misdemeanors and is 50 for felonies. Several felonies ended a player's career, but those are not considered.

The results are given in Figure 6.7, again with the probabilities of an additional arrest within three years of the prior arrest being labeled.

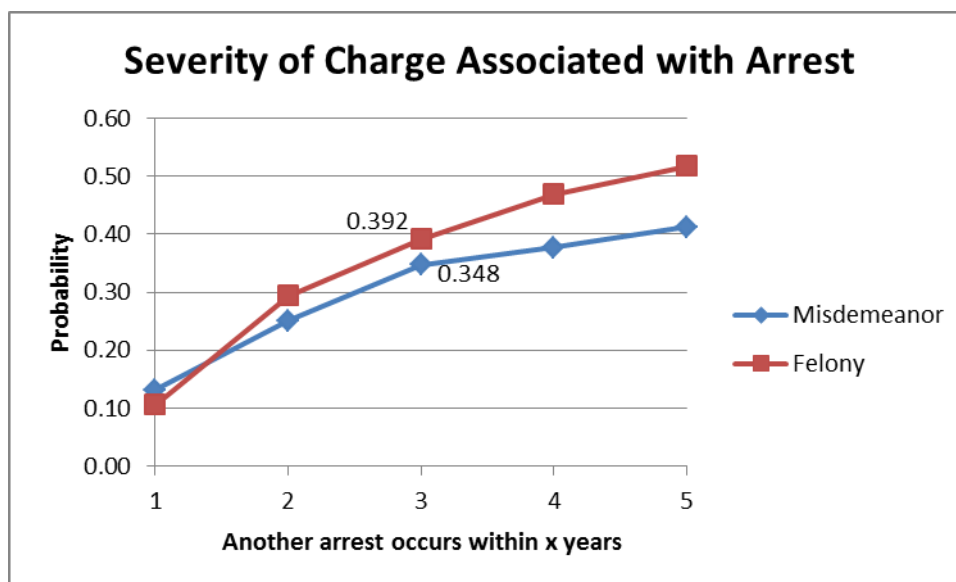


Figure 6.7 Severity of Charge Associated with Arrest

The results demonstrate that, for the most part, felonies do lead to higher recidivism rates than misdemeanors, though not by a substantial margin. Therefore, there appears to be more weight to the hypothesis that a wrongdoing as serious as a felony could be indicative of the player facing more legal trouble in the future.

The other hypothesis---that a potentially harsh punishment stemming from a felony could deter the player from getting arrested again---may not really hold up because the players who are found guilty of a felony, and correspondingly face the most serious penalties, often never play football again and aren't in this data set. On the other hand, the players who get to continue their career often had their charge dropped or pleaded guilty to a lesser charge, so they may not have been given a punishment that was significant enough for them to learn from their mistake and change their behavior.

It is also worth noting that the recidivism rate within one year of the arrest is actually lower for felonies. This could be one area where the second hypothesis does take effect, since at this point the verdict likely hasn't come out yet and the possibility of a major punishment is still looming, which may provide enough of an incentive for the player to stay out of legal trouble.

Type of Offense

The final factor that is considered is whether certain types of offenses more frequently lead to a future arrest than others. The three most common reasons for an arrest of an NFL player are DUI, domestic violence, and marijuana possession. Only including players who took part in at least one full season following their arrest, there were 164 cases involving a DUI, 68 involving domestic violence, and 49 for marijuana possession since 2000. No other types of arrest had a large enough sample size to make doing a calculation worthwhile.

Figure 6.8 displays the results, with labels for the probability that an additional arrest occurs within three years. Again, no consideration is made for whether or not the player was determined to be guilty of the charge.

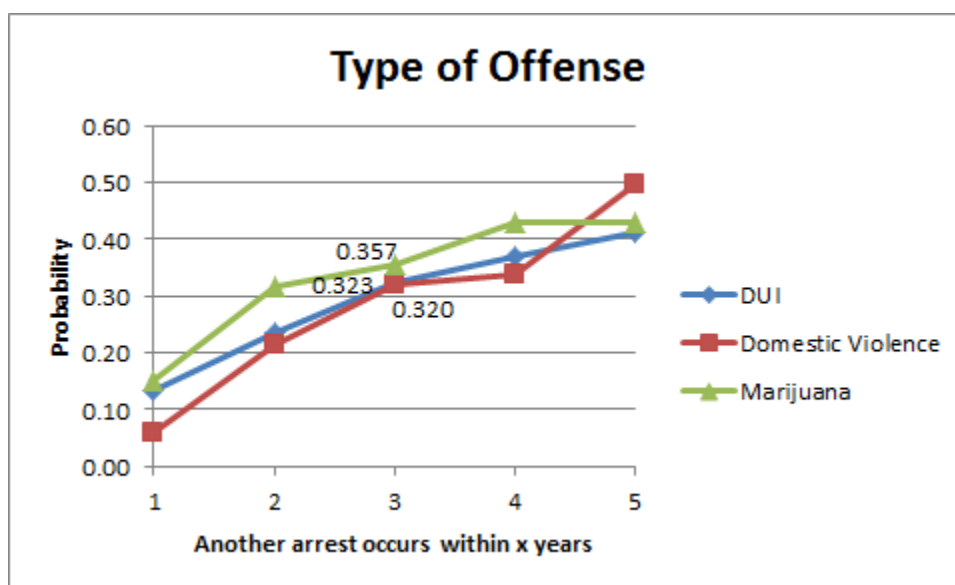


Figure 6.8 Type of Offense

According to these results, both a DUI and domestic violence have a three-year recidivism rate around 32 percent, and for marijuana possession it is about 36 percent. None of these rates are very different from the overall three-year average of 34.6 percent, and the entire graph seems to indicate that the type of offense has a minimal impact on the probability of a future arrest. Therefore, this does not appear to be a factor that teams should really take into consideration.

Tests of Statistical Significance

The analysis in this chapter examines whether, over the past 15 NFL seasons, certain characteristics have been associated with recidivism more frequently than others. We have noted several factors for which there is a difference in the recidivism rates between different subgroups of players. However, we haven't yet addressed whether these differences are statistically significant.

Using a two-proportion test, we can see whether the rates for the characteristics that have more often led to a repeat arrest are statistically different than the rates for the more favorable characteristics in terms of avoiding recidivism. Our null hypothesis is that the two recidivism rates are the same, so a low p-value would enable us to reject the null hypothesis and conclude that the recidivism rates being compared are statistically different.

Focusing on the three-year recidivism rates and using a five percent level of significance, only one of our variables---years of NFL experience---turns out to be statistically significant. Comparing rookies to second-year players, the p-value is .031, so we can reject the hypothesis that the two groups of players would be expected to exhibit the same recidivism rates. When we compare rookies to veteran players, we again obtain a significant p-value of .000, making it extremely unlikely that the observed difference in recidivism rates between the groups could have happened by chance.

Another one of our factors---time since last arrest---doesn't show statistical significance at the five percent level, but does at the ten percent level. The p-value is .063 when comparing players with one clean year to those with two clean years, and it is .085 when comparing players with two clean years to those with three or more clean years. Therefore, we have some statistical significance that the length of time since a player's last arrest should result in different recidivism rates, though the support is not as strong as it was with years of NFL experience.

This means that for our other variables where we noted differences in recidivism rates, statistically, we cannot reject the null hypothesis that the recidivism rates should be similar. However, this doesn't mean that we should automatically discard our earlier findings regarding these factors.

First of all, since we have narrowed our research to the population of NFL players since the turn of the century, we don't have enormous sample sizes, which can make it difficult to achieve statistical significance.

Furthermore, just because some of our findings weren't backed by large-enough sample sizes to be statistically significant, it doesn't necessarily mean that our results wouldn't be representative of a larger sample. Several of our conclusions were backed by research regarding the general population, and for the ones that couldn't be tied to literature, it was only because no research was available, not because our findings contradicted any studies. In addition, we developed reasoning as to why each characteristic that appeared to impact recidivism could alter future behavior.

Finally, actuaries often need to make decisions where they have limited information available. For example, if an insurance company expands a product to a brand-new market, actuaries may have little data to go off of, but they still must be able to come up with their best estimates possible on how to price and reserve for the product. Companies who choose not to expand the product simply because they do not have as much information as they would like risk falling behind their peers.

Similarly, if certain NFL teams elected to avoid signing players just because they were arrested in their rookie season, they could risk falling behind their competition as well. We have gained empirical support for other information that, while perhaps not statistically significant, could certainly have some practical value in helping teams evaluate the recidivism rate of a player. Therefore, it seems to make the most sense for teams to utilize everything that is available to them in order to make the most well-informed decision possible.

Chapter 7

Predicting Recidivism

The analysis given to this point focuses on one factor at a time and examines whether the subgroups of players that are being compared exhibit different recidivism rates. This has enabled us to determine five factors that appear to influence recidivism to some degree: time since last arrest, number of arrests, years of NFL experience, presence of punishment affecting playing career, and severity of charge associated with arrest.

While it can be beneficial for a team to know which factors to consider when predicting whether or not a player will be arrested again in the future, a more helpful model would take into account all of the variables behind a player's most recent arrest to determine the odds of recidivism for that specific individual. Though there is no such model developed for the population of NFL players, there has been an actuarial study conducted by the Correctional Service of Canada---an agency of the Canadian federal government---that predicts recidivism for federally sentenced non-Aboriginal males (Nafekh and Motiuk).

This tool utilizes the Statistical Information on Recidivism – Revised 1 (SIR-R1) scale, which assigns a score for each of 15 factors that are believed to impact recidivism rates. The scores are then added together to classify the risk of recidivism for each individual. In this study, recidivism is defined as an additional offense that occurs within three years of the person's release from prison.

Each score is determined by comparing the recidivism rate of a subgroup of the population with the overall recidivism rate for the population. As an example relating to our study, the three-year recidivism rate for players who were last arrested as a rookie (approximately 53 percent) would be compared to the general three-year recidivism rate for all NFL players who have been arrested since 2000 (about 35 percent). In other words, it measures the distance from the mean that results from the presence of a certain characteristic.

The scoring system then assigns one positive or negative point for every five percent that the recidivism rate for a particular subgroup differs from the overall recidivism rate. This way, we are able to give the most weight to the most statistically significant factors. Characteristics with lower probabilities of a future arrest would receive a positive score, and those with higher recidivism rates would get a negative score. However, there is also a buffer of plus/minus five percent from the mean before the scoring begins.

For example, using the 35 percent overall recidivism rate for NFL players as a baseline, the method of the SIR-R1 scale would say that any rate between 30 and 40 percent would not be significantly different enough from the mean to be scored. For every five percent above 40 percent, the characteristic would receive a score of (-1), and for every five percent below 30 percent, it would receive a (+1). The method does allow for rounding up, so a point could still be assigned if the rate is close to but doesn't quite reach 45 percent.

Though it would be ideal if we could follow this exact method to develop a model predicting recidivism of NFL players, the Correctional Service of Canada possesses the advantage of having access to the government's data, which enables it to include more factors and information about each person. For example, the SIR-R1 scale includes marital status and number of dependents as two of its factors, but that is not publicly available information that we can incorporate into this analysis.

In addition, there are some factors used in the SIR-R1 scale that wouldn't apply to the population of previously-arrested NFL players. One of which is employment status---since, of course, each NFL player has the same occupation.

All in all, with the SIR-R1 scale having 15 factors at its disposal, it offers more flexibility. Characteristics with borderline significance can be discarded, and there are still enough variables remaining to create a sufficient amount of differentiation between individuals to classify them into different risk groups based on their overall scores.

But as we discussed earlier, having less data to work with, we need to use any information we do have indicating that a certain characteristic appears to impact recidivism, even if it doesn't fall outside of the plus/minus five percent buffer zone.

Scoring System

Table 7.1 shows the possible classifications for each of the factors that appear to affect recidivism rates of previously-arrested NFL players and the associated scores.

Table 7.1 Scoring System

Characteristic	Score
Time Since Last Arrest	
1 Clean Year	+1
2 Clean Years	+3
3+ Clean Years	+4
Number of Arrests	
1st Arrest	+0.5
2nd Arrest	-0.5
3+ Arrests	-2
Years of NFL Experience	
Rookie	-3.5
2nd Year	0
3+ Years	+1
Presence of Punishment Affecting Playing Career	
Yes	+2
No Games Missed	0
Severity of Charge Associated with Arrest	
Misdemeanor	0
Felony	-1

Each of these numbers was found by subtracting the three-year recidivism rate for that particular characteristic from the overall average rate of 35 percent, dividing by five, and then rounding to the

nearest whole number, with two exceptions. Since the recidivism rate for rookies (52.94 percent) was almost squarely in-between the 50 percent and the 55 percent threshold, it was assigned a (-3.5). Also, when looking at recidivism following a first and second arrest, the rates were 32.9 percent and 37.3 percent, respectively. So, the two probabilities are separated by about five percent and are therefore scored as being one full point apart, but since they were only 2.0-2.5 percent from the mean, they were each assigned plus/minus a half-point.

Creating Risk Classification Groups

This scoring system was then applied to the data set of NFL players with at least one arrest since 2000. Having 15 full years of data, we are able to pick four different points in time---1/1/2003, 1/1/2006, 1/1/2009, and 1/1/2012---at which we can retrospectively test to see how accurately this method predicted recidivism.

For example, the test at 1/1/2012 would include players that had been arrested at some point before that date, and it would look to see whether or not that player got arrested an additional time in the next three years (by 12/31/2014). Players were only included in the data set if they were eligible to receive a score for all five factors. Therefore, players whose career began before 2000 were not included because they could not be scored for number of arrests (unless they have at least three), due to the possibility of arrests occurring before 2000. Also, players were only included in the calculations if their career lasted through the entire three-year period of interest.

To give an example of how the scoring works, say we have a player who has been arrested once, for a misdemeanor, in his third NFL season, on 4/12/2010, and did not miss any games because of it. He would receive a (+1) because, as of 1/1/2012, it has been one full year since his last arrest; he would get a (+0.5) because his most recent arrest was his first; he would be assigned a (+1) because he was in at least

his third season at the time of the arrest; and he would be given a (0) for not missing any games and another (0) for it being a misdemeanor. Therefore, his overall score would be $1 + 0.5 + 1 + 0 + 0 = 2$.

Similar tests were done using starting dates of 1/1/2009, 1/1/2006, and 1/1/2003, each time using the subsequent three years as the time period of interest. This explains why the tests must be three years apart, or otherwise the three-year time periods would overlap.

Also, this method could allow for the same player to be included in the data set for several time periods. As an example, if he is arrested at some point before 2009, whether or not he gets arrested again between 1/1/2009 and 12/31/2011 would be a separate inquisition from whether or not he gets arrested again between 1/1/2012 and 12/31/2014---although his score would be different for the second observation because he would either have three more clean years at that point, or he could have an additional arrest by then, which may also affect his presence of punishment and misdemeanor/felony score.

A common task for actuaries is to help the underwriting department classify the risk that a customer incurs a future claim. Using our scoring system, we will do something similar here by classifying the risk that a player incurs a future arrest based on the scoring range he falls into.

Of the 30 players who receive a negative score, 36.7 percent of them are arrested again within three years of the specified starting date. Granted, this is a relatively small sample size, but based on the available data, those having a score of (-0.5) or lower appear to constitute a high-risk group for recidivism. In comparison, for the 196 players who receive a nonnegative score (0 or higher), 19.9 percent of them are arrested an additional time during the specified three-year period, constituting a relatively lower-risk group to recidivate.

One thing you may notice is that, utilizing this method, the average recidivism rate (which is 22.1 percent) is well below the overall average three-year recidivism rate of 35 percent found at the beginning of this report. However, keep in mind that the 35 percent figure was reached by finding the probability of an additional arrest within three years of the previous arrest---in other words, with no clean years. All

other graphs shown---except for the one specifically looking at the impact of clean years---follow this same logic of taking clean years out of the equation so as to focus on the variable being examined.

But in most cases, teams aren't going to make a decision on whether or not they want to sign a player the day after he gets arrested. Instead, they'll cross that bridge at some future date, and at that point, the player may have accumulated some clean years. This is the process that is represented by the scoring system method.

Referring back to the analysis on how clean years affect recidivism rates, the probabilities drop rather steeply from 35 percent to 28 percent for one clean year, 22 percent for two clean years, and 15 percent for three or more clean years. As a result, if there are enough players with multiple clean years included in the test of each three-year time period, it is very reasonable that the average recidivism rate for these players is much lower than the 35 percent.

In an effort to classify players into more specific relative risk groups, we will divide both the negative- and nonnegative-scoring groups roughly in half and examine the resulting recidivism rates.

Table 7.2 Risk Group Classifications

Scoring Range	Number of Players	3-Year Recidivism Rate
-5 to -2	15	40.0%
-1.5 to -0.5	15	33.3%
0 to 1.5	102	22.5%
2 to 5.5	94	17.0%

In Table 7.2, we categorize players into high, medium-high, medium-low, and low risks to recidivate based on the five factors utilized in this scoring system. Of course, halving the already-small group of players receiving negative scores makes those sample sizes very small, and it may make the seven percent difference in recidivism rates for those two groups seem insignificant. However, if we were to change the cutoff and look at players who are assigned a (-2.5) or worse, the recidivism rate jumps to 55.6 percent. Therefore, even though we have limited data on players with negative scores, there does

appear to be some value in separating players with strongly negative scores from those with slightly negative scores.

The probabilities associated with the various scoring ranges can't be considered exact, because we don't know how the various factors interact with each other (the presence of certain characteristics could be independent in the way they influence recidivism, while others could either partially cancel each other out or magnify the effect). In addition, there was some judgment involved in the way scores were grouped. However, the results can be useful for developing some general criteria that consider all available information about a particular player to help determine his relative risk of being arrested again in the future.

Application to Recent Cases

We will now revisit the decision that teams must make during the 2015 NFL offseason regarding Ray Rice and Adrian Peterson.

Since the two players' arrests occurred before the new conduct policy was put into place, an additional violation due to a violent crime wouldn't necessarily result in a lifetime ban for either player. That being said, due to the public scrutiny both players received, it seems safe to say that a future arrest of any type would be highly problematic for whichever teams end up with these players.

Under this model, Rice would receive a score of (+3.5) and Peterson would receive a (+1.5), putting Rice in the category of having a relatively low risk of general recidivism and Peterson in the medium-low risk category. Though neither player has yet made it through a clean year since his last arrest, they are both veteran players who each received a lengthy suspension that could cause them to regret and potentially change their behavior. These are positive signs that each player will be less likely to be arrested again in the future. Peterson's score is a bit lower because his most recent arrest was his second, and it was for a felony charge.

Chapter 8

Arrests for Violence

To this point, we have utilized past information to determine the probability that an NFL player will face any type of arrest in the future. This enables us to utilize our sample size to the fullest extent possible to single out certain factors that have empirically shown to make recidivism more likely, and the resultant model can be used to help teams avoid players who could be high risks for future legal trouble.

Though no team wants to see one of its players get arrested, there are certain types of arrests that could be more damaging for a team than others. One of which would be an arrest for a violent crime, not just for the negative publicity it would bring to the team, but also due to the potential that the player misses significant playing time as a result of the new player conduct policy.

It was found earlier that players arrested for domestic violence---the most common type of arrest for a violent act---don't appear to be significantly more or less likely to run into any future legal trouble than someone arrested for another reason. However, in this section, we will only consider whether an arrest for a violent charge predicts similar behavior in the future. In other words, given that a player has been arrested for a violent act, how likely is he to be arrested again for an additional violent act?

Results

Since 2000, 167 players have accumulated 195 arrests for domestic violence, child abuse, sexual assault, assault, or battery. Using similar methods as before, Figure 8.1 presents the results for the probability that a player who has been arrested previously for one of these charges will get arrested for another violent charge in a given number of years.

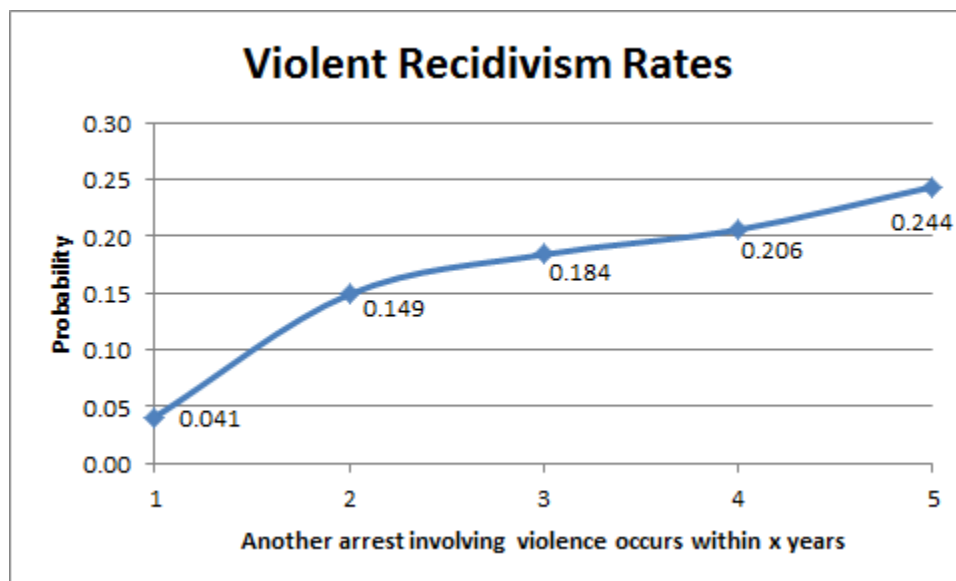


Figure 8.1 Violent Recidivism Rates

These results show that, for example, if a player has just been arrested for a violent act, there is about an 18 percent chance that he will be arrested for another violent act sometime in the next three years.

One noteworthy result is that the likelihood of an additional arrest for violence within a year of the previous arrest is very low (four percent). Perhaps this follows the same logic as the one-year recidivism rate being relatively lower when a player's previous arrest was a felony. In either case, the repercussions could be very serious, but the verdict may not have come out yet, so there is a large incentive for the player to avoid similar behavior in the meantime.

There also is a large jump when the time period of interest goes to two years, and the recidivism rates generally level off thereafter. This is a different result than when we examined all arrests, where the leveling off appeared to occur after year three. Therefore, this seems to show that if a player is going to incur a repeat arrest for violence, the majority of the time it will happen within two years---especially in the second year, since the one-year recidivism rate is very low.

To clarify, this is not to say that either the original or the subsequent arrest for violence would necessarily result in a violation of the player conduct policy, as it is yet to be seen how the new policy will be applied. Going forward, though, any player who is given a conduct violation for violent behavior would then be subject to a lifetime ban with another such violation, so teams would need to pay special attention to these rates in those situations.

However, even if the first arrest for violence doesn't result in a conduct violation, the recidivism rates would still be valuable to consider. A player who has been arrested for violence in the past would seemingly be more likely to exhibit violent behavior in the future than someone with no history of violence; therefore, this player would have an increased risk of picking up his first conduct violation. The first violation may not be as significant as the lifetime ban that comes with the second violation, but it still carries a baseline six-game suspension. As a result, teams should carefully evaluate the risk of any player who could be more prone to violent behavior, even if he hasn't received any official conduct violations.

According to an article in the journal *Aggression and Violent Behavior*, multiple research reports have shown that “there is no distinction between the variables that are predictive of violent and general recidivism,” (Loza 181). This would lead us to believe that the factors we found to impact recidivism earlier would have a similar effect on violent recidivism. We will examine if this is indeed the case for the characteristics where we have a large-enough sample size of violent arrests.

Limitations

Since we are working with just a subgroup of our original data by only considering arrests associated with charges for violence, we will not be able to explore as many factors as before to determine whether certain characteristics appear to impact violent recidivism. For example, there aren't enough rookies and second-year players with an arrest for violence or enough felony violence-related charges to make those analyses worthwhile.

In addition, even for some of the analyses that we will conduct in this chapter, the sample sizes of certain groups are still rather small. Therefore, we will not be looking to prove statistical significance in this chapter, nor will we use the results to create a model classifying risk of violent recidivism as we did before for general recidivism. Instead, the primary goal of the following sections is to examine areas where players with arrests for violence exhibit tendencies similar to what we found when considering all arrests (as literature suggests they do), or to see if there are any areas where the trends may differ.

Time Since Last Arrest

One seemingly important factor from the earlier analysis was the amount of time that has passed since a player's most recent arrest. Here, we will take the same approach, but only considering violence-related arrests. In this situation, a "clean" year does not necessarily mean that the player was completely arrest-free during that time period; it just means that he avoided another arrest for violence.

In Figure 8.2 are the results for the likelihood of an additional arrest for violence following a given clean period. Since our data is more limited than before, the largest clean period shown in the graph is two years and the probabilities are only shown out to three years. As usual, the three-year recidivism rates are labeled.

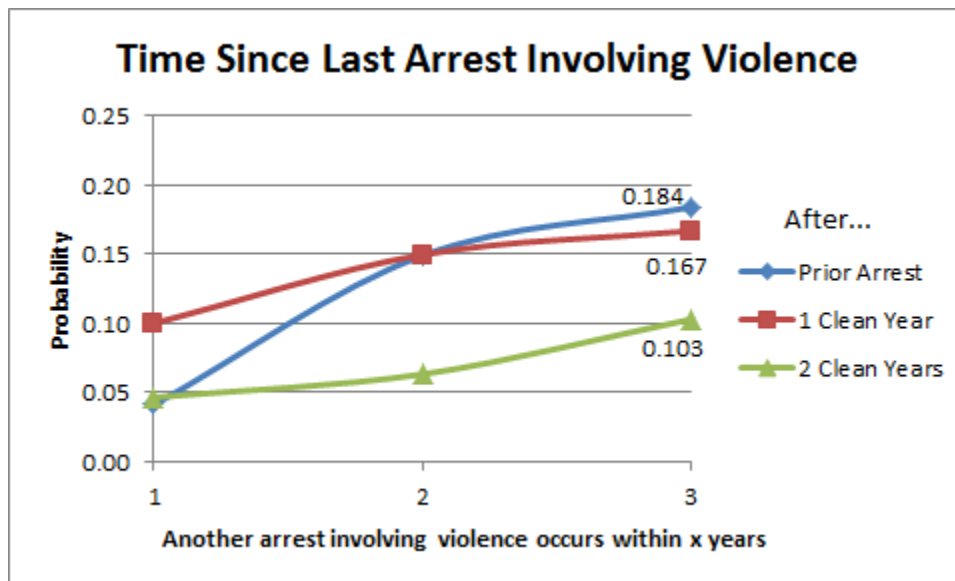


Figure 8.2 Time Since Last Arrest Involving Violence

We noted in the previous section that very few players appear to be arrested a second time within a year for violent charges, and these results show a similar pattern. When looking at the one-year recidivism rates, having one clean year doesn't lower the likelihood of an additional arrest in the next season; not many players are arrested in that first year anyway, so being clean in that year doesn't really signal much. In fact, the one-year recidivism rate is much higher for those with one clean year than for those who were just arrested because players seem to be most likely to recidivate in the second year.

As expected, there is a relatively sizable drop in violent recidivism rates once players have accumulated two clean years. This again shows that once a player makes it through that second year, teams may be able to feel a little more comfortable that he won't recidivate. This finding is based on a sample size of 85 players who have accumulated at least two clean years since their last arrest for violence.

Number of Arrests

When examining all arrests, we found that the players who had more extensive arrest histories were more likely to recidivate. Here, we'll see if the number of times that a player has been arrested for violence affects the likelihood that he will face an additional violence-related arrest.

Since there are very few players who have been arrested three times or more for an act of violence, we will compare recidivism rates for those who have been arrested for the first time to those who just incurred their second arrest or more. 97 players fall into the first category, and 24 are included in the second.

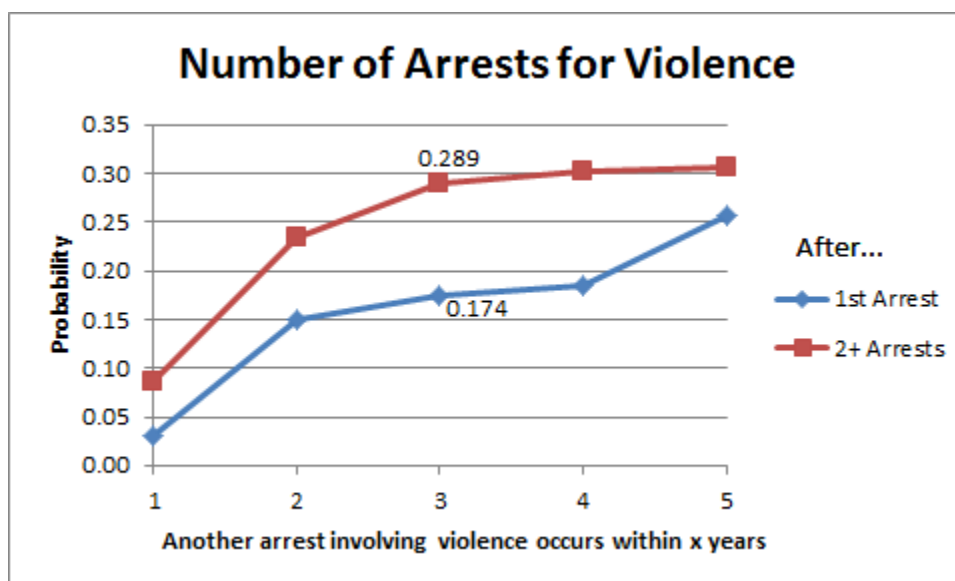


Figure 8.3 Number of Arrests Involving Violence

We see in Figure 8.3 that the trend of players with multiple prior arrests being more likely to recidivate also applies specifically to arrests for violence, and to an even larger degree. This finding agrees with research that has been done on the subject. A report by the Centre for Criminal Justice Studies at the University of New Brunswick-Saint John mentions that, “Among static factors, criminal history is one of the stronger predictors of future violence and general recidivism,” (Campbell, French, and Gendreau 3). The study goes on to say that predicting recidivism based solely on prior offenses often

garners criticism, with one primary reason being that it doesn't "measure change in risk level over time" (3). However, by combining this information with the findings from the prior section on time since last arrest, we could incorporate both of these factors when assessing the risk of violent recidivism for a particular player.

Regarding the results found in this section, violent arrests likely lead to serious consequences more often than non-violent arrests, so perhaps the first arrest for violence serves as enough of a wake-up call to cause many players to change their behavior going forward. However, if a player failed to learn his lesson after his first arrest for violence, this may be a sign that his behavior will continue. It is also important to keep in mind that the sample size is relatively small for players with at least two violence-related arrests, which could potentially be a reason for the very wide discrepancy in recidivism rates for the two groups.

Presence of Punishment Affecting Playing Career

Earlier, we saw that a player being suspended, cut, or missing at least part of a season due to jail time lowers his recidivism rate, perhaps serving as a wake-up call from which the player can learn from his mistake. In this section, we examine whether a punishment stemming from a violence-related arrest that affects an individual's playing career impacts the likelihood that he faces another arrest for violence.

Our sample size includes 101 players who did not miss playing time as a result of an arrest for violence and 22 players who did face a punishment that impacted their career. The results are displayed in Figure 8.4.

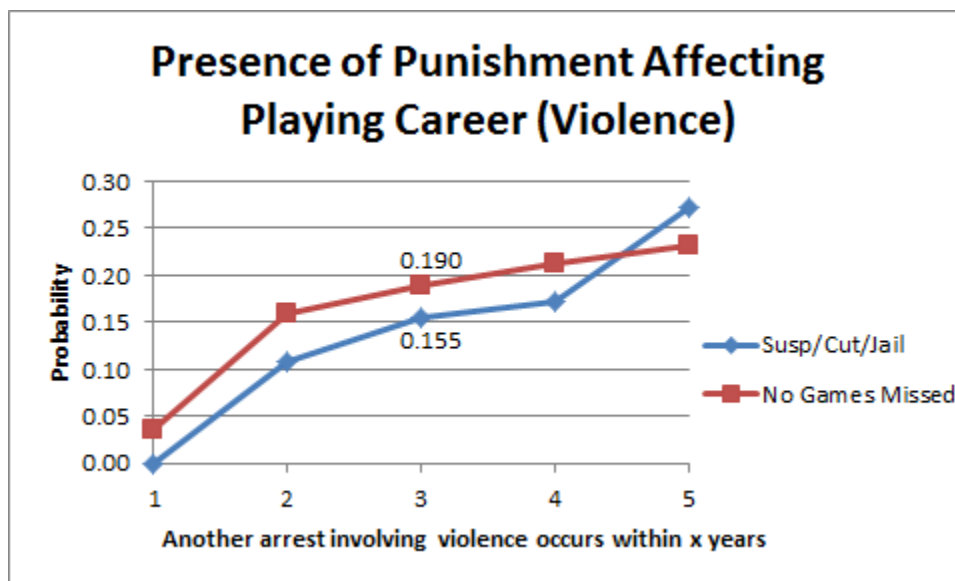


Figure 8.4 Presence of Punishment Affecting Playing Career (Violence)

These results are similar as before, with players who were cut, suspended, or have faced jail time overlapping with an NFL season appearing to be less likely to engage in violent behavior in the future. The difference in recidivism rates is nearly uniform through the first four years, with the recidivism rate for the group of players who missed games following their last arrest for violence jumping in the fifth year. However, due to the small sample size, just a few players from that group getting arrested in the fifth year can substantially affect our results.

Overall, the results from this section seem to add credibility to the NFL's new player conduct policy with harsher suspensions for violence-related violations, as we have again shown that missed playing time does seem to impact future behavior. This also helps substantiate players such as Ray Rice and Adrian Peterson being classified as having a low risk to recidivate, since both players received significant suspensions.

Verdict Following Arrest

We will now examine whether a characteristic that did not seem to impact recidivism when looking at all arrests---the verdict resulting from the charges---has any impact when focusing on arrests involving violence.

As before, players have been separated into two groups. One is any player who was deemed guilty, pleaded no contest, or received a punishment or required action (including a fine, community service, probation, mediation, counseling, or diversion program). The other category includes players who had their charges dropped or were acquitted. Considering only arrests for violence, the former group contains 67 players and the latter includes 62.

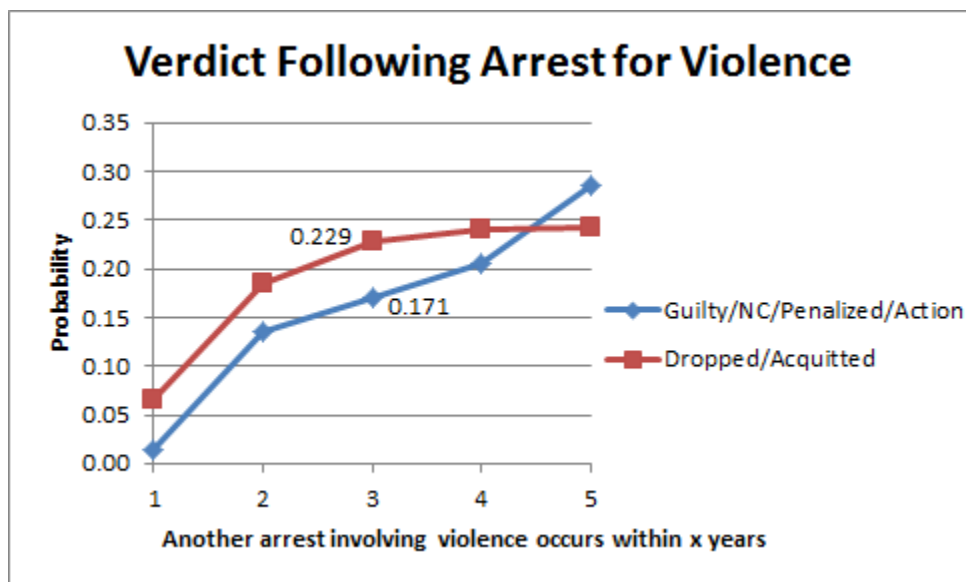


Figure 8.5 Verdict Following Arrest for Violence

The results in Figure 8.5 show that players who faced no legal consequences following their arrest for violence actually appear have an increased chance of exhibiting similar behavior in the future. Our results earlier indicated that teams should avoid over-penalizing players who fell into the guilty/no

contest/penalized/required action group, but these results go a step further and say that for violence-related arrests, teams should perhaps be more concerned about the players who received no repercussions.

As mentioned earlier, since violent offenses can result in serious penalties, a possible explanation for these findings is that some of these legal rulings may have been substantial enough to change a player's behavior. In comparison, when we were considering all arrests, the consequences from some of the non-violent arrests might have been relatively small, so the effect of a player learning his lesson may not have been as significant as it is here. Regardless, these results appear to add further support for the NFL's decision to continue investigating a possible violation of the player conduct policy for an act of violence even if there are no legal ramifications.

Chapter 9

Conclusion

In this report, we have taken an in-depth look at evaluating the risk of recidivism for previously-arrested NFL players. We found that the likelihood of a future arrest within three years of a player's most recent offense is about 35 percent, and if recidivism is to occur, the majority of the time it happens within three years.

In addition, several characteristics appear to make certain players more likely to recidivate than others. For example, players who were arrested as rookies have been empirically shown to be worse recidivism risks, as are players who have had multiple arrests throughout their career. Those who have incurred a felony charge look to have a slightly larger recidivism risk as well.

On the other hand, players who have been punished in a way that has forced them to miss playing time seem to be less likely to face a future arrest. Additionally, the more time that has passed since a player's most recent arrest, the more that his recidivism odds decline, as this arrest-free time period may signal a change in behavior.

We also learned that whether or not a player faces any legal consequences as a result of his arrest does not appear to affect the probability that he will repeat his behavior, nor does the type of charge that the player has been arrested for.

We used an actuarial tool that was originally created to classify the risk of recidivism for members of a general population and adapted it so that it can be applied to NFL players. Players were scored based on the five variables that were determined to impact recidivism to some degree, with different weights being applied based upon how much the recidivism rate associated with a certain characteristic deviates from the overall mean recidivism rate.

Due to several incidents during the 2014 NFL season, including two high-profile cases involving Ray Rice and Adrian Peterson, the NFL has installed harsher measures when a player violates the conduct

policy with an arrest involving violence. With the consequences growing larger for a team having a player who faces a violence-related arrest, we examined the recidivism trends specifically related to this type of charge.

We found that the probability of a player incurring an additional arrest for violence within three years is about 18 percent. Many of the factors that impacted the likelihood of any future arrest affected the odds of a violence-related arrest in a similar fashion. For example, elapsed time since a player's last violent offense and the presence of a punishment that affected the player's career both served to lower the recidivism rate, whereas the accumulation of multiple arrests for violence raised the rate of recidivism.

A few key differences were that the majority of repeat arrests for violence occurred within two years---not three, as we saw when considering all arrests---and those who were acquitted or had their charge for violence dropped actually appear that they might have an increased risk for recidivism.

Of course, teams may also be able to glean valuable information by interviewing a previously-arrested player before signing him. However, this report offers a tool that objectively measures recidivism risk, which could always be used in conjunction with the front office's subjective feelings about the likelihood that a player recidivates. We will conclude by examining some ways to expand upon the model formulated in this report and applying these methods to other risks that teams could come across when making personnel decisions.

Further Extensions of Model

This report makes use of publicly available data to develop recidivism rates for NFL players. However, teams generally have access to more information than is available publicly, which may allow them to add more detail to the analysis conducted thus far.

Adding More Factors

As mentioned earlier, the SIR-R1 scale incorporates 15 different factors to classify the recidivism risk of an individual. Therefore, there would be opportunities to add more variables to the model if they are found to affect the probability of a future arrest.

For example, perhaps marital status and/or number of dependents would be a better predictor of recidivism than years of NFL experience. In addition, the environment in which an individual was raised (both financially and by location) and the city he plays in may also have an impact on recidivism rates and improve the accuracy of the model.

Projecting College Players

This report focuses on whether or not a team should sign a player whose NFL career is already in progress, based on the player's arrest history since his pro career began. However, an interesting application of this model would predict the likelihood that a player who faced legal trouble in college will also be arrested in the NFL.

The same general methods discussed in this report could be used, and there is also no reason to believe that some of the factors shown to impact the recidivism rates in this analysis wouldn't pertain to the college model as well.

For example, it seems reasonable that a player who was arrested as an underclassman and has been clean since would be less likely to recidivate than someone who was arrested later in his college career. A player who was arrested multiple times in college would probably have a higher recidivism rate than someone arrested once, and getting suspended or kicked out of a program could cause the player to alter his future behavior.

One factor that may not differentiate college players from each other as much as it differentiates NFL players from one another is years of experience at the time of arrest. This factor is certainly still

worth examining, since upperclassmen should be able to handle a mistake more maturely than underclassmen. However, the one characteristic that may have substantially separated recidivism rates between rookies and experienced NFL players is the impact of veteran players being more likely to have a family, whereas significantly fewer college players (regardless of what year they are in) would have that responsibility.

Though the age/maturity factor may not substantially separate college players from each other, it would likely increase the recidivism rate for college players as a whole as compared to NFL players. For example, a report by the State of New York Department of Corrections and Community Supervision shows that, of those released from prison, the recidivism rate is 1.35 times higher for those under age 21 than it is for those aged 21-34 (“Three Year Post Release Follow-up”). Though our model considers arrests rather than incarcerations, this study still demonstrates a trend of minors being more likely to repeat their behavior.

Developing a model that takes all of these factors into consideration would be very helpful for teams on draft day. Often, college players with an arrest history are labeled as simply having “character issues,” but that doesn’t provide much detail into their likelihood of a future arrest. If teams could use the specific circumstances behind a player’s college arrest(s) to help determine the general recidivism rate to apply to the player, they could make a more informed decision on whether it would be worth the risk to draft him and place him on their draft board accordingly.

Application to Injuries

When a team is considering signing a player, another important risk to consider is the likelihood of a future injury. For example, given that a player has torn his ACL in the past, what are the odds that he will sustain a similar injury again?

Creating a model to answer this question would require some adaptations; for example, some of the variables would be different, and our event of interest would probably only be if the player injures the same body part an additional time, since something like a broken finger followed by a concussion would be completely unrelated.

However, the same general methods could be applied to determine the likelihood of re-injury within a certain number of years. The “time since last injury” factor would very much come into play, as it would be interesting to see how a given number of healthy years affects the odds of a future injury and examine how that changes depending on the injury. The age factor would likely have a significant role in projecting the re-injury rates as well.

Though the public can usually find injury information, it is not present in aggregated form as player arrests are. Additionally, teams may choose to give very minimal detail when disclosing injuries. However, if teams did have this information at their disposal, they could couple it with the model created in this report and be able to fully evaluate all of the risks involved in adding a player with a history of arrests or injuries to its roster.

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Internships

Cigna, Actuarial Executive Development Program Intern (5/14-8/14)

- Proposed a new credibility formula for pricing of healthcare business that accounts for pooling point
- Conducted a formal presentation of findings from project to actuarial community
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Hay Group, Healthcare Analyst Intern (6/13-7/13)

- Reviewed bids submitted by insurance companies to the Centers for Medicare and Medicaid Services
- Drafted comments explaining actuarial methods used to project costs and enrollment

SOA, Actuary of the Future (AOF) Section Council Intern (10/13-10/14)

- Conducted interview of a CRO for the Joint Risk Management Section newsletter
- Participated in the AOF Section Council's monthly teleconferences

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- Assisted producers in efficiently creating highlight packages to air on nightly newscasts

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Actuarial Science Club Vice President (3/14-3/15)

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- Broadcasted live Penn State sporting events, including football, for an online radio station
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