**Examining the Factors Associated with Recidivism**

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**Abstract**

    Recidivism, when used to describe criminals, is the act of an individual being rearrested for committing a similar offense. Many factors exist that are associated with recidivism and have predictive value. Age is one such factor; adolescents are becoming just as likely to commit crimes as adults. Other variables to consider when observing recidivism rates are type of crime committed, gender, history of mental illness, and race. Many studies focus on one of these variables while very few take more than one into consideration. It is important to understand each variable and how it relates to recidivism in order to see which ones, if any, has greater significance, but it is also important to see how these variables relate with one another and how, together, they affect recidivism rates. Logistic regression was used on Pennsylvania Sentencing Data from 1998 to analyze how the aforementioned factors interact in conjunction with one another and how these factors may have different values of significance in predicting recidivism.

**Introduction**

　　Recidivism, when used to describe criminals, is the act of an individual being rearrested for committing a similar offense. Recidivism in general has become a major concern for society. America already has the largest number of incarcerated individuals in the world. There are many variables to consider when looking at recidivism rates that include age, type of offense, gender, mental illness, and race, among others. Research is also limited to the number of studies conducted in relating several variables with recidivism. By looking at combinations of variables, and how they influence recidivism, researchers will be able to develop a greater picture of why recidivism rates are so high.

*Age*

　　Countless studies have been conducted to observe recidivism among adults. Very few studies, however, have been done to observe recidivism among adolescents. One of the main reasons for this contrast is due to adults being more prone to commit crimes over time. In this present day, however, adolescents are becoming just as likely to commit crimes as adults. Additionally, this increase in adolescent criminal behavior increases the number of individuals who are likely to reoffend; solving this problem has become a national priority (Shepherd, Green, & Omobien, 2005).

　　Several reviews regarding adolescents have been published; these reviews led to the identification of behavioral factors connected to a youth's level of functioning (LOF) that are associated with recidivism. While many of these reviews feature the use of certain criminogenic assessments, such as the Youth Level of Service/Case Management Inventory (YLS/CMI), published research evaluating adolescents is limited (Shepherd, et al., 2005). Researchers use assessments, like the YLS/CMI, to predict recidivism measures among the individuals in a

population. Often times, the assessments used on adolescents are based on adult assessments. A positive correlation was found between LOF and criminogenic risk which suggests that adolescents with a higher LOF score are more at risk of reoffending (Shepherd, et al., 2005).

Another view regarding this association of age and recidivism is the idea that there are two types of delinquency among juveniles: adolescence limited and life-course persistent. Adolescence limited delinquency is based on characteristics that are specific to adolescents; it is also seen as common, to an extent, because it occurs in a large portion of the population of adolescents – between 30-40% (Mulder, Brand, Bullens, & van Marle, 2011). Although much research has been done on risk factors associated with recidivism, there has not been a significant amount of research conducted on risk factors for severity of recidivism nor on how much risk factors can predict recidivism. The severity of recidivism is especially important because the burden on society is greater when the offense is more serious (Mulder, et al., 2011).

*Types of Crimes*

In addition to age, another variable to consider when determining recidivism rates is the type of crime committed. There are hundreds of types of crimes from which to observe, but the two most prevalent crimes that have been studied are drug offenses and sexual offenses.

Drug use and abuse has become a growing concern for society. Richard Nixon declared that drugs were becoming a national problem almost 40 years ago. With probationers accounting for almost 60% of the correctional institution population and 43% of probationers being classified as drug dependent, individuals whose offenses are drug-related make up a large portion of the criminal population (Huebner & Cobbina, 2007; Spohn & Holleran, 2002). In this present day, there are many opportunities for addicts to receive the treatment they need. Probationers are offered the chance to enroll in a treatment program following their release. Researchers found

that most probationers with a history of drug use opted to participate in the treatment. Of those, 71% completed the full course of treatment. Probationers who entered treatment, but did not complete it, were most likely to reoffend, followed by those who did not enter treatment and then those who successfully completed treatment (Huebner & Cobbina, 2007).

Additionally, in a similar study, individuals who were sentenced to prison were significantly more likely to be rearrested for a new offense than offenders who were put on probation. Researchers also discovered that inmates released from prison reoffended more quickly than those on probation (Spohn & Holleran, 2002).

Another important classification of crime to consider is sexual offense. There are two major scales that were developed to screen for sexual recidivism risk: the Rapid Risk Assessment of Sexual Offense Recidivism (RRASOR) and the Static-99 (Sjostedt & Langstrom, 2001; Babchishin, Hanson, & Helmus, 2012; Firestone, Nunes, Moulden, Broom, & Bradford, 2005; Nunes, Firestone, Wexler, Jensen, & Bradford, 2007). These two scales have relatively high success rates when used in the traditional setting of their creation. Researchers in Sweden decided to test these two scales by studying the results of sexual offenders in their own prisons. Under Swedish law, a sexual offense meets one of two criteria: physical contact, such as molestation or rape, and non-physical contact, such as indecent exposure. After the research was concluded, it was determined that both scales were indeed capable of accurately measuring sexual recidivism (Sjostedt & Langstrom, 2001).

A supplementary view on sexual offense and recidivism can be found by looking at sexual offenders who fail to register (FTR). They are believed to be at a higher risk for sexual recidivism because they are conceivably trying to find new victims and avoid detection. The researchers found that FTR offenders had more prior offense, both sexual and nonsexual than

those who registered; they also committed a greater variety of crimes (Levenson, Sandler, & Freeman, 2012).

*Gender*

Both men and women commit crimes and they are both capable of reoffending. These two groups may even face similar, relevant risk factors. That does not mean, however, that both sexes have the same opportunities and chances in society; it also does not mean that they face the same social disadvantages (Andrews, et al., 2012). When using the Level of Service/ Case Management Inventory (LS/CMI), it was found that predictive validity of this scale was gender-neutral; there was no bias against a certain gender (Andrews, et al., 2012).

A competing viewpoint is observed when looking at the female gender exclusively. Some researchers argue that scales, such as the LS/CMI, should not be used due to the fact that these scales were developed with male theories of crime in mind. That is to say, these theories were developed by men who relied on their own assumptions of social life and used samples of men and boys to test their hypotheses (Reisig, Holtfreter, & Morash, 2006). Consequently, some groups argue that these scales do not take female-specific needs into consideration. Few studies have been done regarding recidivism among women offenders; additional research should be completed to improve general understanding.

Similarly, another article explores the idea of gender-neutral scales and how they affect recidivism for men and women. The researchers found that, by using these assessments, men had a greater risk score than women. However, there were other differences in the scores as well. Men were found to have more problems with criminal history, finances, drugs, and alcohol, whereas women had more troubles with education and work, familial relationships, and

emotions. These individual parts of the risk scores contribute to the total recidivism risk rate (van der Knaap, Alberda, Oosterveld, & Born, 2012).

*Mental Illness*

History of mental illness is another variable that is usually observed when considering recidivism rates. Providing treatment for criminals with a history of mental illness will decrease the risk of recidivism and improve their stability and public safety (Rotter & Carr, 2011). The researchers suggest that the overrepresentation of the mentally ill in the criminal system can be alleviated with community-care.

In addition, 15% of all prison inmates and 24% of all jail inmates were reported to display psychotic symptoms (Lamberti, 2007). These numbers are consistent with other research that has found individuals with psychotic disorders were arrested more often and have higher rates of convictions, both violent and nonviolent, when compared the general population. While individuals with an illness such as schizophrenia sometimes commit minor crimes, like theft or public intoxication, they and others have the ability to commit more serious crimes. One of the main reasons that the mentally ill find themselves in the criminal justice system can be attributed, with much debate, to the health care system. Combining legal leverage with readily accessible care is crucial to preventing recidivism among the mentally ill (Lamberti, 2007).

*Race*

Researchers have also tried to determine if a person's race has any effect on predicting whether or not he will reoffend. Many studies have been conducted on black males and recidivism because their data is easily accessible. One such study sought to identify whether or not black males released into an area of racial inequality recidivated at a different rate than the general black population. A study estimated that the likelihood of reoffending within two years

was 10% higher for black males released into areas with higher levels of racial inequality (Reisig, Bales, Hay, & Wang, 2007). Similarly, on another study featuring black males, researchers discovered that they recidivated at a much higher rate than white males. Additionally, the greatest amount of recidivism occurred during the first year after release, followed by the second and third year respectively (Jung, Spjeldnes, & Yamatani, 2010).

*Studies Involving More Than One Variable*

There is very little research done on multiple variables and recidivism. However, the most prevalent studies feature age and sexual offense or gender and history of mental illness compared to recidivism. When observing age and sexual offense against recidivism, many different factors exist. Researchers have found that not only does age at release affect the risk of recidivism, but age at first offense does as well. The relationship between age and sexual recidivism risk is also different between different types of sexual offenders, such as child molesters and rapists (Craig, 2008). In addition, researchers found that both sexual and nonsexual risk factors, developed by using the Estimate of Risk of Adolescent Sexual Offense Recidivism (ERASOR), can be used to accurately predict the risk of reoffending (Spice, Viljoen, Latzman, Scalora, & Ullman, 2012).

Another combination of variables that is scarcely investigated is gender and history of mental illness. Women and individuals with mental illnesses make up the two fastest growing portions of the U.S. prison population (Cloyes, Wong, Latimer, & Abarca, 2009). However, research is limited concerning the intersection of gender and mental illness in regards to recidivism. One study displayed evidence that women with serious mental illness (SMI) recidivated at the greatest rate. They reoffended more quickly than both men with SMI and females without SMI. Another result was that men with SMI recidivated faster than men without

SMI; this analysis suggests that mental illness is a significant factor when looking at recidivism for both genders (Cloyes, et al., 2009).

**Data and Methods**

*Sample*

The Pennsylvania Commission on Sentencing is a legislative agency of the Commonwealth of Pennsylvania that develops sentencing guidelines for judges to use when sentencing felony and misdemeanor offenses. The judges then report sentences to the Commission on a Guideline Sentence Form. The data collection, Pennsylvania Sentencing Data 1998, reflects all felonies and misdemeanors reported to the Commission that were sentenced during calendar year 1998. All records in the dataset contained information on individuals sentenced using either the 1991 sentencing guidelines or 1994 sentencing guidelines. The 1991 sentencing guidelines pertain to all offenses committed on or after August 9, 1991, up until the time that the 1994 guidelines became effective. The 1994 sentencing guidelines became effective for all offenses committed on or after August 12, 1994.

The data consisted of 32,744 offenses committed by 15,746 unique individuals, meaning the majority of individuals, when being sentenced, were sentenced for having more than one offense. The response variable took on two values: the individual had a prior conviction or the individual did not have a prior conviction. The available predictor variables for analysis in the dataset included age, gender, race, county, and drug assessment. The values for gender were male and female. The values for race were Caucasian, African American, Hispanic, Asian, American Indian, and other. Given the Pennsylvania county, the values for county were counties with a population less than 50,000 individuals, counties with a population between 50,000 and 200,000 individuals, and counties with a population greater than 200,000 individuals. The values

for drug assessment were individuals who were drug dependent, individuals who were not drug dependent, and individuals for which no drug assessment was completed.

All independent variables, except for age, are also qualitative in nature. Qualitative variables, unlike quantitative variables, cannot be measured on a numerical scale. The values of the qualitative variable (called levels) need to be coded as numbers before they can be fitted for a model. These coded qualitative variables are called dummy variables since the numbers assigned to the various levels are arbitrarily selected. For models that involve qualitative independent variables at more than two levels, additional dummy variables must be created. In general, the number of dummy variables used to describe a qualitative variable will be one less than the number of levels of the qualitative variable (Mendenhall & Sincich, 2003.)

The gender of an individual was either male or female, creating one dummy variable. The majority of individuals in the dataset were either Caucasian or African American; therefore, the race variable was split into three levels: Caucasian, African American, or other minorities. This created two dummy variables. In 1998, there were 18 Pennsylvania counties with populations greater than 200,000 individuals, 24 counties with populations between 50,000 and 200,000 individuals, and 25 counties with populations less than 50,000 individuals. This distinction also created two dummy variables. Finally, an individual could have been drug dependent, could not have been drug dependent, or could have had no drug assessment completed; this created two additional dummy variables. Adding the quantitative variable age to the number of dummy variables brought the total number of independent variables studied to eight variables.

*Model*

The model used to analyze this dataset was a logistic (or logit) regression model due to the qualitative binary response variable. The logistic model was originally developed for use in

survival analysis, where the response $y$ is typically measured as 0 or 1, depending on whether the experiment unit "survives." The mean response $E(y)$ can never fall below 0 or above 1. Thus, the logistic model ensures that the estimated response $\hat{y}$ (i.e., the estimated probability that $y = 1$) lies between 0 and 1 (Mendenhall & Sincich, 2003). The form of a logistic model is given by:

$$E(y) = \frac{\exp(\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_k x_k)}{1 + \exp(\beta_0 + \beta_1 x_1 + \beta_2 x_2 + \cdots + \beta_k x_k)}$$

where $E(y)$ is the expected value of the dependent binary variable, $x_i$ is the $i^{th}$ independent variable, and $\beta_i$ is the regression coefficient for $x_i$.

**Results**

The results of the logistic regression were generated using the statistical software R and are illustrated in Table 1.

Table 1: Logistic Regression Results

|  | $\hat{\beta}_k$ | Standard Error | Test Statistic Z | Pr(>\|z\|) |  |
|---|---|---|---|---|---|
| (Intercept) | -1.958121 | 0.121864 | -16.068 | < 2e-16 | *** |
| $X_1$: Age | 0.031593 | 0.001651 | 19.137 | < 2e-16 | *** |
| $X_2$: Gender | 0.614197 | 0.045464 | 13.509 | < 2e-16 | *** |
| $X_3$: Caucasian | 0.148698 | 0.072228 | 2.059 | 0.0395 | * |
| $X_4$: African American | 0.551619 | 0.073065 | 7.550 | 4.36e-14 | *** |
| $X_5$: County pop. > 200,000 | -0.198033 | 0.078313 | -2.529 | 0.0114 | * |
| $X_6$: 50,000 < County pop. < 200,000 | -0.181239 | 0.081983 | -2.211 | 0.0271 | * |
| $X_7$: Drug dependent | -0.056187 | 0.102981 | -0.546 | 0.5853 |  |
| $X_8$: Not drug dependent | -0.311418 | 0.077547 | -4.016 | 5.92e-05 | *** |
| Notes: *p < 0.05. **p < 0.01. ***p < 0.001 | | | | | |

All variables, with the exception of drug dependency, were significant at the 0.05 level of significance. The variables for age, gender, African American, and not drug dependent were all

highly significant while the variables for Caucasian, counties with populations greater than 200,000 individuals, and counties with populations between 50,000 and 200,000 individuals were significant at levels from 0.01 to 0.05.

Among these significant variables, age had a positive impact; the older an individual was, the greater the probability that he or she had at least one prior conviction on his or her record. The variable gender also had a positive impact. Males had a higher probability of having a prior conviction than females. With regards to race, both Caucasians and African Americans had a higher probability of having at least one prior conviction.

Several variables tended to have a negative impact on the probability of having at least one prior conviction as well. An individual that resided in a county with a population greater than 50,000 individuals had a lower probability of having a prior conviction. Finally, as expected, not being drug dependent lowers the probability of having at least one prior conviction.

**Conclusion**

The analysis completed in this study is an important addition to understanding recidivism. All variables, except drug dependency, were found to be significant in this study. These variables have an impact, whether positive or negative, on the probability that an individual had at least one prior conviction. If values are given for the variables, the impact they have on the probability of having at least one prior conviction is significant. In other words, the unique qualities of an individual – age, gender, race, county, and drug assessment – provide important information that can be used to determine the probability of that person having a prior conviction.

**Implications for Future Research**

This study has its limitations. The only data analyzed was Pennsylvania Sentencing Data from 1998. The perspective of the results is of individuals sentenced using 1991 and 1994 guidelines 16 years ago. There is not a plausible way to apply these results to criminals being sentenced in the present.

One way to expand upon this research is to look at data in terms of different locations. Comparisons can be made between criminals in different states or they can be made between criminals in different countries. The analysis of one state's data is insufficient to apply to a broader range of individuals. Another way improve this research is to find data that has more qualities that define individuals. For instance, employment status might be a variable to consider. Other variables to consider in an analysis could include marital status, annual income, number of individuals in the immediate family, and level of education. Lastly, it may be beneficial to track individuals over time. If an individual is being sentenced for the first time, it may be beneficial to look at what qualities changed if he or she ever recommits another crime in the future. Keeping track of these individuals may give other researchers the information they need to investigate why individuals recidivate.

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