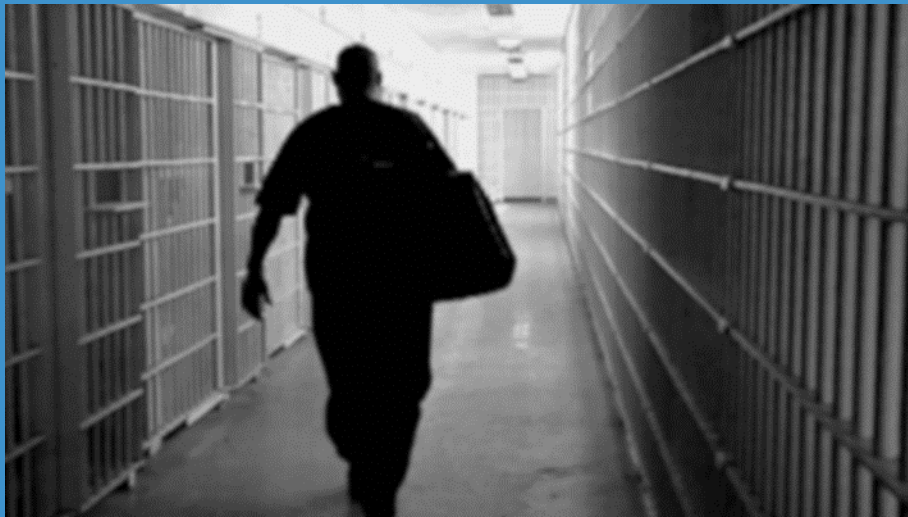


# Prison Recidivism

## 2016 Release Cohort



### What is prison recidivism?

Prison recidivism is a correctional system's measurement outcome that reflects the proportion of prison inmates that return back to an institutional facility within three years of release. A downward trend in the rate signifies improvement in the rehabilitation process.

### Why is it important?

Incarceration represents an opportunity cost for incarcerated persons as well as for the correctional system. Modern theories argue that time spent in a correctional institution doesn't have to be treated as a form of punishment, but as time dedicated to rehabilitation instead. Evidence based predictive modeling provides valuable information for inmate management and policy making.

### How is it measured?

A formula calculates the number of Nevada felony offenders released during a calendar year and the number that returns at least once within 36 months of release. The proportion that returns is the rate for the release cohort. Out of 5,041 inmates released in 2016, 24.62% returned. This rate is a significant decline from the rate of 27.52% of the 2015 releases cohort.



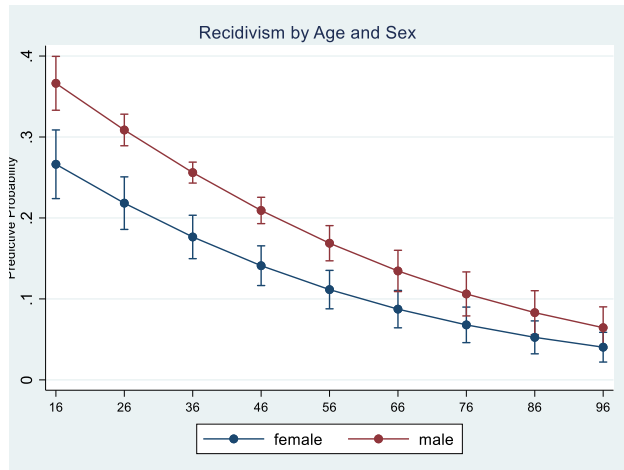
### Probability of Returning after Exit

Individuals possess a variety of known characteristics and risk factors that affect their ability to rehabilitate. Regardless of the factors, on the average, 37.7% of them are at risk of returning and 69.1% may be able to survive in the community. Incarcerated individuals possess traits that increase or decrease the odds of reintegrating successfully. There are also unknown reasons for an ex-offender's success or failure.

**What factors increase or decrease the chance of returning to the correctional system?**

A predictive model reveals that when the offender is a male, there is an 8.6 percentage point increase in the chance of returning relative to a female offender. On the average, females return 16.6% of the time and males 25.2% of the time. Age is a highly significant contributing factor in reducing the chances that an offender will return, given that an additional year of age at time of release decreases the probability of returning by 0.006 percentage points. In fact, for each additional ten years of age, the recidivism rate of a female decreases 0.05 and of a male 0.06 percentage points, starting at 25% for a female and 35% for a male at age 16 and declining to 15.0% and 21.0% at age 45 respectively.

*Exhibit 1*

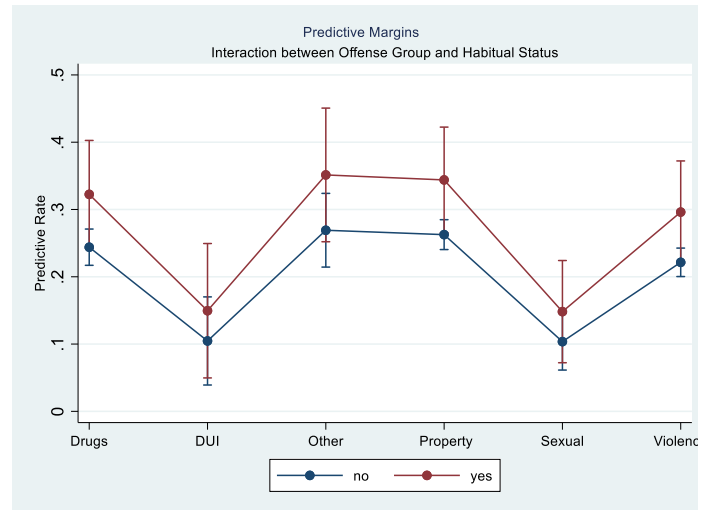


As expected, an offender’s former pattern in the criminal justice system significantly impacts the probability of returning to prison. A habitual offender is 48.2% more likely to return than his or her counterparts, and having at least three prior felony convictions increases the probability of returning 13.5% for women and 17.0% for men relative to offenders that are booked with no prior felonies. An offender with no prior convictions has a 21.0% chance of returning to the prison system within three years of release while an offender with three or more prior convictions has a 36.0% chance.

Chances of returning to prison vary distinctly across offense groups and habitual statuses. Drug, property, and violent offenders have the largest probabilities, and DUI and sex offenders the lowest.

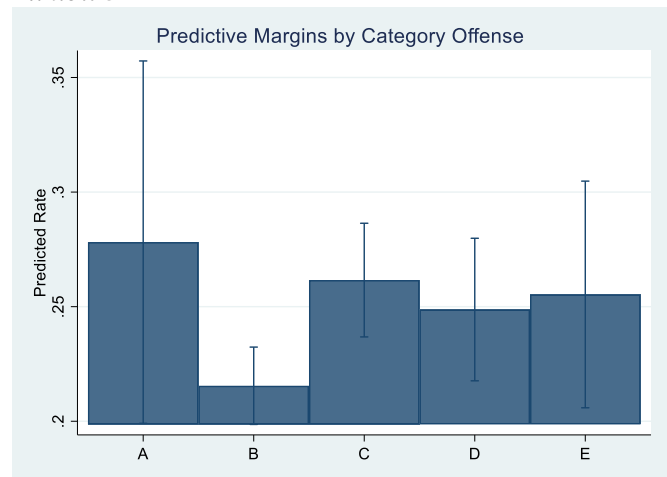
Nevertheless, the probability of returning to custody for habitual offenders is always above that for non-habitual offenders.

*Exhibit 2*



Category A and C felons also stand out when it comes to recidivism, given that their probabilities of failing in the community are 26.6% and 26.2% respectively, with A felons having very wide confidence intervals. B felons, on the other hand, have the lowest chance at 21.6%

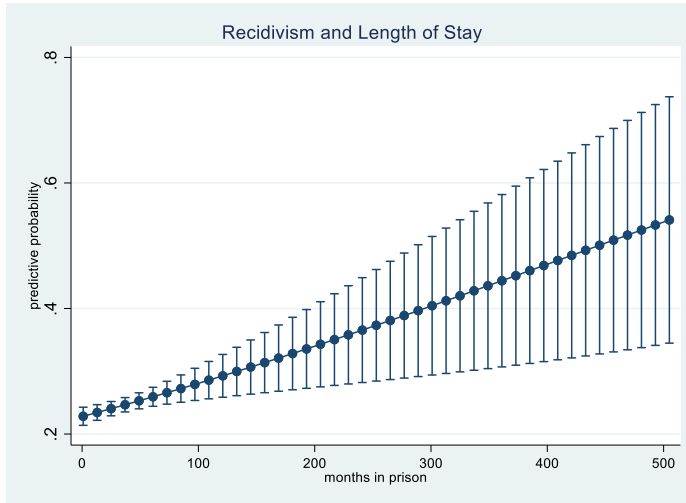
*Exhibit 3*



The average length of stay for the 2006 release cohort was 36 ½ months for males and 21 months for females; nevertheless, the length of stay is highly positively skewed ranging from one to 506 months. Interestingly, the length of stay for the offender that is released is of statistical significance, leading to an increase of 0.003 percentage points in the rate for each additional six months in prison. As depicted in

the chart below, recidivism increases linearly as time in prison increases, and the level of precision of the estimate decreases ranging from the low 20.0% range to more than 30.0% to 70.0% for an inmate who was in custody 506 months. Specifically, when the length of stay is more than 8 years, the probability of returning rises above the mean rate of 24.6% to 27.7%, and after 33 years in prison, the probability reaches 47.8%.

Exhibit 4



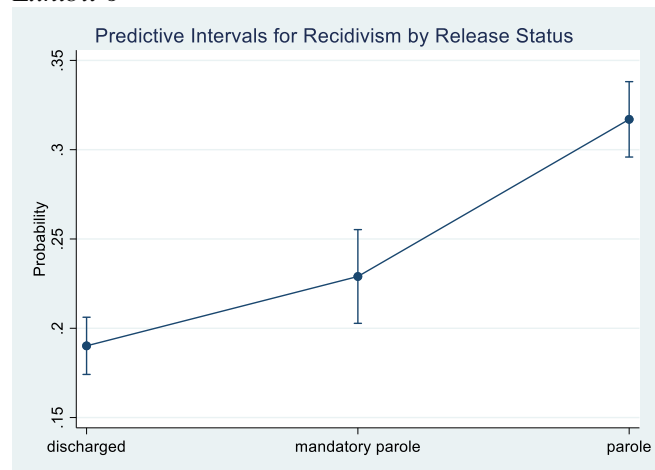
Recidivism within a cohort is tracked for returns that occur after 30 days of release through the end of the 36<sup>th</sup> month of release. Time in the community after release exhibits a trend worth observing, given that more than half of the offenders that return (13.3%), do so by the time they have been in the community for 12 months, and only 2.2% returns after 31 months. The declining pattern is present in all release cohorts and suggests that the first twelve months post incarceration are the most risky, a finding that sheds light in the crafting of supervision policies post incarceration.

Exhibit 5

Months of Release	% Returned	% Cumulative
1-7	7.95%	7.95%
7-13	5.38%	13.33%
13-19	3.33%	16.66%
19-25	2.98%	19.64%
25-31	2.76%	22.40%
31-37	1.79%	24.18%
>37	0.44%	24.62%
Total	24.62%	--

In addition to the indicators listed above, release status significantly affects recidivism, given that relative to a discharge release, a parole release is associated with a 0.14 percent point increase in recidivism and a mandatory parole release is associated with a 0.04 percent point increase in the probability of returning to custody. Offenders that discharge their sentences or that are released on mandatory parole are less likely than the average offender to return to custody, at 18% and 22.2% respectively. In contrast, the chance of returning rises above the mean to 31.8% for offenders released on parole as depicted in the chart below.

Exhibit 6



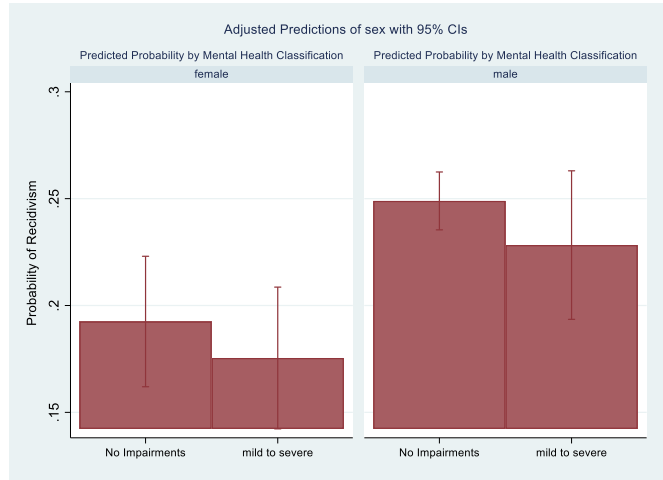
A common concern is the mental health status of the prison inmate and the likelihood of success after imprisonment. To arrive at a conclusion, the 2016 cohort was divided into two groups: those with mild to severe impairments and those without impairments. Based on the statistical evidence, it can be concluded that males have larger probability of returning for both types of mental health classification statuses.

Exhibit 7

Predicted Probabilities	
Females and Mental Health	
None	Mild to Severe
19.2%	17.5%
Males and Mental Health	
None	Mild to severe
24.9%	22.8%

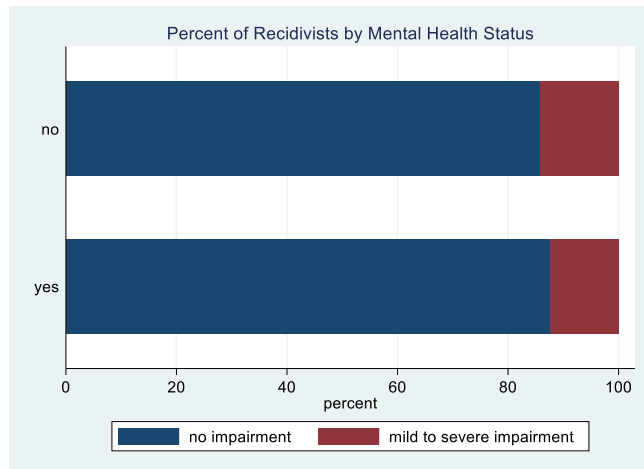
However, the probability of returning to custody is not statistically different for offenders with and without mental health conditions for each, males and females.

Exhibit 10



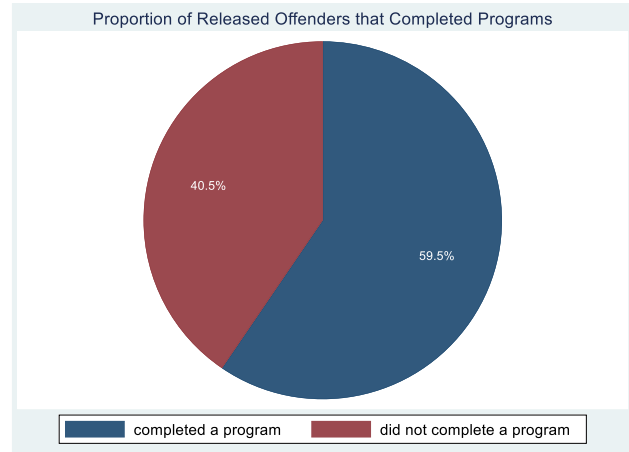
Of the 5,041 offenders in the study, 13.68% had been classified with a mental health impairment, of which 20.8% returned versus 24.3% that returned and that didn't have mental health impairments.

Exhibit 11



The Nevada Department of Corrections offers a wide variety of rehabilitative programs for offenders, and placement is dependent upon several factors, such as the individual's risk score, educational needs, and their desire to pursue a vocational or job training program; and each individual can complete multiple programs during the stay in prison. For this analysis five major program types were identified: addiction, correctional, education, job training, and vocational training. In all, 59.5% of individuals released from

Exhibit 8



prison in 2016 completed a program while incarcerated. The probabilities of returning to prison were derived for each major program group by gender against the populations that did not complete programs in the program group, concluding that offenders that complete addiction prevention, job training, and education programs have lower probability of returning than the average offender. In fact, the odds of returning to custody are lower for those that complete education, training, and addiction prevention versus those that complete correctional programs. The effect of a program is slightly dependent on the interaction between the inmate's gender and program; for example, the probability of returning to custody is statistically significantly lower for females than for a males that complete addiction prevention and education programs when tested at the 10% level of significance.

Exhibit 9

Predictive Recidivism Rates			
Addiction Prevention			
Females		Males	
Completed	16.41%	Completed	21.80%
Did not	18.95%	Did not	24.93%
Education			
Females		Males	
Completed	17.37%	Completed	23.21%
Did not	18.70%	Did not	24.86%
Training			
Females		Males	
Completed	17.04%	Completed	22.79%
Did not	18.93%	Did not	25.19%

These predictions can be visualized in the margins plots below, where the probabilities for non-program completers are depicted in the first vertical axis and the declining probabilities in the second vertical axis for program completers.

Exhibit 14

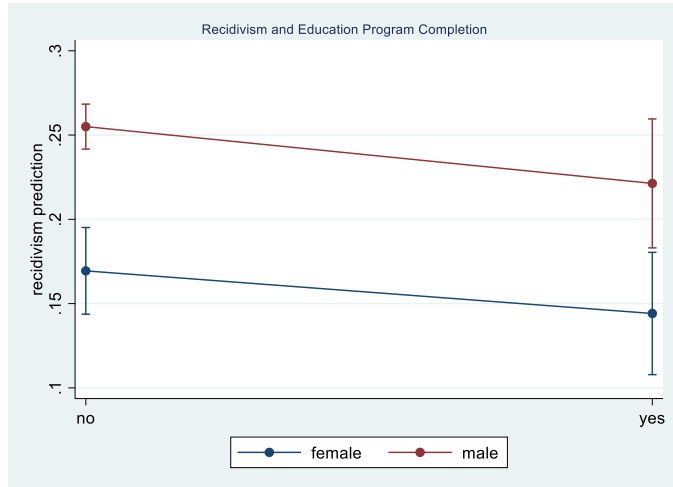


Exhibit 15

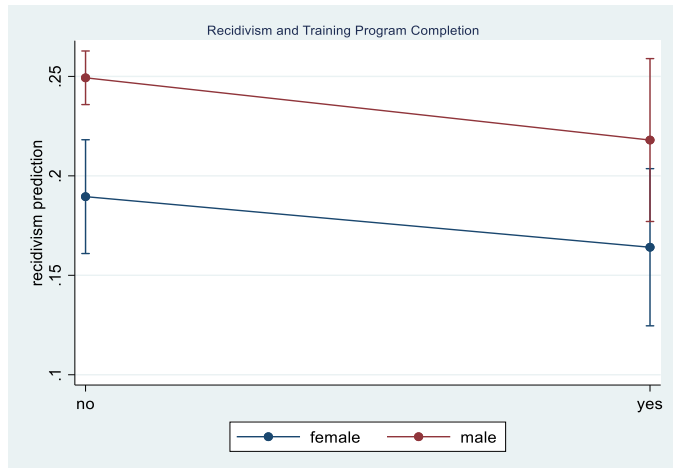


Exhibit 16

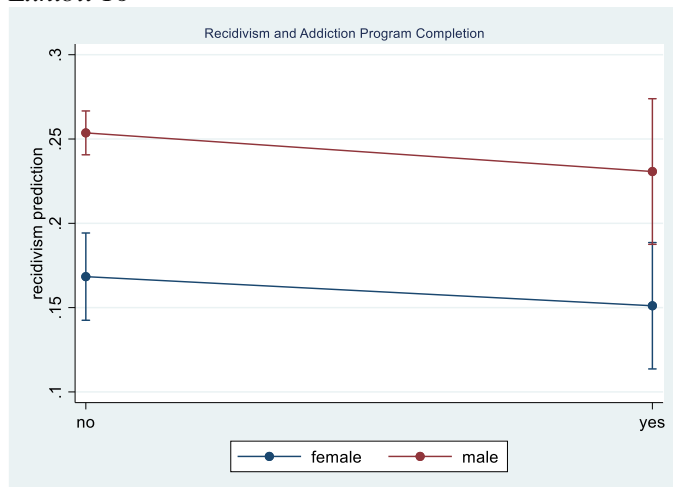


Exhibit 12



### Housing Arrangements

Correctional case managers are tasked with deciding the type of housing that is most appropriate for an inmate. Inmates can be housed in fenced institutions, camps, transition houses, or can serve time in residential confinement. This study found a relationship between recidivism and the type of housing where the ex-prisoner lived before being released. Worth noting is that inmates released from transition housing or residential confinement have statistically lower recidivism rates than inmates released from camps and fenced institutions. Relative to release from a camp, ending a period of confinement in a residence reduces the rate by 0.219 percent points and relative to a fenced institution by 0.198. Furthermore, there is an associated 0.059 percent point decrease with a release to the community from a transition house versus a camp and a 0.0742 percent point decrease relative to release from a prison. Perhaps, this is attributed to lower risk offenders serving the end of the period of confinement in less restricted environments.

Exhibit 13

Housing	Predicted Rates
Camps	23.45%
Prisons	24.93%
Residential Confinement	1.51%
Transition Housing	17.51%



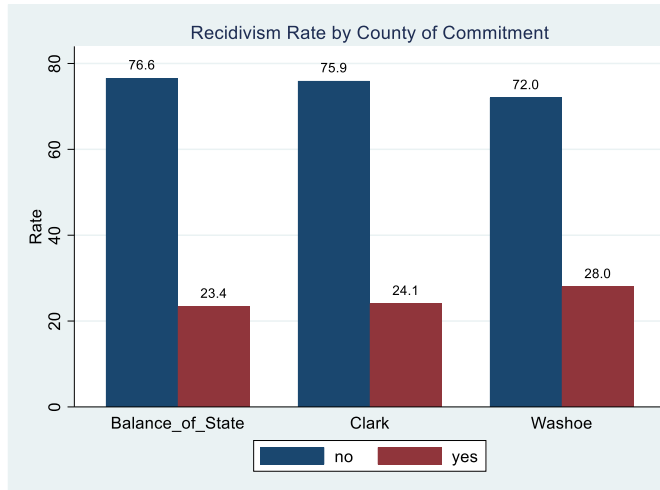
### Race and Ethnicity

In addition to analyzing the indicators above, this study evaluated whether select racial or ethnic groups have statistically different probabilities of reincarceration. The probabilistic model produced for this analysis provided insight for comparing these groups and lead to the conclusion that there are no significant differences in their likelihood to return to custody.

### Geographic Location

Nevada has ample rural space where the majority of correctional sites are located. The bulk of commitments are from Clark County, however, the largest of the only two urban counties in the state. In 2016, the distribution of commitments released from custody was 12.62% from fifteen rural counties, 16.29% from Washoe County, and 71.1% from Clark County. The distribution of returns by county of commitment was 23.4% from rural counties, 24.1% from Clark County, and 28.0% Washoe County.

Exhibit 17



From a predictive model perspective, it can be concluded the probability of returning to custody is approximately 0.065 percentage points larger for Washoe County commitments than for Clark and rural county commitments, and their predicted probabilities differ by sex.

Exhibit 18

Region	Predicted Rate	
	Female	Male
Balance of State	15.85%	23.97%
Clark County	15.98%	24.14%
Washoe county	21.15%	30.77%

### Cost of Reincarceration

Correctional administrators are charged with assessing the cost of incarceration and utilizing resources efficiently. Recidivism adds time to the initial length of stay for an offender; thus, increasing the length and cost of incarceration for offenders that return to custody.

The mean length of stay for an individual that was released on parole in 2016 was 17 months for a female and 30.5 months for a male, and for an individual released after expiration of a sentence was 20 months for a female and 28.5 months for a male. At an average monthly cost of \$1,654 from 2014 to 2016, time in prison for offenders paroled in 2016 cost an average of \$28,115 for a female and \$50,773 for a male; time in prison for offenders that were discharged cost an average of \$33,573 for a female and \$47,134 for a male. Returning to prison on a technical violation adds 11 months to the stay, returning as a parole violator with a new offense adds 29 months, and with a new crime after discharge 20 months. Proudly, 36 months after release, 134 fewer inmates from the 2016 cohort relative to the 2015 cohort returned to the Nevada Department of Corrections saving the state \$4,084,016, assuming a distribution of 49.9% technical parole violators, 2.1% parole violators with new offenses, and 48.0% new commitments. Relative to the 2010 cohort, 304 fewer inmates returned within 36 months of release, saving the state an astonishing \$9,109,380, assuming an average monthly cost of \$1,686 per month for calendar years 2010 to 2016.

Exhibit 19

Trends per Release Cohort				
Cohort	Releases	Returns	Change	Rate
2010	5232	1545	--	29.0%
2011	5271	1533	-12	29.1%
2012	5106	1544	-11	30.2%
2013	4972	1452	-92	29.2%
2014	5260	1502	54	28.6%
2015	4996	1375	-131	27.5%
2016	5041	1241	-134	24.6%

Exhibit 20

Ten-Year Cost Savings		
Years	Change in Recidivists	Cost Savings
2010-2019	-304	\$9,109,380

Exhibit 21

Costs Savings per Inmate not Returned		
Return Type	Length after Returning	Savings
New Commitment	31.06 months	\$53,924
Technical Parole Violator	10.75 months	\$18,662
Parole Violator with new Commitments	29.05 months	\$50,430

## Predicting Recidivism

Logistic regression can be utilized to complement risk score and classification instruments and enable corrections analysts to derive predictive probabilities for offenders with specific characteristics. If the analyst needs to know what are the probabilities of returning for female and male inmates that are drug and habitual offenders, the model will predict that these are 24.6% and 34.8% respectively; and if wanting to know the probabilities for female and male property offenders who are category C felons, the model predicts 20.8% and 30.5% respectively.

Given that these probabilities have been tested, they can be employed in a variety of ways, such as to forecast the proportion that will return in later cohorts, and to formulate more intensive programs of rehabilitation for groups that are more likely to return than the average offender.

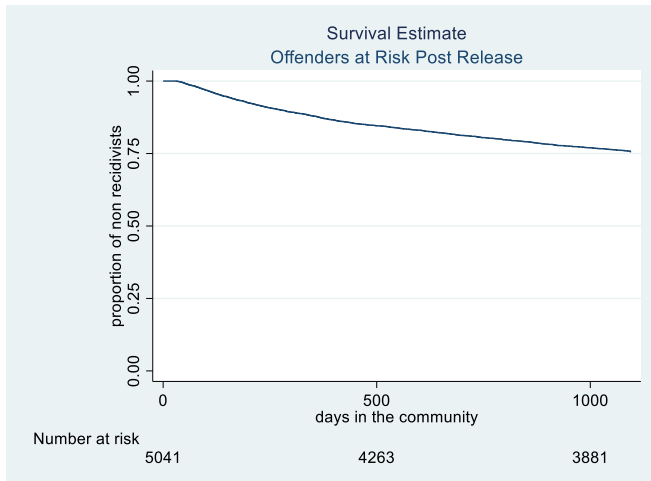
## Survival Time in the Community

Once inmates return to the community, their survival rates decline at varying rates, and survival and hazard functions can be calculated to empirically derive the number of months at which their survival and failure rates change beyond a specified time. For the entire cohort, length of stay ranged from one to 506 months with a mean length of stay in prison of 34 months and 10 days; and for those that returned, the mean time to failure was 14 months. From the time the first offender was released in Calendar Year 2016 through the end of Calendar Year 2019, a total of 36 months and 14 days were accounted for and survival and cumulative hazard functions were derived for each offender type that confirmed that select groups of individuals have larger probability of re-incarceration and lower survival rates than the average offender. Specifically, these functions indicate that after 14 months and 4 days in the community (approximately the mean time to failure), a habitual offender has 73.5% of surviving outside prison, while a non-habitual offender has an 86.3% chance; a DUI offender has a survival rate of 92.5%, while the survival rates of drug and property offenders are 7.1% and 10.5% lower respectively; Category B felons survive beyond 14 months 88.6% of the time, while Category C felons survive at a rate that is 6.3% lower; and an offender that is released at the age of 48 and older has a survival rate that is 7.9% greater than a 26- to 29-year old. Similarly, offenders that complete select programs during prison stay have larger survival rates than non-program completers.

Analyzing time at risk provides wisdom for fine tuning rehabilitation and supervision programming policies intended to improve the success of returning citizens beyond the first 14 and most precarious months, and it's the type of examination that can be investigated at the criminogenic level. A variety of data visualization techniques can be utilized to interpret the distinction in survival functions and

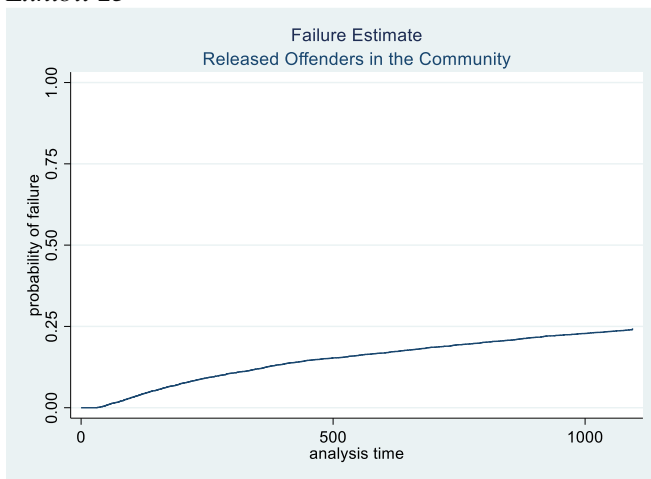
relative failure rates within 36 months of release of an inmate to society. Exhibit #22 for example, depicts the survival function for all offenders in the cohort, 5,041 offenders at risk on day one, the mean number of days in the community before failure, and 3,881 not returning to the custody of the NDOC 1,000 days post release.

Exhibit 22



Conversely, Exhibit #23 illustrates the failure estimate reaching nearly 25% passed 1,000 days.

Exhibit 23



The remaining exhibits depict survival functions at various levels of the criminogenic spectrum, with lines for a category in a group being closer to 100.0% having greater survival rates than their counterparts. For example, sex offenders and DUI offenders have survival rates above the other offense groups. Survival rates being higher for sex offenders may be attributed to stricter regiments of supervision for this group, while property offenders have the lowest rate of survival with this group being the most likely to fail.

Exhibit 24

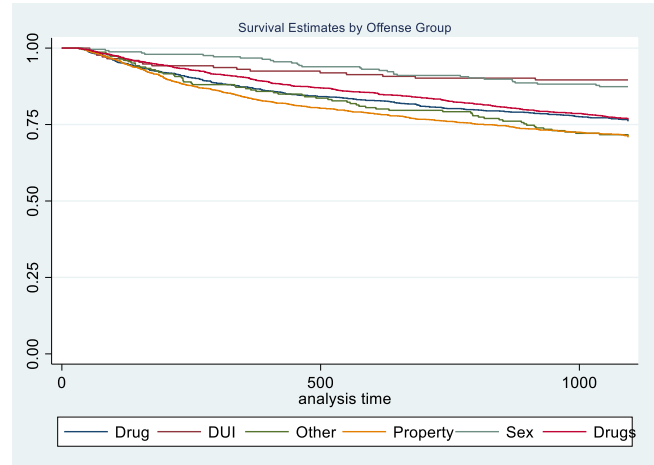


Exhibit 25

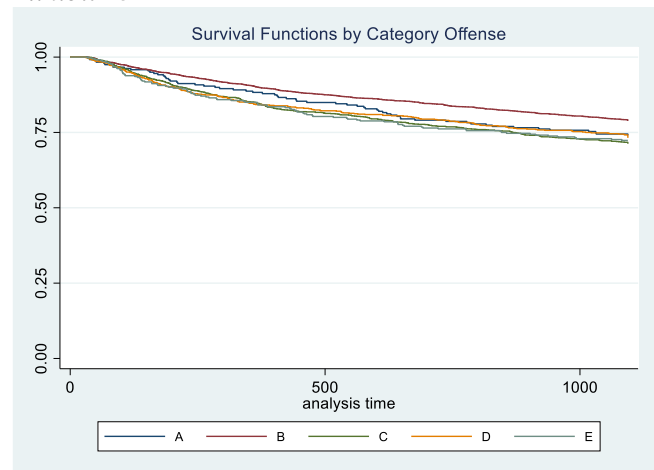
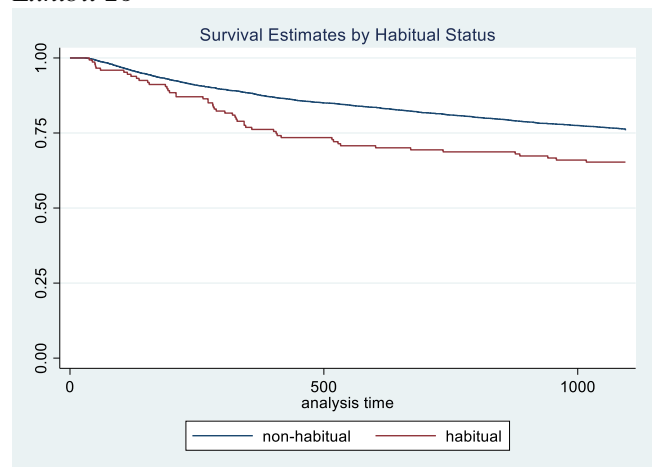


Exhibit 26



Survival rates are larger for inmates that complete programs, though, not statistically significantly different for the 2016 cohort. In the charts below, the survival curve for program completers is above the curve for non-program completers.



Exhibit 27

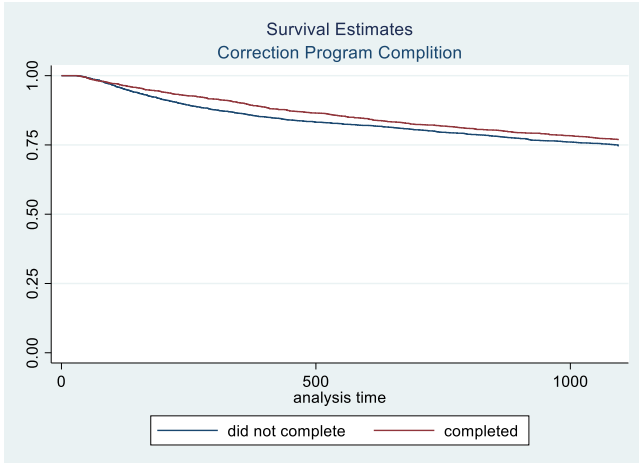
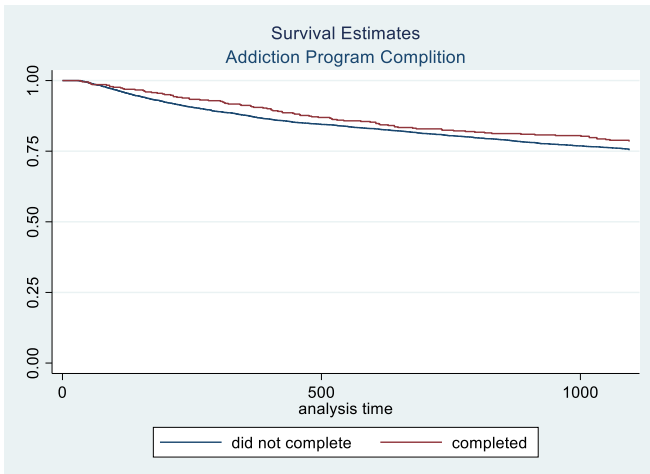


Exhibit 28



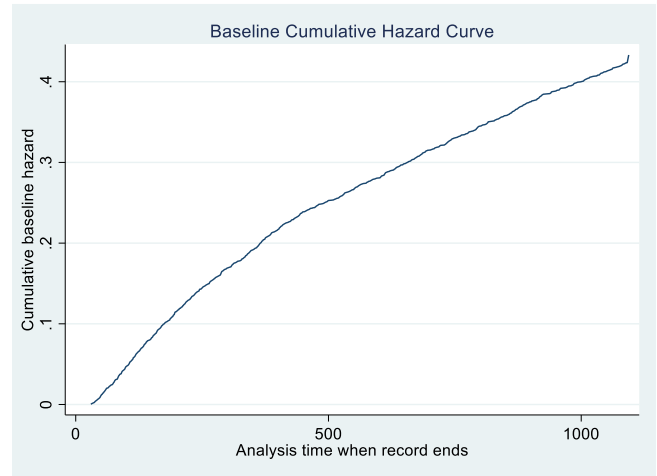
Exhibit 29



At the center of the analysis of survival in the community is the evaluation of how the risk of returning to custody per time unit changes over the 36 month monitoring period. As noted earlier, to evaluate how risk factors contribute to recidivism, a reference point must be established, and this is done by deriving a baseline, and then assessing the relative increase or decrease in risk when specific

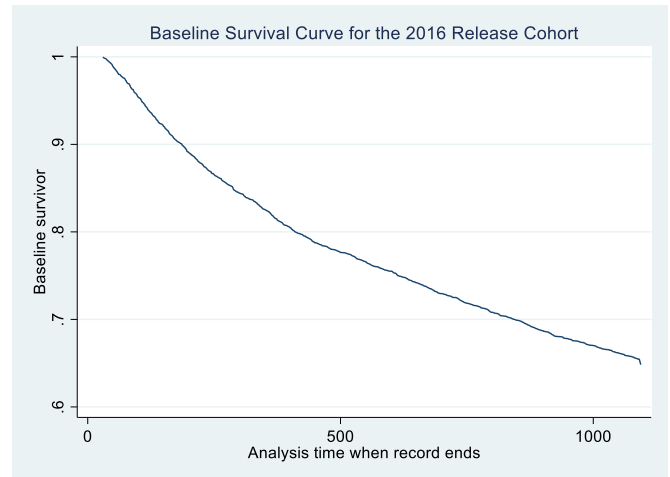
demographic and criminogenic factors are present. The cumulative hazard function is non-parametric and can be thought of as the probability of failure at a specified time given survival at the specified time, and it's a measure of risk that can be further developed to derive risk scores. The greater the hazard, the greater the risk of returning to custody. Exhibit #30 displayed below illustrates the cumulative hazard function for the 2016 Cohort, which starts at 0.02%, has a mean of 37.67%, and reaches 43.33% on day 1,094.

Exhibit 30



The function above has an associated baseline survival function that at time 0 is 99.71%, has a mean of 69.1%, and on day 1,094 it reaches 64.83%.

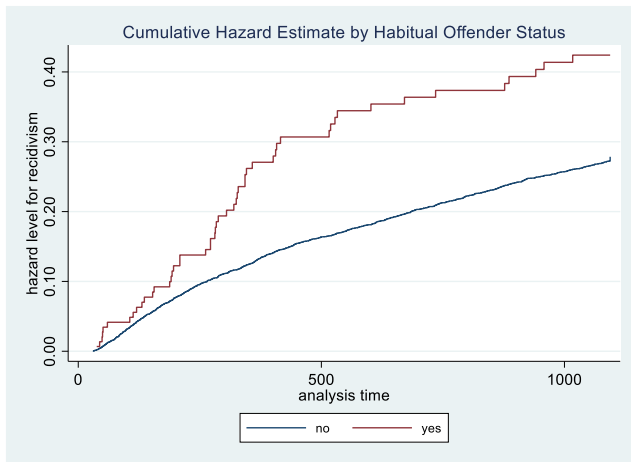
Exhibit 31



Cumulative risk can also be investigated at the criminogenic level, to assess the effect of programming, and demonstrated with curves. The distances between the curves illustrate the differences in risks. Taller curves denote higher risk

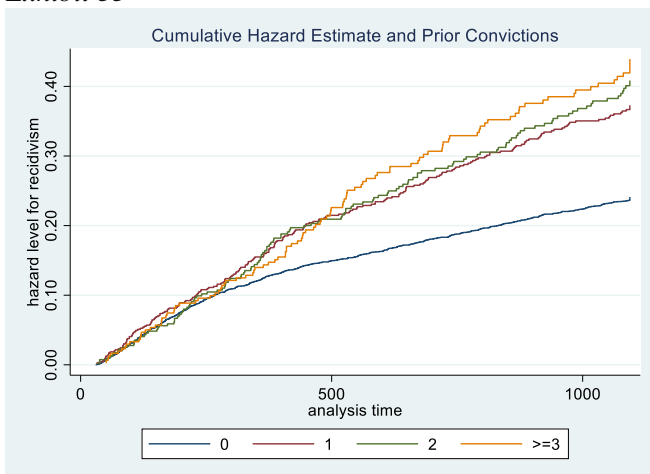
than the counterpart curves below them, and failures occur at specified times. Exhibit #32, for example illustrates the estimated cumulative risks of recidivism for non-habitual and habitual offenders, validating that habitual offenders are gradually significantly more at risk than non-habitual offenders reaching a mean hazard rate of 42.4%, while non-habitual offenders have smooth hazard function and reach a mean hazard rate of 27.8% on day 1,094.

Exhibit 32



Differences in cumulative risks can also be observed in the foregoing exhibits that illustrate that offenders with no prior felony convictions are at much less risk than offenders who had three or more prior convictions when they were incarcerated at the NDOC. As expected, property offenders are much more at risk than sex offenders, and C felons at more risk than B felons. Offenders without prior felony convictions have smoother and flatter cumulative hazard functions.

Exhibit 33



Cumulative hazard functions clearly depict hazard rates over the 36-month following release from custody, with them being flatter for DUI and sex offenders and much steeper for property offenders. B felons have smoother and less steep cumulative hazard curves than the other category felons.

Exhibit 34

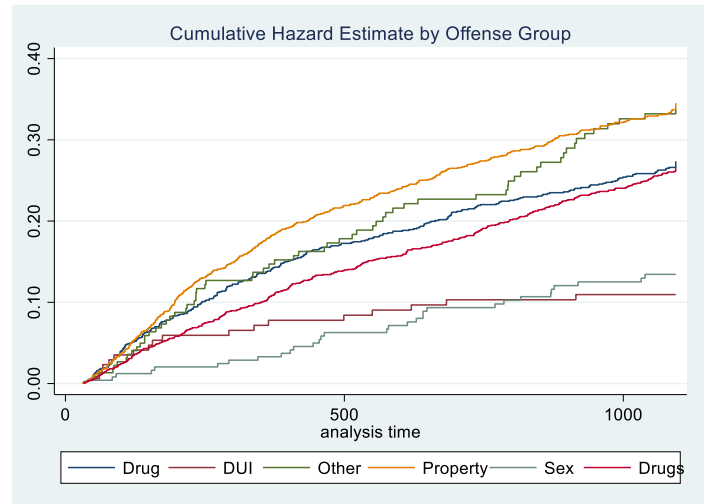
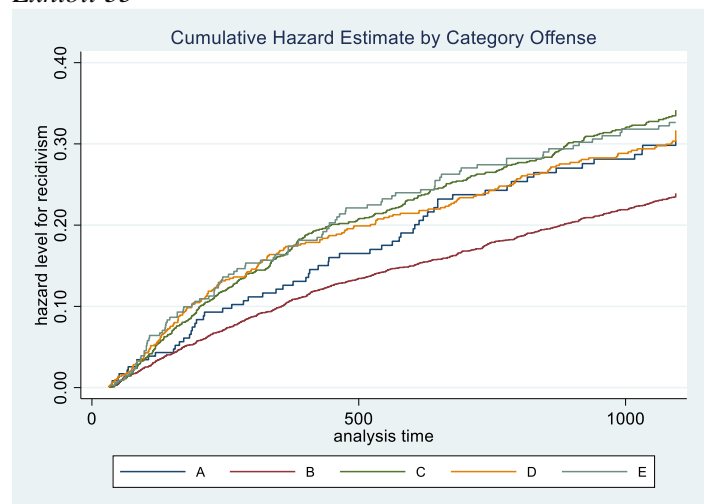


Exhibit 35



Furthermore, cumulative hazard curves validate that completing programs reduces the cumulative risk. In particular, completion of education, addiction prevention, and job training programs reduces the risk and as demonstrated by their curves of completers laying below the curves of non-completers.

Exhibit 36

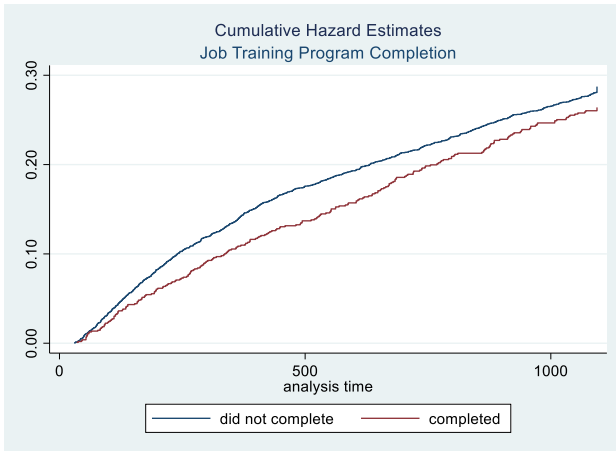
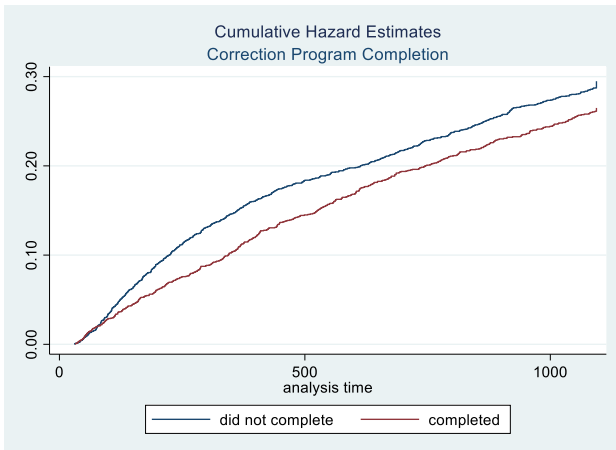


Exhibit 39



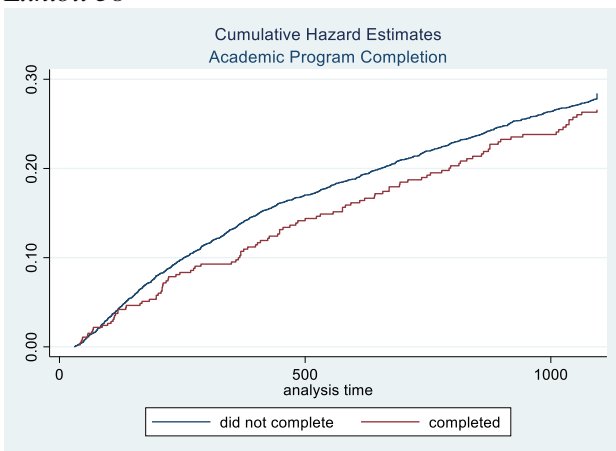
Exhibit 37



Summary

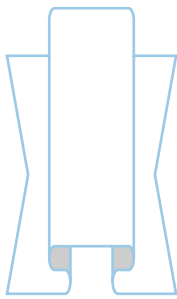
The Nevada Department of Corrections derives recidivism rates for each yearly cohort of releases. Each of the main groups released to freedom is tracked for a period of 36 months for the possibility of returning due to parole violations or conviction of new crimes. The NDOC follows the Performance Based Measures established by the Association of Correctional Administrators (ACA). For each yearly group, only the first release during a calendar year and the first return to custody during the following 36 months are accounted for. The analysis presented investigated the characteristics of the 2016 cohort of releases and it was noted that the NDOC achieved a ten-year low rate of 24.6%, a decrease of 4.4 percentage points relative to the 2010 release cohort that constitutes a reduction of 304 inmates returning to prison which translates in cost savings of \$9.1M for the State of Nevada.

Exhibit 38



Parametric and non-parametric models were utilized to derive the predictive probability of recidivism according to an offender’s criminogenic and non-criminogenic characteristics to arrive at the conclusion that factors that increase the chances that the individual will return to custody are: being male, younger than 48 years of age, property offender, category C felon, carrying multiple prior felony convictions, serving long lengths of stay, not completing prison programs, and parole release. It was empirically and visually demonstrated that individuals that have these characteristics have larger probability of recidivism and lower chances of

surviving in the community after a period of time in the community than those who don't possess these risks factors. Risk factors also increase the probability of failure, given survival at a specified time. Whilst there are many unknown factors and circumstances that interact with an ex-prisoner's ability to succeed in the community, the findings from this analysis improve the understanding of the prison population and are intended to provide insight for formulating evidence-based criminal justice policies and programs.



Alejandra Livingston, MS, MBA, PStat®  
Nevada Department of Corrections  
Research, Planning, and analysis  
P.O. Box 7011  
Carson City, NV 89702  
Visit us at  
<http://doc.nv.gov/About/Statistics/Home/>



©2020 Nevada Department of Corrections