Recidivism Evaluation of the Colorado Division of Youth Services

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Regarding Committed Youth

Discharged in Fiscal Years

2013-14,

2014-15,

&

2015-16

July 1, 2018

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EXECUTIVE SUMMARY

Annually, on July 1st, the Colorado Department of Human Services (CDHS or Department) publishes the results of a comprehensive analysis and review of juvenile recidivism for youth discharged from the Division of Youth Services (DYS or Division) in the preceding fiscal years.

YOUTH STUDIED

Recidivism rates were determined for three unique cohorts of discharged youth: one-, two-, and three-years post-discharge from DYS. The Division defines recidivism as the adjudication or conviction of a new misdemeanor or felony offense within a specified time period.

- Fiscal Year 2015-16: Four hundred forty-five (445) youth discharged from DYS. Among these discharged youth, 86% were male, and 14% were female. This cohort was used to determine a one-year recidivism rate.
- Fiscal Year 2014-15: Four hundred seventy-six (476) youth discharged from DYS. Among these discharged youth, 86% were male, and 14% were female. This cohort was used to determine a two-year recidivism rate.
- Fiscal Year 2013-14: Five hundred fifty-six (556) youth discharged from DYS. Among these discharged youth, 86% were male, and 14% were female. This cohort was used to determine a three-year recidivism rate.

ANALYSIS COHORT

As a means of combating the challenges associated with a shrinking population of youth who discharge from DYS annually, three years of data were combined to create a single, larger one-year post-discharge cohort. Specifically, each of the youth in the one-year post-discharge cohort for Fiscal Years (FY) 2013-14, 2014-15, and 2015-16 were combined to form a single analysis cohort of 1,477 youth. By combining these three cohorts into a larger cohort, some of the challenges presented by a shrinking population size were ameliorated and sufficient statistical power was generated in the analyses to detect significant between-groups differences. A total of 11 youth discharged in more than one Fiscal Year due to consecutive sentences, new commitments, or other legitimate reasons. For the purposes of the demographic analyses, these youth were only counted once to avoid "double-counting" individual characteristics of recidivists and non-recidivists. For a more detailed description of the demographic characteristics of the analysis cohort examined in the body of this report, please see Table 2 and Appendix B.

- Analysis Cohort: One thousand four hundred seventy-seven (1,477) youth discharged from DYS. Among unique discharged youth, 86% were male and 14% were female. This cohort was used for the majority of the analyses discussed throughout the report.

RECIDIVISM RATES

One-year recidivism rate

For youth who discharged in FY 2015-16, **31.5%** (140 out of 445 youth) were guilty of one or more recidivist acts within one year of discharge from DYS.

Two-year recidivism rate

For youth who discharged in FY 2014-15, **49.2%** (234 out of 476 youth) were guilty of one or more recidivist acts within two years of discharge from DYS.

Three-year recidivism rate

For youth who discharged in FY 2013-14, **55.2%** (307 out of 556 youth) were guilty of one or more recidivist acts within three years of discharge from DYS.

Analysis cohort recidivism rate

For youth in the combined one-year post-discharge analysis cohort, **30.1%** (444 out of 1,477 total youth) were guilty of one or more recidivist acts within one year of discharge from DYS.

CHANGES TO THE RESEARCH METHODS IN THE CURRENT REPORT

Colorado has experienced nine consecutive fiscal years of decline in the number of youth discharged from DYS. The decline in the number of youth discharged from the Division (*n* = 445 in FY 2016) places limitations on the type and quality of analyses that can be performed with confidence and accuracy. Specifically, the sample sizes within the one-, two-, and three-year cohorts examined annually have grown so small that they call into question whether or not sufficient statistical power can be generated to detect significant differences between groups. Given the challenges presented by the Division's shrinking population, significant changes were made to the research methods employed in the current analysis with the goal of providing a scientifically rigorous means of addressing and ameliorating these challenges. The most significant change to the methodology involved creating a larger census for analysis. In order to accomplish this, the one-year post-discharge cohorts from the past three fiscal years (FY 2013-14, FY 2014-15, and FY 2015-16) were combined into one, larger cohort of youth who were followed for one-year for the analysis. Increasing the sample size using this approach preserved the integrity of each cohort, while allowing for more meaningful comparisons both between and within groups. This larger cohort is referred to as the "Analysis cohort" throughout the report.

CRIMINOGENIC RISK REDUCTION

Criminogenic risk is defined as the statistical likelihood of future offending. The Colorado Juvenile Risk Assessment (CJRA) is a psychosocial evaluation tool used to estimate a youth's future risk of recidivism on a scale (Low, Moderate, or High risk). Youth are evaluated for risk of recidivism at several points, including but not limited to: when they are initially committed to DYS, when they transition onto parole, and upon discharge (when all DYS treatment, services, and supervision have concluded). At the time of commitment, 90% of youth in the analysis cohort with two valid CJRA scores were categorized as being at a High risk to recidivate, while at the time of discharge only 65.9% of this same cohort remained in the High risk category, a 26.8% reduction. This measured reduction in criminogenic risk indicates that services provided to youth during their time with DYS helped to reduce the likelihood of future recidivism.

NATIONAL COMPARISON

Currently, five states and the District of Columbia define, measure, and report juvenile recidivism utilizing a research methodology similar to Colorado, thus providing six data points for a between-states comparison of recidivism rates.   When comparing the one-year post-discharge recidivism rates between comparable states, Colorado's rate (31.5%) is on the higher end of the performance range (16.7% - 45%). The two states with rates lower than Colorado are Maryland (16.7%) and Idaho (30%).

C.R.S., 19-2-203(6) Details

The Colorado Department of Human Services (CDHS or Department), Office of Children, Youth and Families (OCYF or Office), Division of Youth Services (DYS or Division) prepares an annual recidivism report on committed youth. The current report is submitted in response to C.R.S., 19-2-203(6) (formerly House Bill 18-1010). The educational outcomes requirement is submitted in a separate report.

> *On or before July 1, 2018, and on or before each July 1 thereafter, the Department of Human Services shall collect recidivism data and calculate the recidivism rates and the educational outcomes for juveniles committed to the custody of the Department who complete their parole sentences and discharge from Department supervision. In collecting the recidivism data, the Department shall include any juvenile adjudication or adult conviction of a criminal offense within three years after parole discharge.*

Statute C.R.S., 19-2-203(6) specifies that:

> *The report must denote the demographic characteristics of the population considered in the report. In reporting on recidivism rates, the report must denote the types of criminal offenses committed, delineating between felonies and misdemeanors and between crimes that are included as a "crime" pursuant to Section 24-4.1-302(1) and other crimes.*

Specific elements can be found on the following pages:

- Demographic characteristics of the population considered in the report: Table 2, pp. 19-20
- Criminal offenses committed (felonies and misdemeanors): Figures 17-20, pp. 44-47
- Crimes pursuant to Section 24-4.1-302(1), C.R.S and other crimes[i]: Figures 19-20, pp. 45-46

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[i] In compliance with C.R.S., 19-2-203(6), previously HB 18-1010, the Department began collecting data on those crimes included in Section 24-4.1-302(1), C.R.S. (Victim Rights Act) after the bill was signed into law on March 7, 2018. Delineations between recidivist crimes that are included in Section 24-4.1-302(1), C.R.S. and other crimes will appear in future reports, after the data has been collected for the three year post-discharge time period specified by law.

DEFINITION OF RECIDIVISM

The Division defines recidivism as a new adjudication or conviction resulting from a misdemeanor or felony offense at any point within the prescribed follow-up time period(s). In FY 2012-13 this definition was changed from measuring recidivism as a new filing (irrespective of a guilty finding) within the same time parameter(s) in order to more closely conform to the research methodologies utilized by other states who track juvenile recidivism. This more easily allows for a between states comparison of recidivism data.

POST-DISCHARGE RECIDIVISM

Post-discharge recidivism refers to new adjudications and convictions that occur within the prescribed follow-up time period(s) *after* a youth has completed all treatment and services and is fully discharged from DYS supervision. Post-discharge recidivism is the primary outcome measure utilized by juvenile justice agencies across the nation. It serves as a proxy measure for how well youth are able to re-integrate back into the community and remain crime-free upon discharge. Nationally, juvenile justice agencies are using recidivism rates to objectively determine whether treatment and services provided to youth were not only appropriate and effective, but also as a tool to inform policy and practice.

MULTI-YEAR RECIDIVISM RATES

The majority of states currently engaged in measuring and reporting juvenile recidivism typically only report a one-year post-discharge recidivism rate. In contrast, DYS tracks youth for three years post-discharge in order to determine whether they have remained crime-free. Tracking youth for three years post-discharge provides a more rigorous and comprehensive longitudinal analysis of the overall paradigm of recidivism in Colorado, as well as the trajectory of outcomes over time.

RISK REDUCTION

In addition to measuring recidivism, this report also examines risk reduction in the analysis cohort. While reducing recidivism is the primary function of corrections, reducing a youth's risk to recidivate is an equally important intermediate function of the Division. Despite the fact that recidivism is frequently viewed as the primary measure used to gauge outcome success among justice system-involved youth, other intermediate measures can also indicate whether youth are better prepared to reintegrate into the community after receiving treatment and services. These intermediate risk reduction measures examine whether the treatment services provided to a specific youth have significantly targeted those domains known to contribute to the overall actuarial risk the youth presents to public safety in terms of recidivism. When examined in tandem with primary outcome measures (recidivism rates), these intermediate measures (risk reduction) can provide a more holistic view of a juvenile justice agency's success.

RECIDIVIST ACT DEFINED

A recidivist act is defined as a new adjudication or conviction that occurs after a youth has discharged from the supervision of the Division. Within the Criminal Justice System, an *adjudication* refers to a finding of guilt for a delinquent offense involving a defendant under the age of 18, and is analogous to a *conviction* of an adult defendant found guilty of a criminal offense. A youth is deemed to be a recidivist if he or she commits a new offense that results in a guilty finding for a misdemeanor or felony class charge (adjudication/conviction). Traffic violations (not to be confused with traffic infractions), and petty offenses are not counted as recidivist acts. The unit of analysis for this study is youth discharged from the Division (rather than the number of recidivist acts), and all information is reported in the aggregate.

STUDY POPULATION

In FY 2015-16, four hundred forty-five (445) youth discharged from DYS. These youth were observed for one year after discharge, and official adjudication/conviction Judicial records were used to calculate a one-year post-discharge recidivism rate. In FY 2014-15, four hundred seventy-six (476) youth discharged from DYS. These youth were observed for two years after their discharge, and official adjudication/conviction Judicial records were used to calculate a two-year post-discharge recidivism rate. In FY 2013-14, five hundred fifty-five (555) youth discharged from DYS. These youth were observed for three years following their discharge, and official adjudication/conviction Judicial records obtained from the Judicial Branch were used to calculate a three-year post-discharge recidivism rate.

An analysis cohort of 1,477 youth was created by combining each of the one-year post-discharge cohorts from three Fiscal Years (FYs 2013-14, 2014-15, and 2015-16) into a single, larger cohort. All of the analyses that follow were conducted on this analysis cohort as a means of minimizing the trend of a substantially shrinking population size. Over the past ten years, the population of youth discharged from DYS has declined from a high of 950 in FY 2007-08 to a low of 445 in FY 2015-16, a 53.2% reduction (see Figure 1 for details). This decrease in population size directly impacts the Division's ability to detect significant differences between groups, particularly when examined in smaller sub-populations (e.g.: males vs. females, by ethnicity, or among our special populations). Increasing the sample size is one accepted means of minimizing these challenges.

Figure 1: Ten-Year Discharge Population Trends

Discharge Population Over Time

New Discharges

Number of Discharged Youth

944 — FY 2006-07
950 — FY 2007-08
858 — FY 2008-09
823 — FY 2009-10
786 — FY 2010-11
655 — FY 2011-12
666 — FY 2012-13
556 — FY 2013-14
476 — FY 2014-15
445 — FY 2015-16
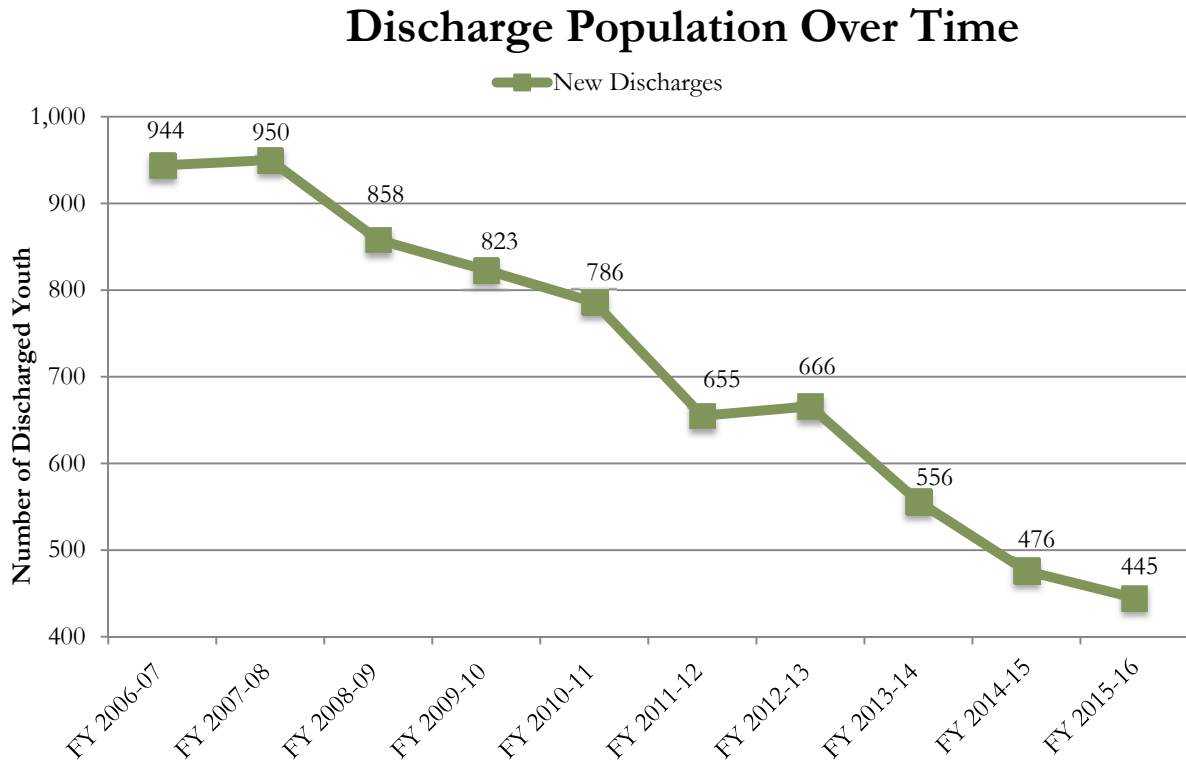
As Figure 2 illustrates, the average total length of DYS supervision for committed youth was 26.8 months in FY 2015-16. This total commitment Length of Service (LOS) begins at the time of commitment to DYS and continues through the parole period until a youth is officially discharged and DYS supervision ends.

Figure 2: DYS Timeline of Care
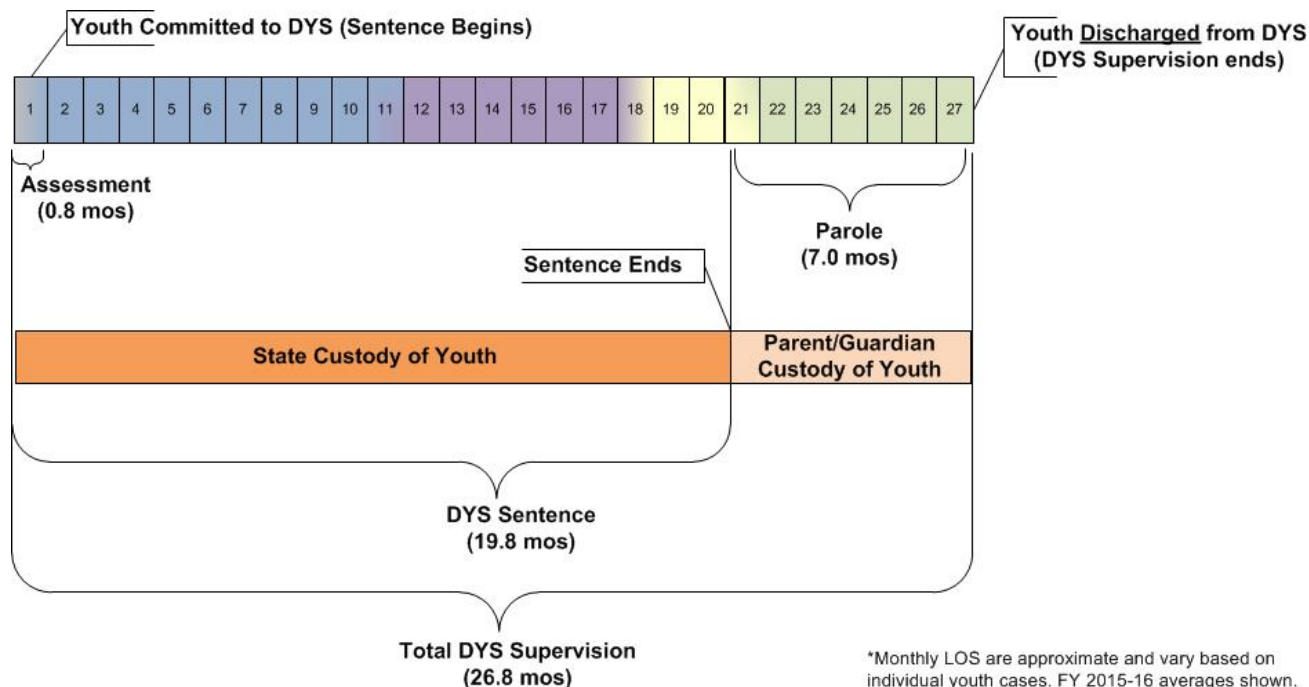
STUDY DESIGN

A prospective quasi-experimental observational cohort study design with a longitudinal follow-up period measured at three distinct intervals was used in the current analysis. This approach allowed for non-intrusive observation of the natural progression of three cohorts of previously delinquent youth in the community after they were discharged from DYS. The Division utilized Judicial court data from the Colorado State Judicial Department (Judicial) to determine whether or not a youth had committed a recidivist act during the follow-up period for each cohort.

Due to several safeguards related to confidentiality and data-sharing, the Division and the Office of the State Court Administrator developed a Memorandum of Understanding (MOU) specifically related to this annual study. This MOU serves as a data-sharing agreement that grants DYS permission to utilize the adjudication/conviction information for purposes of identifying youth who recidivate.

RECORD MATCHING BETWEEN DYS AND JUDICIAL

Matching records from Judicial to youth discharged from DYS is a difficult and labor-intensive process that is challenged by an inability of data systems across State agencies to "talk" to one another. In addition, typical matching techniques used in identifying adult offenders simply aren't applicable to a juvenile population. Specifically, the typical forms of identification commonly present in the adult population (e.g.: driver's license, social security number, etc.), are often rare or nonexistent for system-involved juveniles. Thus, youth discharged from DYS must be matched to a multitude of Judicial filings

using less straightforward means. For this study, youth were matched between the two data systems through a two-step process which is both automated and manual. Initially, youth are matched through an algorithm that compares elements of a youth's name, and date of birth. Next, the remaining youth who do not match are identified by hand until all discharged DYS youth are accounted for in the Judicial system database. This hand-matching process is hindered by the vast number of aliases, misspellings, hyphenated names, attempts at intentional misrepresentation of identity, and data entry errors for dates of birth, social security numbers, etc. present in both data sets. Finally, all cases in the analysis data are reviewed to ensure the automated portion of the match did not result in any "false matches" in which two separate youth with similar names and identical dates of birth are incorrectly matched together. As a fidelity measure, each youth's commitment case is found in Judicial's data, thus providing great confidence that all youth are being appropriately matched across systems.

RECIDIVISM RATES

A decade (10 years) of DYS recidivism rates are displayed in Figure 3. The one-year post-discharge recidivism rate has consistently averaged around 31%, with the exception of the data reported in FY 2010-11. The recidivism rate of 15.8% originally reported in FY 2010-11 was investigated and found to be a result of a data coding error that failed to identify certain filings. The data were subsequently re-pulled from the system, and the actual one-year post discharge recidivism rate of 31.1% was revealed. In the spirit of transparency, the original rate is preserved in Figure 3. Given this generally consistent historical trend, it is anticipated that recidivism rates will continue to hover around one-third of the total discharge population, barring significant systemic changes (e.g.: the use of front-end discretion in sentencing among adjudicated youth, the increased use of alternatives to incarceration, the quality and efficacy of treatment services delivered, resources available to both clinicians and youth, etc.).

Two- and three-year post-discharge recidivism rates are a relatively new addition to the study methodology. The two-year post-discharge recidivism rate has averaged around 45% over five years of measurement, with a range of 43% to 49%. The three-year post-discharge recidivism rate has remained slightly over 50% over four years of measurement. As a relatively new outcome measure with only four data points currently available, analysis is limited; however, over half of youth were consistently found to recidivate within three years of their discharge from the Division.

Figure 3: Recidivism Trends (One-, Two-, and Three-Years Post-Discharge)

Recidivism Rates Over Time

- 1-Year Recidivism Rate
- 2-Year Recidivism Rate
- 3-Year Recidivism Rate

Percentage of Youth who Recidivate

3-Year Recidivism Rate: 53.2%, 51.9%, 53.9%, 55.2%

2-Year Recidivism Rate: 43.3%, 44.6%, 43.7%, 46.2%, 49.2%

1-Year Recidivism Rate: 30.8%, 31.8%, 33.1%, 28.5%, 31.1%, 15.8%, 28.7%, 30.9%, 28.1%, 30.9%, 31.5%

Cohorts: FY 2006-07 Cohort, FY 2007-08 Cohort, FY 2008-09 Cohort, FY 2009-10 Cohort, FY 2010-11 Cohort *, FY 2011-12 Cohort, FY 2012-13 Cohort, FY 2013-14 Cohort, FY 2014-15 Cohort, FY 2015-16 Cohort

The three cohorts of interest in this study.

MULTI-YEAR RECIDIVISM RESULTS

The table that follows (Table 1) reports the recidivism rates across all three cohorts of interest in this study. The three unique cohorts of discharged youth were examined by follow-up period to see how many youth recidivated after one, two, and three years post-discharge. See Table 1 for details on multi-year recidivism rates.

Table 1: Recidivism Rates by Discharge Cohort

Youth Discharge Cohort	One-Year Recidivism Rate	Two-Year Recidivism Rate	Three-Year Recidivism Rate
FY 2015-16 cohort (N = 445)	31.5%	TBD*	TBD*
FY 2014-15 cohort (N = 476)	30.9%	49.2%	TBD*
FY 2013-14 cohort (N = 556)	28.1%	46.2%	55.2%

*Rates TBD; available in forthcoming reports

FY 2015-16 Cohort

The FY 2015-16 discharge cohort (N = 445) has currently been tracked for one year following discharge from DYS. The one-year recidivism rate for this cohort was 31.5%. The two- and three-year rates will be reported once the allotted two- and three-year time periods have concluded.

FY 2014-15 Cohort

The FY 2014-15 discharge cohort (N = 476) has been tracked for two years following discharge from DYS. The one- and two-year recidivism rates for this cohort were 30.9% and 49.2%, respectively. The three-year recidivism rate will be reported once the allotted three-year time period has concluded.

FY 2013-14 Cohort

The FY 2013-14 discharge cohort (N = 556) has been tracked for three years following discharge from DYS. The one-, two-, and three-year recidivism rates for this cohort were 28.1%, 46.2%, and 55.2%, respectively.

Adjudications vs. Convictions

As previously mentioned, when juveniles are found guilty of a criminal offense they are adjudicated, while adults who are found guilty of a criminal act are convicted. As discharged youth age over the course of the follow-up period, some recidivists are charged as adults. In the analysis cohort (N = 1,477), just over 86% of youth who committed a recidivist act received adult criminal charges, while nearly 14% were adjudicated as juveniles (see Figure 4 for details). It should be noted that the majority of youth who discharged from DYS during Fiscal Year 2015-16 turned 18 prior to discharge, thus making them eligible to receive adult probation or Department of Services sentences if found guilty.

Figure 4: Criminal Convictions vs. Delinquency Adjudications[ii]

Percent of Guilty Filings by Type

13.7%

86.3%

■ Criminal (Adult)   ■ Delinquency (Juvenile)
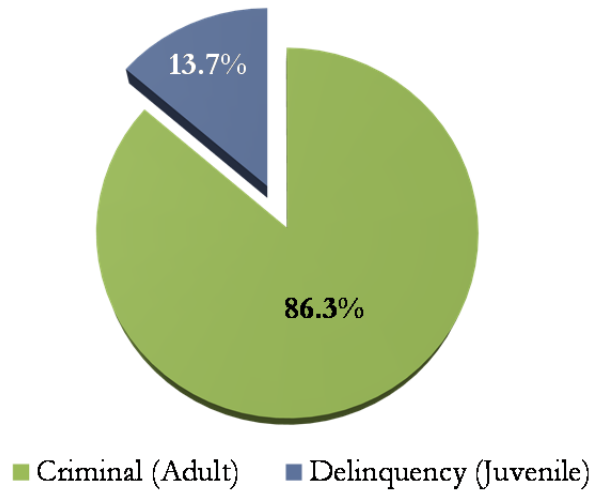
RECIDIVISM ANALYSIS COHORT

Statistical Analysis Steps

Conducting statistical analysis is a scientific process that must, like all science, adhere to a series of procedures or steps. Each of these steps is guided by the data, and the results of the analyses conducted within each step dictate what additional analyses can be conducted. Simply put, the analysis begins with basic tests of the relationships between a number of independent variables identified by the literature and larger body of juvenile justice research as contributing to recidivism (the dependent variable in this case: being a recidivist). Any variables found to have a significant relationship are thought to create a "model" for accurately predicting an outcome (being a recidivist) based on the data. Next, this model is subjected to more sophisticated analyses in order to test the *strength* of any relationships previously identified as being statistically significant. Finally, additional tests are then performed in order to determine *how well* the model created by these significant variables "fits," or is capable of accurately predicting an outcome based on the data. Thus, the data identified in step 1 as being statistically significant will be included in each of the following steps (See Figure 5).

[ii] Due to rounding throughout the report, figures may not total to 100% in all figures or tables.

Figure 5: Statistical Analyses Steps
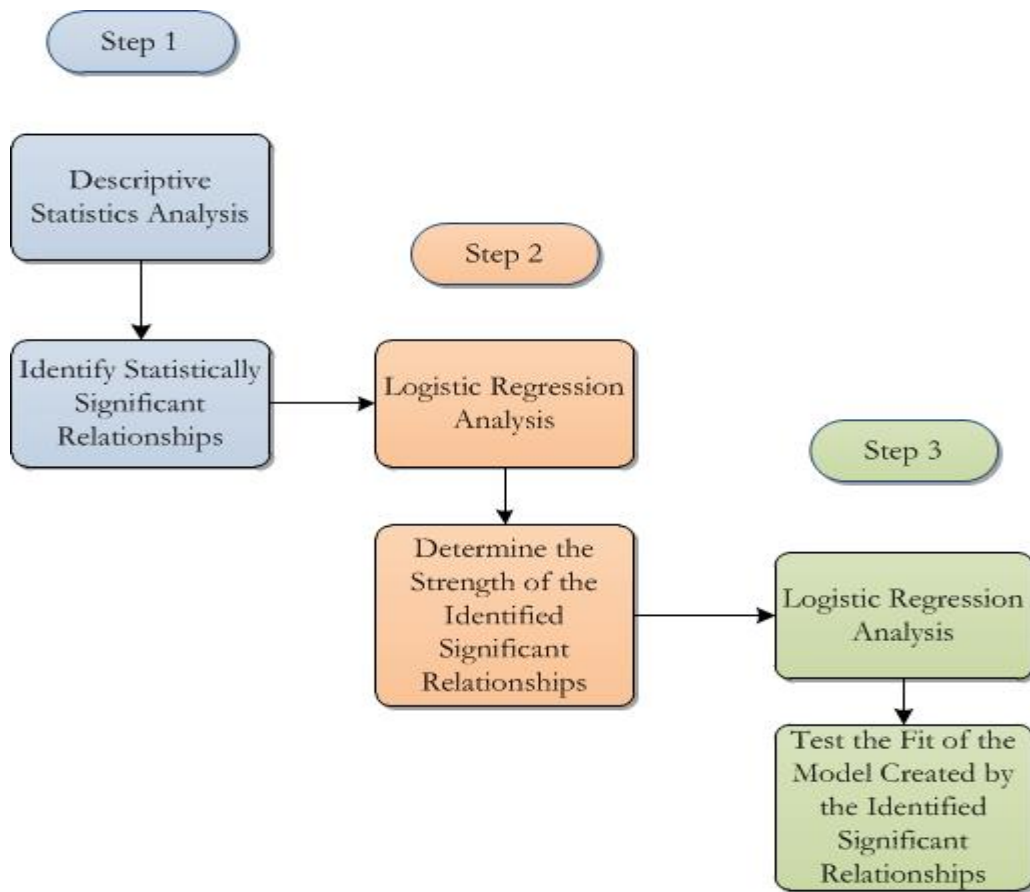
Step 1: Descriptive Statistics

The table that follows (Table 2) details some basic descriptive differences between youth who recidivated and youth who did not recidivate within one year of discharge (FYs 2013-14, 2014-15, and 2015-16 discharge cohorts combined into one large analysis cohort). Only those youth demographics which demonstrated differences that were statistically significant are displayed in Table 2. For a list of the non-significant demographics examined, please refer to Appendix B.

Table 2: Demographic Differences between Non-Recidivists and Recidivists (Analysis Cohort)

	Non recidivists		Recidivists		p-value	Effect Size[1]	% of **Total**
	n	%	*n*	%			
Total (*N* = 1,466)[2]	**1,027**	**100%**	**439**	**100%**			**100%**
	n	%	*n*	%			
1. Gender							
Male	857	83.4%	404	92.0%	0.00*	0.11 (small)	86%
Female	170	16.6%	35	8.0%			14%
2. Mean Age at Discharge							
	18.7 years		18.4 years		0.00*		18.6 yrs
3. Mean Length of Prior Detentions							
	19.3 days		25.9 days		0.02*		21.2 days
4. DYS Region							
Central	427	41.6%	155	35.3%			39.7%
Northeast	303	29.5%	141	32.1%	0.05*	0.07 (weak)	30.3%
Southern	184	17.9%	100	22.8%			19.4%
Western	113	11.0%	43	9.8%			10.6%
5. Number of Escapes[3]							
None	487	47.4%	154	35.1%	0.00*	0.11 (small)	43.7%
One or more	540	52.6%	285	64.9%			56.3%
6. Mean Age at First Adjudication							
	14.8		14.5 yrs		0.00*		14.7 yrs
7. Mean Age at Commitment							
	16.4 years		16.2 years		0.01*		16.3 yrs
8. Prior Number of Adjudications							
None	297	28.9%	84	19.1%			26.0%
One	272	26.5%	127	28.9%	0.00*	0.1 (small)	27.2%
More than Two	458	44.6%	228	51.9%			46.8%
9. Ethnic Minority							
Non-Minority	456	44.4%	170	38.7%	0.04*	0.05 (weak)	42.7%
Minority	571	55.6%	269	61.3%			57.3%
10. Parole Discharge Rating[4]							
Unsatisfactory	355	34.6%	241	54.9%			40.7%
Satisfactory	182	17.7%	74	16.9%	0.00*	0.2 (small)	17.5%
Excellent	429	41.8%	108	24.6%			36.6%
Not on Parole at Time of Discharge	61	5.9%	16	3.6%			5.3%

(Table continued on following page)

Table 2 (continued): Demographic Differences between Non-Recidivists and Recidivists (Analysis Cohort)

	Non recidivists		Recidivists		p-value	Effect Size[1]	% of **Total**
	n	%	n	%			
11. Program at Discharge							
Full-time Program	665	64.8%	247	56.3%			62.2%
Part-time Program	115	11.2%	46	10.5%	0.01*	0.1	11.0%
No Program	247	24.1%	146	33.3%		(small)	26.8%
12. CJRA Overall Risk Level at Discharge							
Low	73	7.2%	16	3.7%			6.2%
Moderate	302	29.9%	86	19.7%	0.00*	0.12	26.8%
High	634	62.8%	335	76.7%		(small)	67.0%
13. Secure Need Factors							
Zero	212	20.6%	58	13.2%			18.4%
One	383	37.3%	168	38.3%	0.01*	0.09	37.6%
Two	299	29.1%	150	34.2%		(weak)	30.6%
More than Two	133	13.0%	63	14.4%			13.4%

*p < 0.05 (indicates a statistically significant difference between recidivists and non-recidivists)

[1]An effect size is considered large at 0.5, medium at 0.3, small at 0.1, and weak when below 0.1.

[2]There were a total of 11 youth who discharged in more than one Fiscal Year due to consecutive sentences, new commitments, etc. For the purposes of the demographic analyses, these youth were only counted once to avoid "double-counting" individual characteristics of recidivists and non-recidivists.

[3]An escape, for the purposes of this study, is defined as a period of time when a youth absconds from a commitment facility, a community placement, or from parole for four hours or longer without permission.

[4] The Parole Discharge Rating is the level at which the client manager determines the youth to be at discharge in regard to parole compliance, which is based on pre-determined criteria.

Summary of Descriptive Analyses

Demographic Differences Found between Recidivists & Non-Recidivists

An extensive analysis of potentially differential demographic characteristics (variables) was conducted in order to determine which traits best characterized youth who recidivated.   In other words, the analysis that follows attempts to define, in very general terms, significant differences in characteristics between youth who recidivate when compared to youth who did not recidivate. As was anticipated, increasing the analysis sample size did, in fact, generate sufficient statistical power to detect significant between-groups differences for variables identified by the literature to be linked to juvenile recidivism. The 13 characteristics that generated significant findings are shown in Table 2 and are summarized below.

1. Gender

Although 86% of the total number of youth in analysis cohort were male, 92% of recidivists were male, which indicates that a significantly larger percentage of recidivists were male than female, with a small effect size (Phi) (92% male vs. 8% female, $p < 0.001$; Phi = 0.11). Generally speaking, an effect size is a statistical tool used with certain tests to illustrate practical or meaningful differences observed, and can

be thought of as a measurement of the *amount of impact* an independent variable (gender, in this case) has on a dependent variable (being a recidivist). It should be noted, however, that the number of female recidivists in the analysis sample remained very small, despite aggregating three years of one-year cohort data ($n = 35$). This very small sample size excluded the possibility of performing additional analyses comparing female recidivists to their male counterparts.

2. Average Age at Discharge

The average age at which youth in the analysis cohort discharged from DYS supervision was 18.6 years. Recidivists were significantly younger at discharge (18.4 years) compared to non-recidivists (18.7 years) ($p < 0.001$). As recidivists were also significantly younger at the time of their commitment and there was no significant difference in the length of service between groups, it is not surprising that recidivists would thus be younger at discharge than non-recidivists.

3. Average Length of Prior Detentions

The average length of stay in detention for all youth in the analysis cohort was 21.2 days. On average, recidivists had a length of stay in detention that was 4.7 days longer compared to non-recidivists, a significant difference ($p = 0.02$). Non-recidivists had an average detention LOS of 19.3 days, compared to 25.9 days among recidivists.

4. DYS Region

For the purposes of this analysis, "Region" refers to the specific Region of the state where a committed youth's case is managed, and frequently reflects either the Region to which a youth will discharge, or where immediate family members reside. Most of the youth in the analysis cohort (39.7%) had their cases managed out of the Central Region, followed by the Northeast Region (30.3%), the Southern Region (19.4%), and the Western Region (10.6%). Regional differences when comparing recidivists to non-recidivists were statistically significant, but had a weak effect size ($p < 0.05$, Phi $= 0.07$), indicating that while the observed differences are significant, the strength of the relationship between Region and being a recidivist is weak. If a stronger relationship was identified, it might be possible to examine differing regional practices that impact recidivism, such as service provision, judicial practices, etc. Unfortunately, the observed weak effect size most likely points to the unequal distribution of youth across the four Regions rather than true Regional differences in recidivism. Given the unequal distribution of the sample sizes across Regions, caution should be used when interpreting these data.

5. Number of Escapes

An escape, for the purposes of this study, is defined as a period of time when a youth absconds from a commitment facility, a community placement, or from parole for four hours or longer without permission. Although more than half (56.3%) of all youth in the analysis cohort had an escape at some point during their commitment to DYS, recidivists comprised a significantly larger percent of those with one or more escapes compared to non-recidivists. Nearly 65% of recidivists had an escape sometime

during their commitment, while roughly 53% of non-recidivists had an escape sometime during their commitment to DYS, though the effect size was small ($p < 0.001$, Phi = 0.11).

6. Average Age at First Adjudication

The average age at which youth in the analysis cohort were first adjudicated for a delinquent offense was 14.7 years. Recidivists were significantly younger (14.5 years) than their non-recidivist counterparts (14.8 years) ($p < 0.001$) at the time of their first adjudication. This finding is consistent with the literature on juvenile delinquency, which finds that the likelihood of becoming an adult offender is greater among youth who demonstrate an early onset of criminality, are chronic delinquents, and commit violent offenses [1] [2].

7. Average Age at Commitment

The average (mean) age at commitment for youth in the analysis cohort was 16.3 years. Recidivists were significantly younger (16.2 years) compared to non-recidivists (16.4 years) at the time of commitment ($p = 0.01$). Again, this is consistent with the finding that recidivists begin offending at an earlier age, and thus experience their first commitment at a significantly younger age compared to non-recidivists.

8. Prior Number of Adjudications

Roughly 47% of youth in the analysis cohort had more than two prior adjudications. There was a significantly larger percentage of recidivists with both one (28.9%) and two or more (51.9%) escapes compared to non-recidivists (26.5% and 44.6%, respectively), although the effect size was small ($p < 0.001$, Phi = 0.1). Generally speaking, youth with multiple prior adjudications may possess a tolerance or acceptance for a deviant life course or trajectory, which would be consistent with behaviors associated with recidivism [1].

9. Ethnic Minority

When ethnicity was examined in terms of four categories (Caucasian, Black/African-American, Hispanic, and Other), no significant differences were observed between recidivists and non-recidivists. Significant differences were observed, however, when ethnicity was examined as a dichotomous variable and the above four categories were collapsed into either "minority" or "non-minority" ethnicity. There were more minority youth (57.3%) in the analysis sample than non-minority youth (42.7%), which is consistent with the changing demographics of the Division over the past several years, as well as the over-representation of minorities among incarcerated populations observed on a national level. Among recidivists, there was a larger percentage of minority youth (61.3%) compared to non-recidivist youth (55.6%), a significant difference with a weak effect size ($p = 0.04$, Phi = 0.05).

10. Parole Rating at Discharge

The Parole rating at discharge is the level at which the client manager determines the youth to be in regard to parole compliance (based on pre-determined criteria) at discharge. The goal of the Division is that each youth earns either a Satisfactory or Excellent parole rating at discharge. Unfortunately, some youth ultimately discharge from parole with an Unsatisfactory rating (40.7% in the analysis cohort). An Unsatisfactory parole rating at discharge indicates a high level of non-compliance; however, the Division relinquishes all supervision and authority over youth once the parole sentence has been served and youth are discharged from the Division.

A closer look at the 40.7% revealed that recidivists comprised a larger percentage of youth with an Unsatisfactory rating (54.9%) compared to non-recidivists (34.6%), a significant difference with a small effect size (p <0.001; Phi = 0.2). Similarly, recidivists had a significantly smaller percentage of youth receiving either a Satisfactory or Excellent rating compared to non-recidivists. While 17.7% of non-recidivists received a Satisfactory parole rating, only 16.9% of recidivists received this rating. In addition, 41.8% of non-recidivists received an Excellent parole rating compared to only 24.6% of recidivists.

11. Program at Discharge

It is the Division's goal to have every youth engaged in either a full- or part-time program at discharge. A youth is considered to have a program in place at discharge if they are either employed, enrolled in school or vocational training, performing community service, parenting, or have other consistent responsibilities in place. Almost three-quarters of the youth in the analysis cohort had either a full- or part-time program in place at discharge (73.2%). A smaller percentage of recidivists had either a full-time (56.3%) or part-time (10.5%) compared to non-recidivists (64.8% and 11.2%, respectively), a significant difference with a small effect size (p =0.01, Phi = 0.1). Similarly, a larger percentage of recidivists had no program in place (33.3%) compared to non-recidivists (24.1%).

12. CJRA Overall Risk Level at Discharge

Slightly more than two thirds (67%) of all youth in the analysis cohort scored as High risk to recidivate on the Colorado Juvenile Risk Assessment (CJRA) administered at discharge. Recidivists represented a larger percent of youth scoring High risk compared to non-recidivists. More than three quarters (76.7%) of recidivists scored as High risk on the discharge CJRA compared to 62.8% of non-recidivists, and represented a smaller percentage of youth scoring as either Moderate or Low risk to recidivate compared to non-recidivists, a significant difference with a small effect size (p < 0.001; Phi = 0.14).

13. Secure Need Factors

Most youth in the analysis cohort had at least one secure need factor (81.6%). Secure need factors refer to certain youth characteristics identified during assessment that indicate a need for placement in a secure facility. Specifically, these secure need factors include scoring in the secure need range on the

Commitment Classification Instrument administered during assessment, having a special sentence, having more than one recommitment, having a history of more than two out-of-home placements, and having a history of one or more escapes. There were a larger percentage of recidivists with one (38.3%), two (34.2%), and more than two (14.4%) secure need factors compared to their non-recidivist counterparts (37.3%, 29.1%, and 13%, respectively), and a smaller percentage of recidivists with zero (13.2%) secure need factors compared to non-recidivists (20.6%). These differences were statistically significant, but had a weak effect size (p =0.01; Phi = 0.09).

Step 2: Logistic Regression Analysis

Which Characteristics were MOST predictive of Recidivism?

Logistic regression analysis is a statistical modeling technique that seeks to quantify the degree to which two groups are different based on the characteristics identified during the initial descriptive analysis (step 1). While the initial analysis examined whether or not a significant difference exists between those characteristics of youth who recidivate and youth who do not recidivate, the analysis that follows attempts to demonstrate the strength of the observed differences. The results of the logistic regression estimate the probability of an event (being a recidivist) occurring, and can be interpreted as the odds of a youth in the population being a recidivist based on the variables present in the model. In addition, logistic regression allows for a test of the overall fit of the model. In other words, logistic regression can also provide a description of how well the variables included in the model predict whether individuals are recidivists or not.

A binomial logistic regression model was fit for the variables found to be predictive of recidivism in the descriptive analysis (step 1) in an effort to determine which youth characteristics had the most influence on recidivism when all other differential variables were considered. The results of this type of analysis are interpreted in terms of probability using an odds ratio. The greater the odds ratio, the more likely an individual with a particular characteristic is to be a recidivist when taking into account other possible factors. Conversely, the smaller the odds ratio, the less likely an individual with a particular characteristic is to be a recidivist.

Summary of the Logistic Regression

Which Characteristics Were MOST Predictive of Recidivism (Presented as Odds Ratios)?

There were 1,477 youth in the analysis cohort, with 444 re-offending within the one-year follow-up period (30.1%). A binomial logistic regression model was created that included each of the 13 individual-level characteristics found to be significant among recidivists described in the previous

section: gender, age at discharge, length of prior detentions, region, number of escapes during commitment, age at first adjudication, age at first commitment, number of prior adjudications, ethnic minority status, parole rating at discharge, program at discharge, CJRA overall risk level at discharge, and number of secure needs factors[iii,iv]. The model sought to further examine the relationship between these variables and being a recidivist, with the goal of developing a formula for making predictions about recidivism based on the observed values of the independent variables. In this model, 7 of the 13 variables (gender, age at discharge, length of prior detentions, region, number of prior adjudications, parole rating at discharge, and CJRA overall risk level) were found to be predictive of recidivism (see Table 3). The significant findings are reported in the pages that follow.

Table 3: Characteristics Predictive of Recidivism (Presented as Odds Ratios)

Characteristics Predictive of Recidivism		
	Recidivists	**Odds Ratio***
Gender	Male	2.14
Age at Discharge	Younger at Discharge	1.26
Length of Prior Detentions	Longer Length of Stays	1.01
Region	Southern Region	1.42
Number of Prior Adjudications	More Prior Adjudications	1.10
Parole Rating at Discharge	Unsatisfactory	2.30
CJRA Overall Risk Level at Discharge	High Risk	1.50

*The odds ratio represents the odds that an outcome (being a recidivist) will occur given the presence of certain characteristics.

GENDER

In the analysis cohort, the odds of being a recidivist were 2.14 times greater for males compared to females. This finding is consistent with national studies which have repeatedly indicated that males are more at risk for delinquency and criminality than are females, controlling for all other variables [3] [4].[v]

[iii] There were a total of 13 studentized residuals with values greater than 2 standard deviations kept in the analysis.
[iv] Linearity of the continuous variables with respect to the logit of the dependent variable was assessed via the Box-Tidwell procedure. A Bonferroni correction was applied using all 19 terms in the model resulting in statistical significance being accepted when $p < .0.00263$. Based on this assessment, all continuous independent variables were found to be linearly related to the logit of the dependent variable.
[v] Males: OR = 2.14, 95% Confidence Interval (CI): 1.4-3.2, $p < 0.001$

AGE AT DISCHARGE

Youth who were younger at discharge had greater odds of being a recidivist compared to youth who were older at discharge, controlling for all other variables. For every one year reduction in age at discharge, the odds of being a recidivist were 1.26 times greater for youth in the analysis cohort[vi].

LENGTH OF PRIOR DETENTIONS

In general, youth with longer detention length of stays (LOS) had greater odds of being a recidivist compared to youth with shorter detention LOS'. For every one day increase in detention LOS, the odds of being a recidivist were 1.01 times greater for youth in the analysis cohort[vii], holding all other variables constant. The length of detention may be an indicator of a more serious offense or of youth with multiple detention stays within the time period of interest.

REGION

In order to evaluate how region affected the probability of being a recidivist, the data were re-coded with the most populous region, the Central Region in this case, as a reference category. Thus, each additional region was compared to the Central Region in the analyses. For youth from the Southern Region, the odds of being a recidivist were 1.42 times those of youth in the Central Region when controlling for all other variables. Although there were observed differences in the number and percent of recidivists in the remaining regions, the odds of being a recidivist were not statistically significant compared to the Central Region[viii].

NUMBER OF PRIOR ADJUDICATIONS

Youth with a larger number of prior adjudications had increased odds of being a recidivist compared to youth with a smaller number of prior adjudications. For every additional prior adjudication, the odds of being a recidivist is increased by a factor of 1.1 holding all other variables constant[ix]

PAROLE RATING AT DISCHARGE

As is consistent with the results of prior analyses, youth who discharged with either an Unsatisfactory or Satisfactory parole rating at discharge had greater odds of being a recidivist compared to youth with an Excellent parole rating at discharge. For youth who discharged with an Unsatisfactory rating, the odds of being a recidivist were 2.3 times greater compared to youth who discharged with an Excellent parole rating at discharge, when controlling for all other variables. The odds of being a recidivist for youth

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[vi] Age at discharge: OR = 1.26, 95% CI: 1.1-1.46, p = 0.002
[vii] Detention LOS: OR = 1.01, 95% CI: 1.0-1.1, p = 0.03
[viii] Southern region: OR = 1.42, 95% CI: 1.0-2.0, p = 0.04
[ix] Number of prior adjudications: OR = 1.1, 95% CI: 1.0-1.2, p = 0.04

who discharged with a Satisfactory parole rating were not significantly different compared to youth with an Excellent parole rating, although this is likely due to the small number of youth with a Satisfactory parole rating ($n = 253$) compared to either Excellent ($n = 531$) or Unsatisfactory ratings ($n = 597$).[x]

CJRA OVERALL RISK (FOR RECIDIVISM) LEVEL AT DISCHARGE

Very few youth scored as Low risk to recidivate on the discharge CJRA ($n = 87$) compared to youth who scored as High ($n = 921$) or Moderate ($n = 373$). These differences make it difficult to capture an accurate picture of how CJRA risk levels affect the odds of being a recidivist. Youth who scored as High risk for recidivism had 1.5 times the odds of being a recidivist compared to youth who scored as Moderate risk, when controlling for all other variables.[xi] The number of youth who scored as Low risk to recidivate was too small to generate enough statistical power when compared to the large number of youth who scored as High risk to recidivate.

Which Characteristics Were Non-Predictive?

When controlling for all other variables:

- The number of prior **escapes** was not found to be predictive of recidivism.
- The **age at first adjudication** was not found to be predictive of recidivism.
- The **age at first commitment** was not found to be predictive of recidivism.
- Identifying as an **ethnic minority** was not found to be predictive of recidivism.
- Having a **program in place at discharge** was not found to be predictive of recidivism.
- The **number of secure need factors** was not found to be predictive of recidivism.

A Note on Males vs. Females

Given the number of females ($n = 205$ total, $n = 35$ recidivists) in the analysis cohort, it was not possible to draw meaningful predictive comparisons between male and female recidivists, even after aggregating three years of the one-year post-discharge cohorts into one, larger cohort. In general, descriptive terms, females comprised 14% of the total one-year post-discharge population (males = 86%), and had a recidivism rate of 17% compared to males who had a recidivism rate of 32%.

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[x] Unsatisfactory parole rating at discharge: OR = 2.3, 95% CI: 1.6-3.3, $p < 0.001$
[xi] High overall risk to recidivate score on discharge CJRA: 0R = 1.5, 95% CI: 1.1-2.0, $p = 0.02$

Step 3: Test of Model Fit
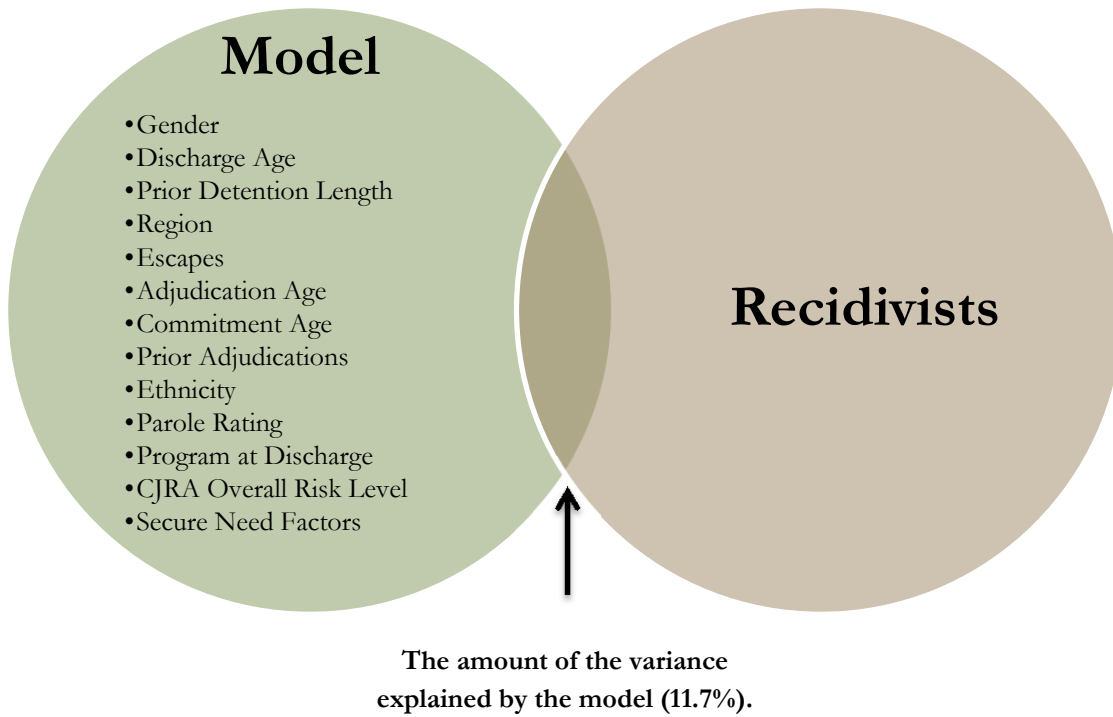
Outcomes of the Test of Model Fit

When conducting analyses that investigate the significance of certain characteristics of recidivists, it's equally important to understand how well the model fits, or how well it can predict the dependent variable knowing only the independent variables. In the following analysis, the dependent variable was recidivist status (a dichotomous yes/no), and the independent variables were those identified as having a statistically significant relationship to youth who recidivate. In order to determine how well the model is able to predict recidivism, a binomial linear regression was performed and included all 13 of the variables identified as significant in the original analysis: Gender, Age at Discharge, Length of Prior Detentions, Region, Number of Escapes (Escapes), Age at First Adjudication (Adjudication Age), Age at First Commitment (Commitment Age), Number of Prior Adjudications (Adjudications), Ethnic Minority, Parole Rating at Discharge (Parole Rating), Program at Discharge, CJRA Overall Risk Level at Discharge (Risk), and Number of Secure Need Factors.

The model indicated[xii] that the 13 variables found to be significantly associated with greater odds of being a recidivist in the original analysis explain roughly 12% of the variation in the model. Generally speaking, given the small percentage of the variance that is explained by the model, it is clear that there are additional, yet unknown factors that are predictive of recidivism than were included in the model (see Figure 6). In social science research, explaining a relatively small percentage of the variance in a model involving human behavior is both common and not necessarily an indicator of poor model fit [5]. Understanding how well a model explains the variance or "fits" a research question is at the heart of all social science research. Additional research is required in order to better understand and predict recidivism among this population.

For a detailed description of the specific tests of statistical significance and model fit, please see Appendix C.

[xii] The pseudo R^2 for the model (0.117) should be interpreted with caution and only in tandem with the additional tests of overall model fitness with a binomial logistic regression.

Figure 6: Venn Diagram of the Variance Explained by the Model

Model

- Gender
- Discharge Age
- Prior Detention Length
- Region
- Escapes
- Adjudication Age
- Commitment Age
- Prior Adjudications
- Ethnicity
- Parole Rating
- Program at Discharge
- CJRA Overall Risk Level
- Secure Need Factors

Recidivists

The amount of the variance explained by the model (11.7%).

COLORADO JUVENILE RISK ASSESSMENT (CJRA)

CJRA RESULTS

The Colorado Juvenile Risk Assessment is an actuarial instrument that is utilized by DYS to assist in predicting a youth's risk of recidivism. The CJRA is based on the Washington State Juvenile Court Assessment, which has been shown to be predictive of recidivism in several validation studies, with juvenile probation populations. The CJRA was developed using 12 domains of risk and protective factors and has been shown to be a useful tool to identify psychosocial criminogenic domains susceptible to recidivist tendencies in individual youth [6].

Every youth committed to DYS is assessed for criminogenic risk and protective factors, both from a static and dynamic perspective. Static domains are based on historical data which cannot be improved with treatment (such as gender, criminal history or history of substance abuse). In contrast, dynamic domains are based on a youth's current living and social factors, which can be targeted during commitment with appropriate treatment and services in order to reduce risk (such as attitudes and behaviors).

The CJRA is utilized by DYS to initially assess and periodically re-assess the risk of recidivism for individual youth at specified points in time. For this analysis, the focus has been narrowed to CJRAs administered during assessment and at the time of discharge from DYS. Re-assessment of risk and protective factors at critical junctures during a youth's commitment and parole sentence allows assessment staff, client managers, and Multi-Disciplinary Teams (MDTs) to accurately gauge a youth's current risk of recidivism, and informs treatment decisions based upon a youth's most current needs. The primary goal of DYS is to decrease recidivism among its youth population by targeting criminogenic risk while increasing protective factors before a youth is discharged from the Division.

For most youth, a final CJRA re-assessment is completed upon discharge. This final risk assessment is called a youth's discharge CJRA. Of the 1,477 youth in the analysis cohort, nearly eighty-eight percent (87.5%; $n = 1,292$) had a valid discharge CJRA. Valid, in this instance, is defined as an assessment that was completed within 90 days of a youth's discharge date.

While each youth is assessed several times throughout his/her commitment to DYS, the last CJRA administered is given the most weight in regard to predicting future recidivism. As the instrument measures a youth's risk for recidivism at a specific point in time, the CJRA completed *closest to discharge* best describes a youth's risk trajectory when s/he is preparing to fully integrate back into the community after completing DYS supervision. Furthermore, research indicates that a youth's most recent risk assessment is the most predictive of future re-offending behavior [7].

Figure 7: DYS Goals for Committed Youth
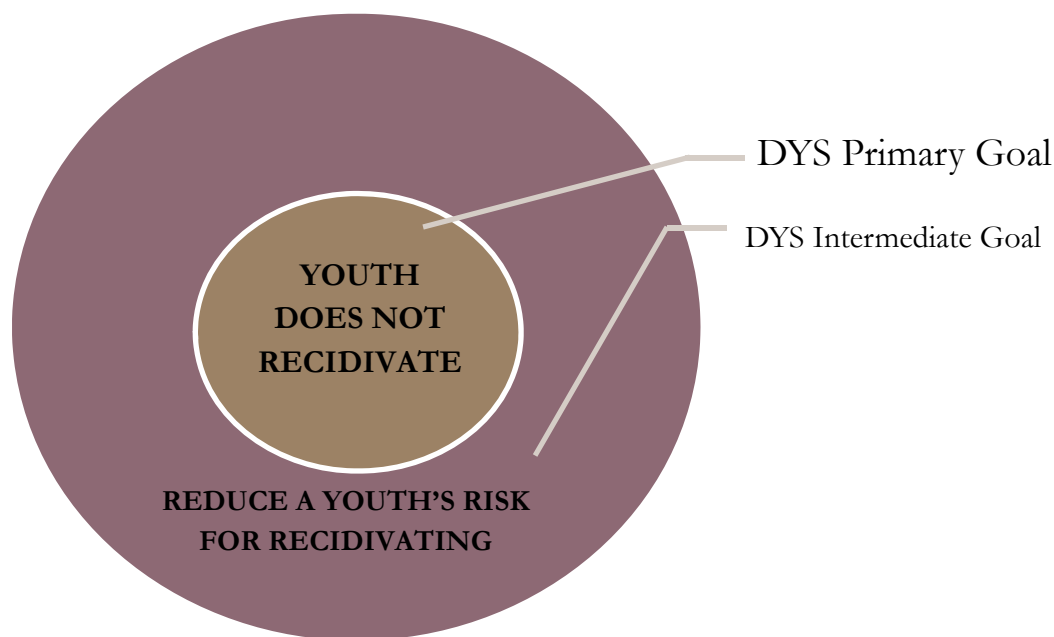
## Risk Reduction from Commitment to Discharge

The Division's primary goal is that youth discharged from DYS do not recidivate (see Figure 7). In other words, the Division's primary goal is a lag measure, meaning the outcome is unknown until the one-, two-, and three-year post-discharge follow-up periods have passed for each discharged youth. Although actual recidivism cannot be determined sooner, there is another measure (an intermediate goal) that *can* be measured while a youth is still serving his or her commitment sentence—the youth's *risk* of recidivism. Recidivism risk assessments, like the CJRA, can determine whether a youth's risk of recidivating has been reduced over the course of treatment and services provided during commitment. As adjudicated youth are at increased risk of committing a new offense in the future due to their criminal history, criminogenic risk reduction is critical to overall reductions in recidivism, as criminogenic risk reduction results in a reduction in risk to re-offend [8] [9] [10]. Thus, one of DYS' key intermediate goals is reducing criminogenic risk.

CJRA OVERALL RISK LEVEL

When youth are committed to DYS, the vast majority score as High risk to re-offend in the future. Among the analysis cohort, 90% scored as High risk to recidivate at assessment (*n* = 1,163), and only 10% scored as Low or Moderate risk (*n* = 129) (See Figure 8). When examined at discharge, however, 65.9% of the analysis cohort scored as High risk (*n* = 852), and 34% scored as Low or Moderate risk

(n = 440). Only youth with both a valid assessment and discharge CJRA were included in the analysis (N = 1,292). The results of the analysis revealed that the analysis cohort demonstrated a statistically significant reduction in recidivism risk (re: CJRA levels) from assessment to discharge after receiving treatment and services from DYS (x^2 = 498.538, df = 4, p < 0.001).

Figure 8: CJRA Overall Risk Level Changes from Assessment to Discharge (Analysis Cohort)
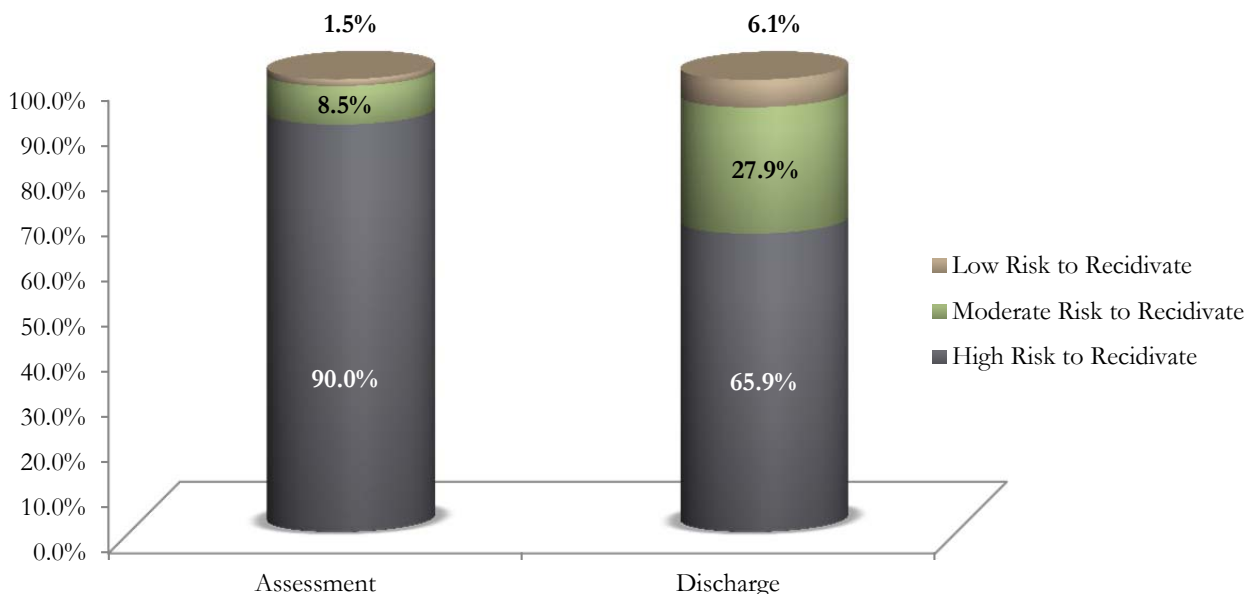
The analysis cohort experienced a 26.7% (n = 311) reduction in High risk to recidivate scores, and even more dramatic gains in the Moderate (228.2%; n = 251) and Low risk (315.8%; n = 60) scores. Unfortunately, while the percentage of High risk youth was significantly reduced from commitment to discharge, the majority of youth maintained a High risk score at discharge.

Figure 9: CJRA Overall Risk Level Changes (Lessened, No Change, Intensified) (Analysis Cohort)
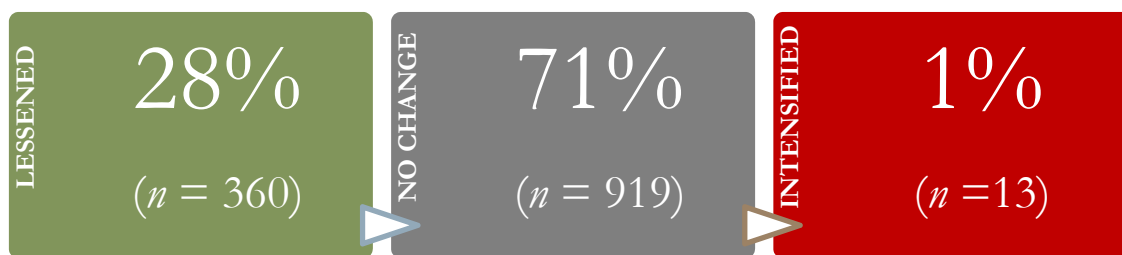
For many of these youth who did not have a change in their risk level, their individual score may actually have decreased, but the change was not sufficient to move them to a lower risk level category. When examined further (see Figure 9), a proportion of youth (28%) lessened their risk level from DYS assessment to discharge. This reduction includes those who initially scored as High risk at assessment and then scored as Moderate risk at discharge, those who moved from Moderate to Low risk scores, or even those who moved from High to Low risk scores. The largest percent of youth scored as the same

risk for recidivism at assessment and discharge (71%). In other words, these youth were committed to DYS with a High risk for recidivism, and discharged with the same High risk. Finally, one percent (1%, *n* = 13) of youth in the analysis cohort experienced an intensified risk level of any kind.

This last finding is significant as it relates to the *Do No Harm* philosophy in corrections. The Division strives to reduce risk among its juvenile population, but is also dedicated to ensuring that lower level offenders are not at an increased risk for recidivism at discharge. As the third box of Figure 9 illustrates, roughly 1% of youth in the one-year cohort (*n* = 13 youth) increased their risk to recidivate between assessment and discharge. Eleven of these youth were assessed as Moderate risk upon commitment to DYS and scored as High risk to recidivate at discharge, while the remaining two youth were assessed as Low risk at assessment and then scored as Moderate risk at discharge. A substantial body of literature points to the iatrogenic effects of incarcerating lower risk youth as well as treating Low risk youth with intensive services [11]. As Social Learning Theory suggests, these lower risk youth may learn anti-social skills from High risk youth that they may not have otherwise been exposed to if not incarcerated [12] [13].

Recidivism Rates by CJRA Overall Risk Level Changes

In general, for those youth with observed decreases in risk level from assessment to discharge, it can be posited that DYS treatment was effective in terms of targeting the risk factors associated with recidivism. In contrast, those youth who did not have a change in risk level may not have responded as positively to treatment. Finally, treatment was perhaps deleterious to those youth who experienced an intensified (or increased) risk level.

The recidivism rate for youth with a lessened risk level confirms that the change in risk level itself can have an effect on recidivism. As shown in Figure 10, youth whose risk score was lessened after DYS treatment and services had a recidivism rate of 24.2% one year after discharge (19.6% lower than the than the average rate of 30.1% for the analysis cohort). Youth with no change in risk score had a slightly higher recidivism rate of 33.8% one year after discharge (higher than the average rate). The 13 youth in the analysis cohort who had an aggravated risk score after being committed to DYS had a recidivism rate of 15.4% one year after discharge, although caution should be used when interpreting outcomes with such a small group. These differences in recidivism rates compared by risk level changes from assessment to discharge were statistically significant (x^2 = 12.817, df = 2, *p* = 0.02). An investigation into the eleven youth with aggravated CJRA risk levels who had not recidivated revealed that four had committed a recidivist act after the one-year post-discharge follow-up period and will be captured in the two-year post-discharge cohort next year, and an additional two had open warrants or cases with pending charges. This is consistent with the Time to Recidivist Offense data presented in Figure 22, where 94% of youth who recidivate do so within 24 months of discharge.

Figure 10: Recidivism Rates by CJRA Overall Risk Level Changes (Analysis Cohort)

| LESSENED	NO CHANGE	INTENSIFIED
24.2%	33.8%	15.4%
(n = 360)	(n = 919)	(n = 13)
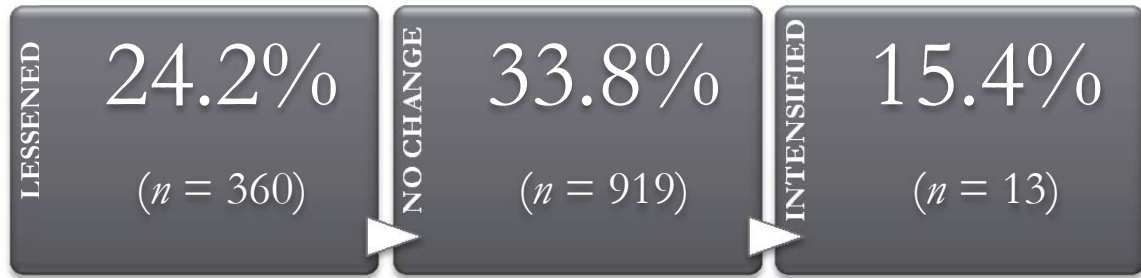
Sensitivity of the CJRA

Human behavior is unpredictable by nature, and thus incredibly difficult to predict with accuracy [14]. The use of actuarial risk assessments provides some insight into the probability that those who possess certain characteristics might re-offend in the future [15]. From a research perspective, the "sensitivity" of an assessment tool is a term used to describe the number of cases that are correctly identified by the tool. In this assessment, the term sensitivity is used to describe the proportion of youth in each cohort who recidivated and also scored High risk to recidivate on the CJRA. If the CJRA is sufficiently sensitive, it should correctly identify a large percentage of youth who eventually recidivate as High risk to recidivate.

As shown in Figure 11, 75.8% of recidivists in the analysis cohort scored as High risk to recidivate on their discharge CJRA. Comparatively, fewer than 4% of youth who scored as Low risk on the discharge CJRA committed a recidivist act. These findings indicate that the CJRA is sensitive enough to correctly identify nearly eighty percent of youth who recidivate.

Figure 11: CJRA Discharge Overall Risk Levels for Recidivists (Analysis Cohort)

Recidivist Discharge CJRA Risk Scores

Legend: ■ High Risk ■ Moderate Risk ■ Low Risk

Slice labels: 3.5%, 20.8%, 75.8%
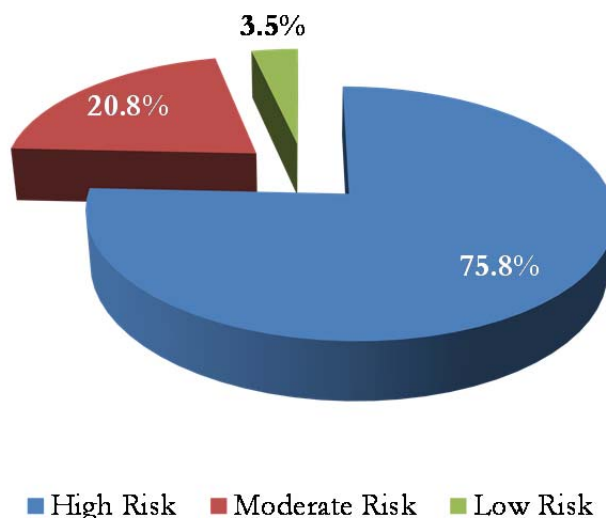
Positive Predictive Value of the CJRA

Within the context of this study, the positive predictive value of the CJRA is defined as the proportion of youth who score as High risk who actually go on to recidivate. If the CJRA is accurately assessing youth who are at the highest risk of recidivating, one would expect to see a large proportion of youth with High risk scores eventually recidivate. As shown in Table 4, among the population of youth who scored as High risk to recidivate, 35.6% (n = 303) had recidivated within one year (18.3% higher than the analysis cohort recidivism rate). Among those youth who scored as Moderate risk to recidivate, 23% (n = 83) had recidivated within one year (23.6% lower than the analysis cohort recidivism rate), and 17.7% of youth who scored as Low risk to recidivate (n = 14) had recidivated within one year (41.2% lower than the analysis cohort recidivism rate). In short, we are seeing a higher rate of recidivism among youth who scored High risk to recidivate compared to youth with Moderate or Low risk scores in each cohort, and the differences are statistically significant (x^2 = 25.648; p < 0.001; Phi = .14). Generally speaking, the observed higher rate of recidivism among High risk youth indicates that the CJRA is internally valid and is measuring what it is intended to measure: youth who are at greater risk to recidivate in the future. In addition, the CJRA also appears to be externally valid in that it is possible to use the risk scores generated to assist in predicting future recidivism among the Division's youth population (i.e., predictive validity)

.

Table 4: Recidivism Rates by Discharge CJRA Risk Level (Analysis Cohort)

Recidivism Rate		
	Analysis Cohort*	
	Recidivists	
Discharge CJRA Risk Level[†]	**%**	*n*
High (risk to recidivate)	35.6%	303
Moderate (risk to recidivate)	23.0%	83
Low (risk to recidivate)	17.7%	14
Total recidivism rate for youth with valid CJRAs	**32.4%**	400

* p < .001 (indicates a statistically significant difference).
†Only youth with a valid discharge CJRA are included in this analysis (valid = within 90 days of discharge and a completed assessment).

DOMAIN RISK LEVEL

The prior section focused on the CJRA overall risk level (i.e.: Low, Moderate, High), while the current section will focus on those criminogenic domains within the CJRA on which the most youth frequently score as being High risk. In an effort to reduce the overall likelihood of re-offending, youth committed to DYS have treatment plans developed to specifically address their individual criminogenic needs. The CJRA is rooted in the following 12 criminogenic domains presented in Figure 12:

Figure 12: Colorado Juvenile Risk Assessment Domains
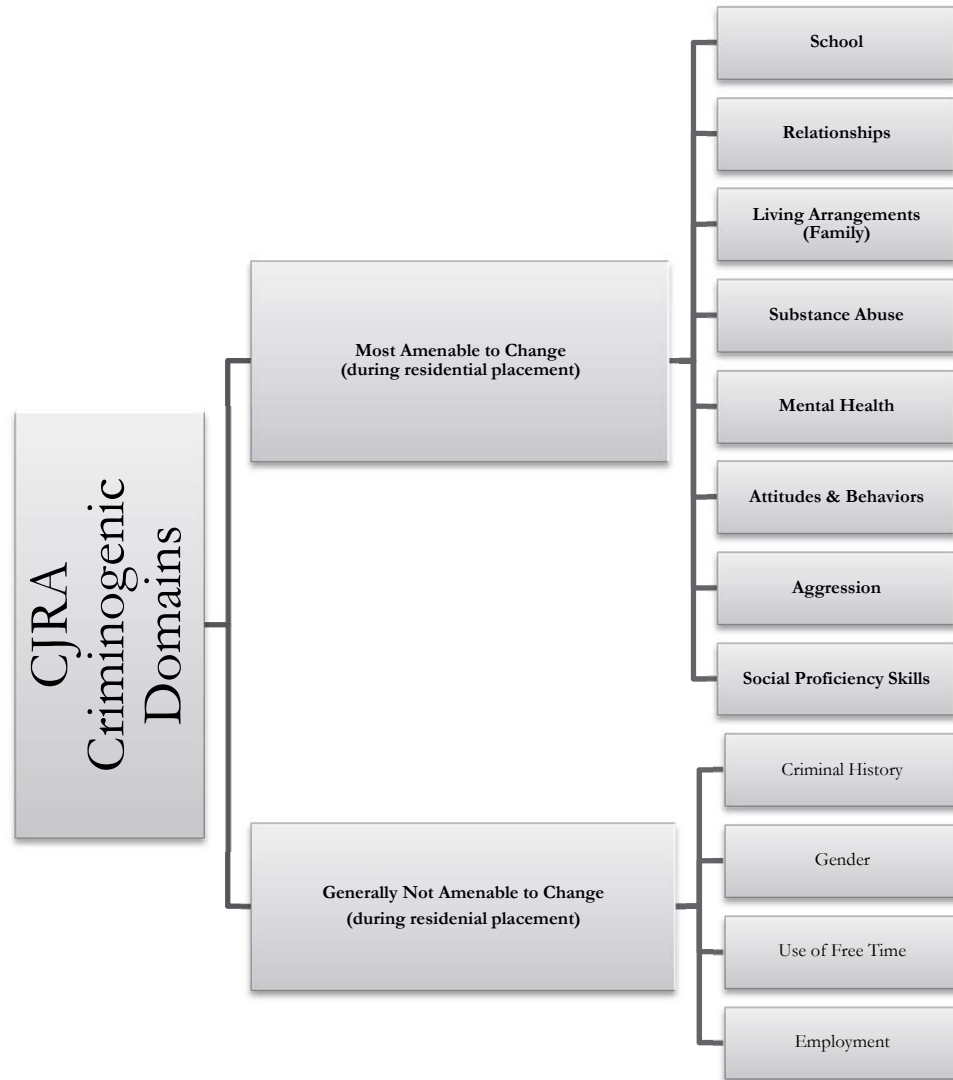
Of the twelve CJRA domains, DYS focuses treatment plans on the eight domains that are most amenable to change during a youth's commitment sentence (School, Relationships, Living Arrangements (Family), Substance Abuse, Mental Health, Attitudes & Behaviors, Aggression, and Social Proficiency Skills). These eight dynamic domains are pertinent to this analysis as they are the only domains where change can be influenced and measured with consistency through treatment and services. The remaining four domains are generally not amenable to change. Criminal History and Gender are static and cannot be changed. Use of Free Time and Employment are generally not amenable to change while youth are in secure residential placement, but may become so during parole or post-discharge.

The analysis in this section focuses on calculated CJRA risk scores at the time of discharge. On average, more than three quarters of the youth in the analysis cohort were committed to DYS and assessed as being High risk on four of the eight domains. At time of discharge, this average decreases to fewer than half scoring High risk on these same four domains (see Figure 13).

Assessment CJRA

On the assessment CJRA, the most frequent High risk domains included Attitudes & Behaviors (95.3% scored as High risk), Aggression (82.7% scored as High risk), Relationships (81.9%) and Social Proficiency Skills (82.9% scored as High risk).

Discharge CJRA

On the discharge CJRA assessment, the most frequent High risk domains were Attitudes & Behaviors (44.2% scored as High risk); Relationships (40.8% scored as High risk); and Aggression (33.1% scored as High risk). See Figure 13 for details.

Figure 13: Percentage of Youth Who Scored High Risk on Both Assessment & Discharge CJRAs, by Most Frequent High Risk Domain
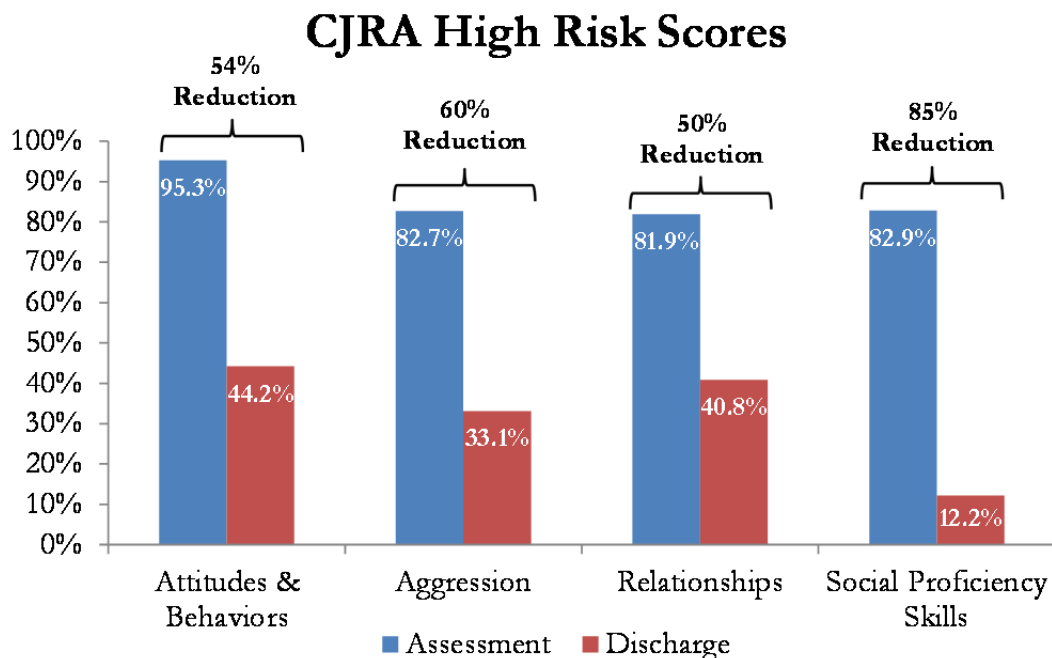
CJRA DOMAIN RISK FOR NON-RECIDIVISTS VS RECIDIVISTS

This section of the analysis will focus on the relationship between individual criminogenic risk factors (i.e. CJRA domains) and rates of recidivism for youth who scored High vs. Not High risk (Low or Moderate risk) on each domain. For each domain, the percentage of recidivists who scored High risk was compared to the percentage of non-recidivists who were High risk, with the goal of determining if certain domains were more characteristic of future recidivism over the course of commitment. The shading in Figure 14 is intended to help demonstrate which domains were statistically significant. Only the domains that demonstrated a statistically significant difference between the percentage of non-recidivists and recidivists who scored High risk in that domain appear in color.[xiii]

Discharge CJRA

Figure 14: Percentage of Non-Recidivists vs. Recidivists Who Scored High Risk on the Discharge CJRA, by Domain

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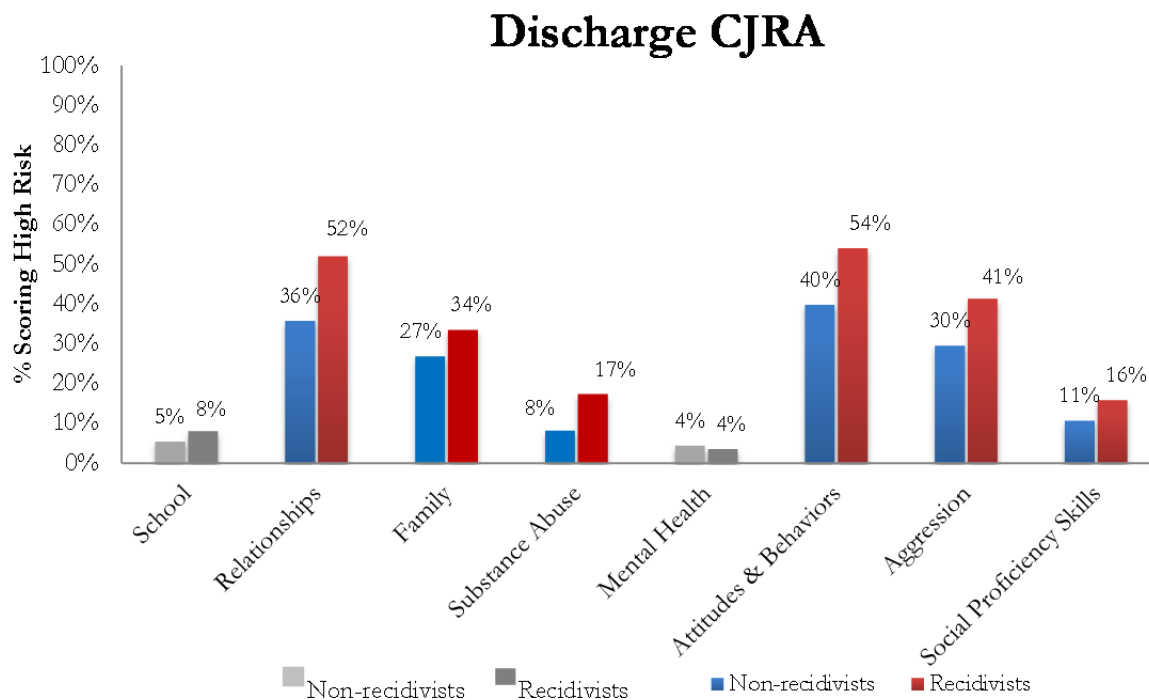
[xiii] As the CJRA administered closest to discharge (e.g.: the discharge CJRA) is considered to be the most valid for predicting who is at the greatest risk for recidivating, the analysis was limited to between groups differences in the risk scores on this discharge CJRA.

On the discharge CJRA, Figure 14 shows the percentage of non-recidivists who scored High risk in each CJRA domain versus the percentage of recidivists who scored High risk in each CJRA domain. It is informative to identify those domains on which youth scored High risk at discharge as well as the demographics of those who ultimately went on to recidivate. These differences help to decode some of the reasons for subsequent criminogenic behavior within the population. A larger percentage of recidivists scored as High risk for recidivism on seven of the eight CJRA domains, with Mental Health being the only domain in which a larger percentage of non-recidivists (4.4%) scored as High risk compared to recidivists (3.5%).

Relationships

It is important to remember that the discharge CJRA happens after a youth has been on parole in the community for at least six months. This allows time for youth to regress to associating with anti-social peers and social networks, which can influence the percentage of youth who score High risk on this domain at discharge. Peer group influence is perhaps at its strongest during the teenage years when adolescents are seeking to define themselves, and the Relationships domain is an indicator of the degree to which a youth's relationships place him/her at risk for recidivism. On the discharge CJRA, 52% of youth who ultimately went on to recidivate scored High risk on the Relationships domain compared to 36% of those who did not recidivate (x^2 = 30.148, df = 1, p < 0.001) [16].

Family

Having prosocial family members who are both present and engaged in a youth's transition back to the community and beyond is critical to a youth's future success. Conversely, family disorganization, family members who have attitudes that are tolerant toward crime and delinquency, who use illicit substances or abuse legal substances, are abusive, or who are otherwise inconsistently or negatively involved in a youth's life are real risk factors for future criminality. On the discharge CJRA, 33.5% of youth who eventually went on to recidivate scored High risk on the Family domain compared to 26.8% of youth who did not recidivate (x^2 = 6.048, df = 1, p = 0.01) [16] [17].

Substance Abuse

Substance abuse is a pervasive problem, particularly among juvenile populations, and among those with an early onset of alcohol, tobacco, or other drug use. The Alcohol and Drugs domain of the discharge CJRA measures current substance use as a risk factor for recidivism. When youth are committed to DYS, it is expected that youth do not have access to illicit substances or to substance using peers. Thus, given the threat of being caught violating this expectation and receiving a sanctions and/or modified treatment plans, one would expect the current Alcohol and Drug use reported on the discharge CJRA to be quite low while youth remain under DYS supervision. Conversely, once a youth has discharged and no longer faces the same consequences for substance use, it would not be surprising for youth with a history of substance abuse to re-engage in substance use behavior with peers. On the discharge CJRA, 17.3% of youth who ultimately went on to recidivate scored as High risk on the Alcohol and Drugs

domain, compared to 8.2% of those who did not recidivate (x^2 = 23.203, df = 1, p < 0.001) [18] [19] [20].

Attitudes and Behaviors

The same concepts described for the Relationships and Family domains are true for the Attitudes and Behaviors domain. Many youth relapse back into formerly established behaviors when they re-enter their homes, neighborhoods, and are surrounded by members of their community. Often times a youth returning home will be confronted with the same anti-social behaviors or attitudes that are tolerant of crime or delinquency that they espoused prior to commitment. Unfortunately, at this stage in the youth's commitment many of the therapeutic advances made while in residential placement are in jeopardy of being reduced. On the discharge CJRA, 54% of youth who ultimately went on to recidivate scored High risk on the Attitudes and Behaviors domain compared to 39.8% of those who did not recidivate (x^2 = 22.584, df = 1, p < 0.001).

Aggression

On the discharge CJRA, 41.3% of youth who ultimately went on to recidivate scored High risk on the Aggression domain compared to 29.5% of those who did not ultimately recidivate (x^2 = 17.257, df = 1, p < 0.001). It has long been established that incarcerated offenders tend score higher on assessments of aggression than the general population. Youth who are committed to DYS have typically experienced an array of aggression and complex trauma in their lives, whether it was perpetrated or witnessed in their neighborhoods, schools, or even at home. Past experiences with violence and complex trauma can lead to aggressive reactions to stress or other confrontations [19].
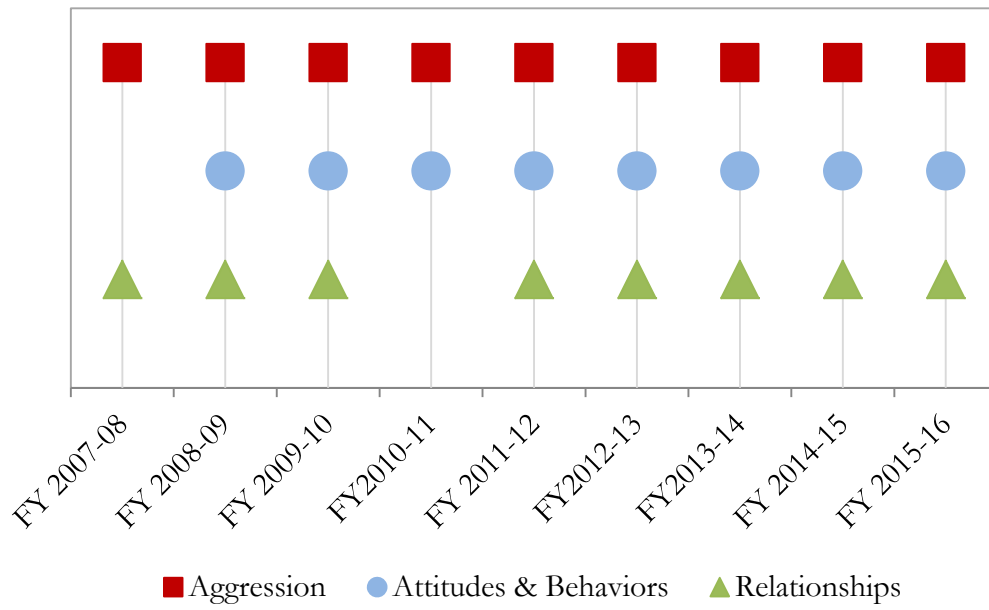
Social Proficiency Skills

The possession of certain social proficiency or "life skills" can have a significant protective effect on juveniles, while a deficit in this area can place a juvenile at greater risk for violence, delinquency, and substance abuse. Youth without a depth of social proficiency skills may be more prone to being isolated by their peers, lack self-esteem derived from social competency, and may be prone to lashing out in anti-social ways, including violence. On the discharge CJRA, 15.8% of youth who ultimately went on to recidivate scored High risk on the Social Proficiency Skills domain compared to 10.7% of youth who did not ultimately recidivate (x^2 = 6.691, df = 1, p = 0.01).

Consistently Predictive CJRA Domains: Aggression, Attitudes & Behavior, and Relationships

Discharged youth scoring High risk on the CJRA Aggression domain have proven **for nine consecutive years** to be at statistically higher risk of recidivating, while discharged youth scoring High risk on the Attitudes & Behavior and the Relationships domains have proven for eight of nine consecutive years to be at statistically higher risk of recidivating (see Figure 15).
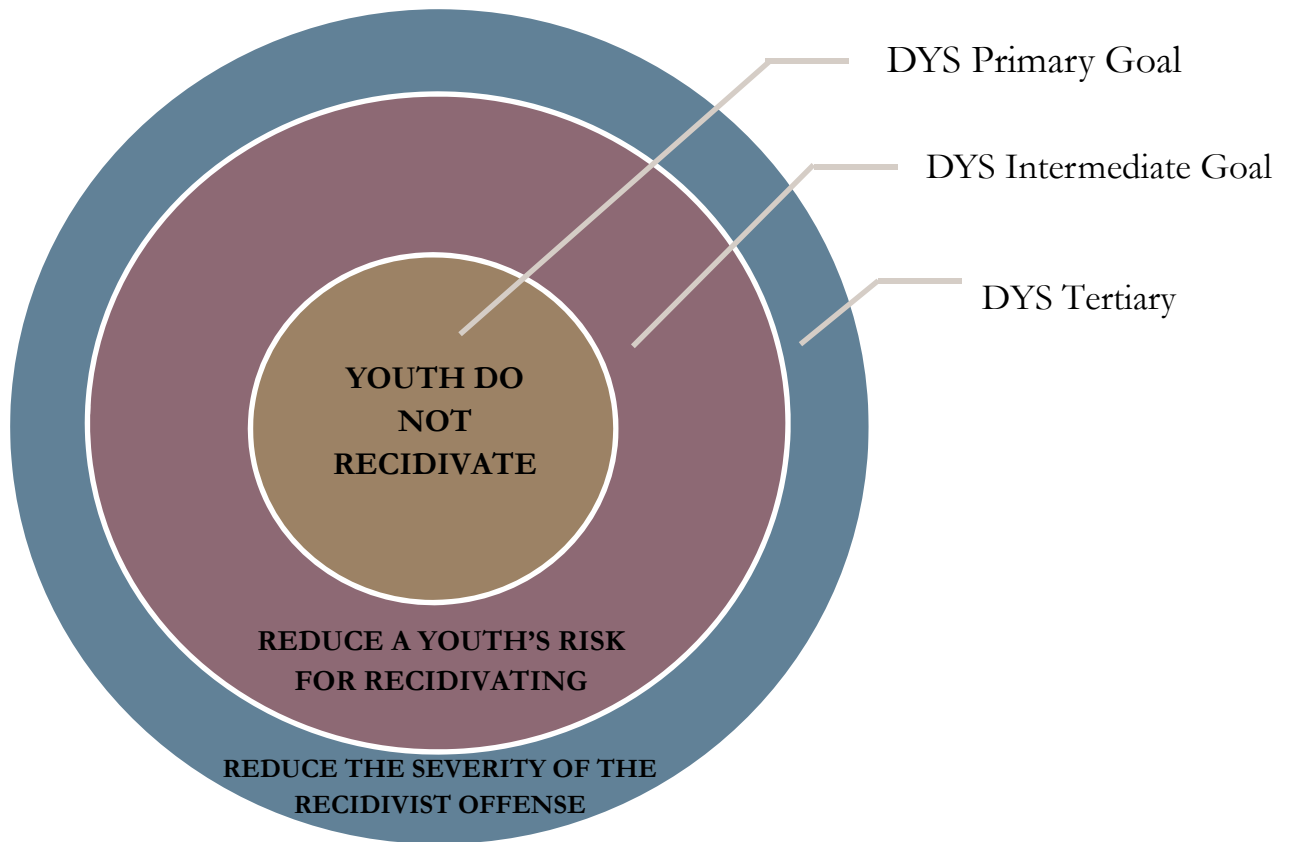
Figure 15: Consistently Predictive CJRA Domains

Legend: ■ Aggression ● Attitudes & Behaviors ▲ Relationships

X-axis: FY 2007-08, FY 2008-09, FY 2009-10, FY2010-11, FY 2011-12, FY2012-13, FY2013-14, FY 2014-15, FY 2015-16

RISK REDUCTION - OFFENSES

As stated previously, DYS's primary goal is that youth do not go on to recidivate after treatment, while the Division's intermediate goal is to reduce our youth's *risk* of recidivating. Given that a large portion of DYS youth do, in fact, recidivate within three years of discharging, an additional means by which to measure youth progress made while in treatment with DYS was developed. One way to evaluate youth progress is to examine the individual recidivist offense severity in comparison to the DYS committing offense (see Figure 16). Reducing the severity of a recidivist act can be thought of as the Division's tertiary goal. Although it is not ideal, the reality is that for many youth treated at DYS, committing a less severe offense can be considered an achievement.

Figure 16: DYS Goals

DYS Primary Goal

DYS Intermediate Goal

DYS Tertiary

YOUTH DO NOT RECIDIVATE

REDUCE A YOUTH'S RISK FOR RECIDIVATING

REDUCE THE SEVERITY OF THE RECIDIVIST OFFENSE

OFFENSE SEVERITY

This section of the analysis examines a youth's commitment offense (the offense that resulted in his or her DYS sentence) compared to his/her most serious recidivist offense (the offense after discharge from DYS). Although youth who re-offend still present a threat to the community, this threat can be considered mitigated if their recidivist offense is less severe than their commitment offense.

Severity of Commitment Offenses vs. Recidivist Offenses

The following analysis examined the severity of the offense type for which a youth was committed to DYS (commitment offense) and compares it to the most serious recidivist offense that occurred during the one-year follow-up period (recidivist offense).

Figure 17: Commitment Offense Severity of Recidivists (Analysis Cohort, $N = 444$)

Petty
- 0%
- $n = 0$

Misdemeanor
- 40%
- $n = 177$
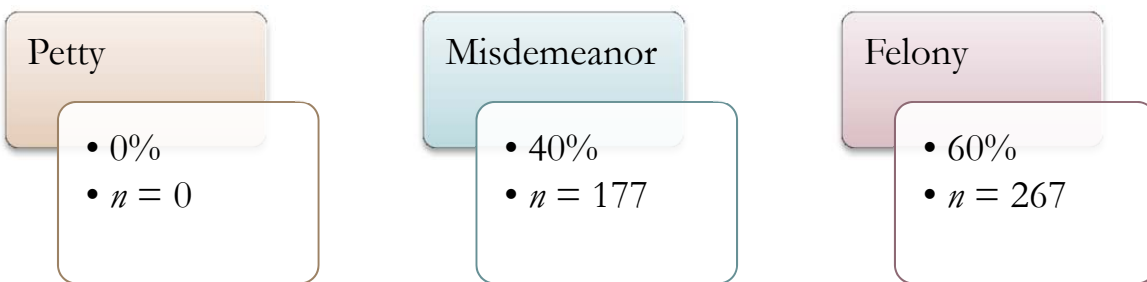
Felony
- 60%
- $n = 267$

Figure 18: Recidivist Offense Severity (Analysis Cohort, $N = 444$)

Petty
- 0%
- $n = 0$

Misdemeanor
- 40%
- $n = 179$
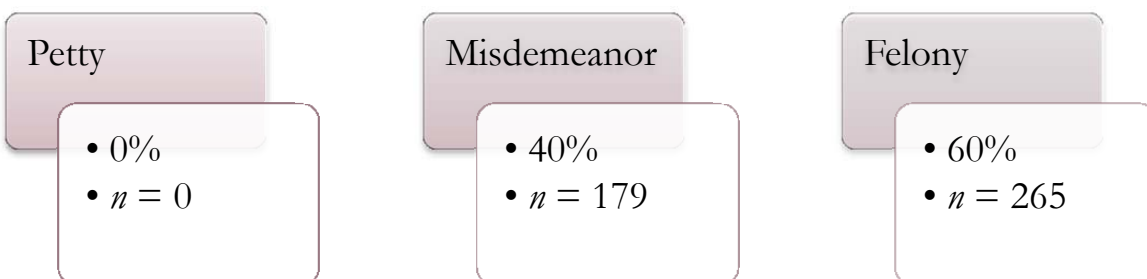
Felony
- 60%
- $n = 265$

Of the 444 clients in the analysis cohort who recidivated during the one-year follow-up time period, the majority were originally sentenced to DYS on felony adjudications (60.1% felony vs. 39.9% misdemeanor) (see Figure 17). The same is true for recidivist offenses; the most common recidivist offense was also a felony (59.7% felony vs. 40.3% misdemeanor) (see Figure 18). In order to truly examine offense severity, however, one also needs to consider the class of felony and misdemeanor for which an individual was adjudicated or convicted. Unfortunately, the available data regarding offense class is not robust enough to examine more closely.

Recidivist Offenses[xiv]

While the previous section delineated between felonies and misdemeanors, the section that follows will provide an analysis of the types of recidivist acts. An analysis was conducted regarding the different types of recidivist offenses perpetrated among the analysis cohort. Specifically, every recidivist offence committed by each of the 444 recidivists in the analysis cohort was examined for type and severity (based on offense class), with only the most serious recidivist act included in the analysis.

There are several different categories into which offenses are classified: person, property, weapon, traffic, drug, and other. Person offenses involve harm to another person and are considered the most severe type of offense. Property offenses involve the theft or destruction of property, while weapon offenses are violations of statutes or regulations that control deadly weapons. Drug offenses can include the manufacture, sale, or possession of specific quantities of illicit substances or prescription medications without a valid prescription. Traffic offenses, not to be confused with traffic violations (e.g.: parking tickets), include things like driving under restraint, driving while ability impaired, and vehicular eluding. Other offenses among the analysis cohort included: accessory to crime, escape, contributing to the delinquency of a minor, impersonation/false reporting, forgery, obstructing a peace officer, obstructing government operations, resisting arrest, failure to register as a sex offender, violating a protection order, identity theft for financial gain, fishing without a license, and violation of a parole order.

Of the 444 recidivists in the analysis cohort, 130 (29%) committed a crime against a person as their most serious recidivist act (see Figure 19). In contrast, the remaining 314 recidivists (70%) did not commit a crime against a person as their most serious recidivist act.

[xiv] In compliance with C.R.S., 19-2-203(6), previously HB 18-1010, the Department began collecting data on those crimes included in Section 24-4.1-302(1), C.R.S. (Victim Rights Act) after the bill was signed into law on March 7, 2018. Delineations between recidivist crimes that are included in Section 24-4.1-302(1), C.R.S. and other crimes will appear in future reports, after the data has been collected for the three year post-discharge time period specified by law.

Figure 19: Types of Recidivist Offenses

Legend: Person, Property, Weapon, Other, Traffic, Drug
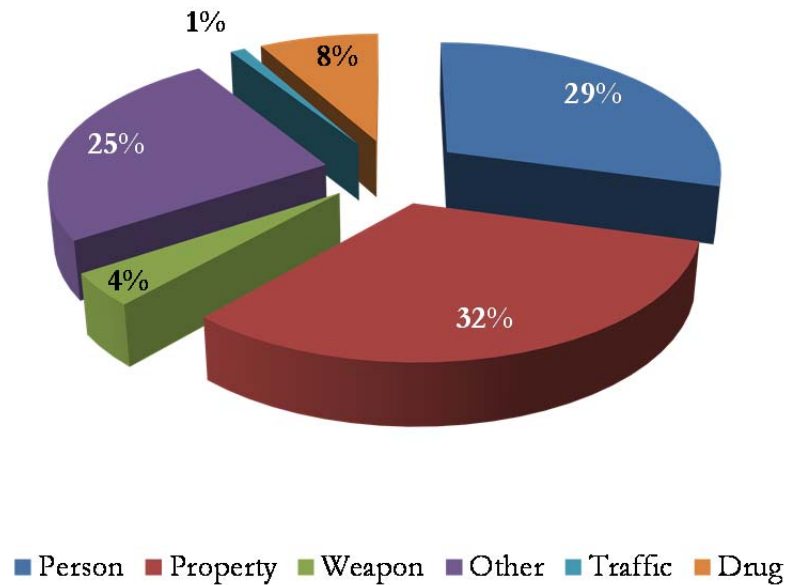
Types of Commitment Offenses vs. Recidivist Offenses

Among recidivists in the analysis cohort, as shown in Figure 20, the most common types of commitment offense were person offenses (37%) and property offenses (41%). Property offenses were the most common DYS commitment offense type.

The most common types of recidivist offenses were also property (32%) and person (29%) offenses. It should be noted that the proportion of recidivist offenses that were of person offenses (29%) was 22% lower than the proportion of DYS commitment offenses that were person offenses (37%). A similar reduction was noted between commitment and recidivist property offenses: 41% of commitment offenses were property offenses, but only 32% of recidivist offenses were property offenses, a 22% reduction. Recidivist offenses classified as other demonstrated a 214% increase from commitment offense to the most serious recidivist act (n = 35 and n = 110, respectively). Drug offenses experienced a 19% increase from commitment (n = 31) to recidivist offense (n = 37), but remained a relatively small number of the total recidivist acts (see Figure 20).

For youth who had more than one recidivist offense, the most severe offense was selected for this analysis (as defined by the severity class). In the event a youth had more than one recidivist offense with the same severity class, the first those offenses to occur was selected.

Figure 20: Types of Commitment Offenses vs. Recidivist Offenses
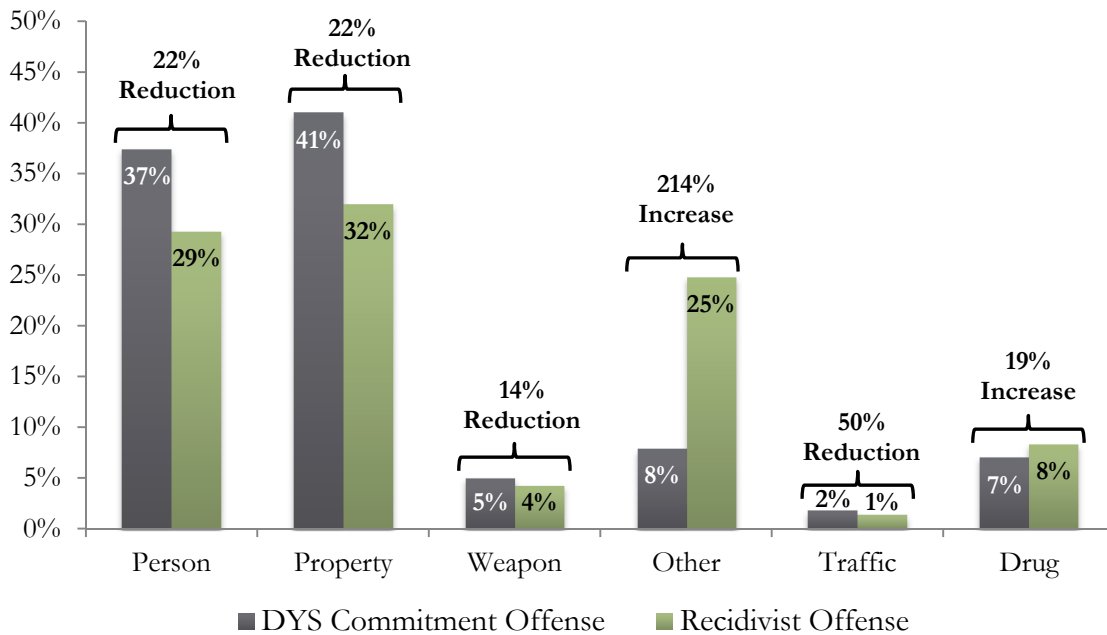
Offense Severity Reduction

As shown in Figure 21, of the 1,477 total discharges, nearly seventy percent (69.9%; *n* = 1,033) did not recidivate in the twelve months following discharge, while the remaining 30.1% (*n* = 444) did recidivate. Five percent (4.9%; *n* = 73) of the analysis cohort re-offended with the same level as the original committing offense. Eleven percent (11.2%; *n* = 165) of youth re-offended with a less serious offense. The remaining fourteen percent exhibited more serious criminal behaviors following discharge (13.9%; *n* = 206).

Viewed from this perspective, the Division was successful in reducing the level of criminal behavior for 81.1% of youth discharged in FYs 2013-14, 2014-15, and 2015-16 (those who did not recidivate or had a decrease in offense severity: 69.9% + 11.2%).

Figure 21: Offense Severity Risk Reduction

Recidivists (30.1%)

13.9%

4.9%

11.2%

69.9%

■ Did Not Recidivate

■ Decrease in Severity
(less serious offense)

■ No Change in Severity

■ Increase in Severity
(more serious offense)

Reduced Level of Criminal
Behavior (81.1%)
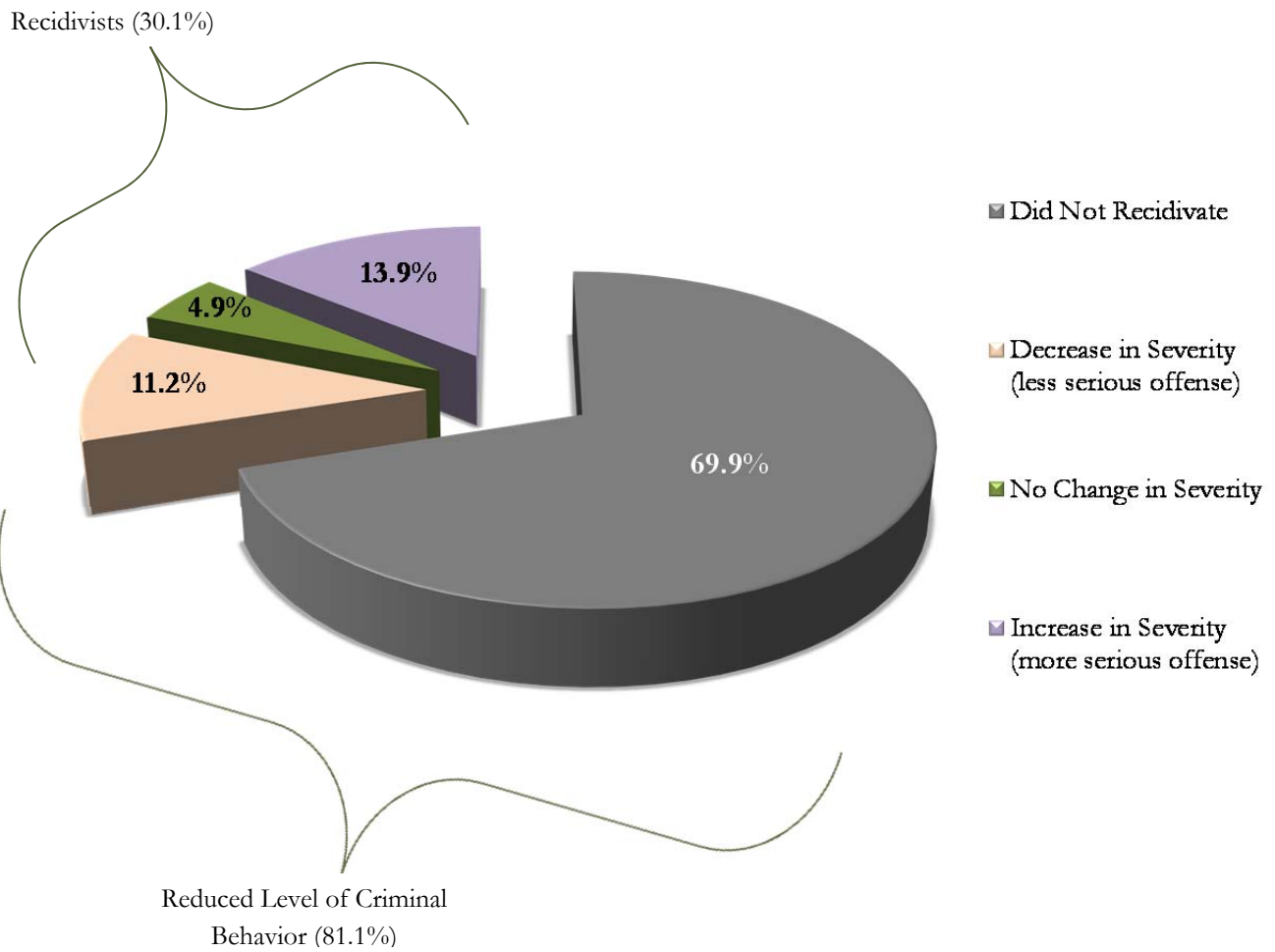
NATIONAL COMPARISON

The following section provides a comparison of Colorado's one-, two-, and three-year post-discharge juvenile recidivism rates to other states with the goal of gaining a better understanding of how the State compares nationally. A 2013 study of how juvenile recidivism is measured and reported in the United States conducted by the Pew Charitable Trusts surveyed executive branch agencies responsible for juvenile state commitment facilities in each of the 50 states and the District of Columbia. This extensive study examined current practices in the data collection, measurement, performance, and reporting of juvenile recidivism data. The results found that individual states utilize very different definitions and methods to study juvenile recidivism, and revealed a need for more policy-relevant data collection and reporting practices [21]. Specifically, approximately one in four states does not regularly collect and report juvenile recidivism data, and fewer than half use measures that provide a comprehensive picture of youth reoffending. In this context, a comprehensive measure of youth reoffending refers to comparing youth to previous cohorts, following youth through adult corrections and probation, and tracking youth beyond the juvenile parole period (e.g.: utilizing a longitudinal research design). Using these terms as defined by the Pew study, Colorado is one of the few states conducting regular research with rigorous data collection, measurement, performance evaluation, and reporting of juvenile recidivism information.

Currently, individual states differ in a number of key factors in terms of defining, measuring, and reporting juvenile recidivism [21]. These differences can complicate between-states comparisons, as outlined in Table 5.

Table 5: Data Collection and Reporting Practices in Juvenile Corrections

Defining Recidivism	
Measures of Reoffending	**Number of Agencies[1]**
Arrest	16
Adjudication or Conviction	28 [2]
Commitment (juvenile or adult)	25
Length of Follow-Up	
12 months	21 [2]
24 months	15 [2]
36 months	19 [2]
Follow Offenders into the Adult System	30 [2]
Measuring Performance	
Compare to the Previous Year Release Cohorts	32 [2]
Compare Rates by Offender Risk	21 [2]
Reporting	
At Least Annually	33 [2]
Results Released to All Three Branches of Government	21 [2]

[1]Sub-categories are not mutually exclusive

[2]Indicates methods currently used in Colorado

Methods of National Comparison

This process involved an extensive review of available juvenile recidivism reports which conveyed each state's juvenile recidivism rates and research methodology. A state was considered ideal for comparison if it met the following conditions: 1) utilized a similar methodology to that of Colorado, 2) had a similar definition of a recidivist act, 3) reported on multiple years of recidivism, and 4) maintained consistency in how recidivism measures were reported in the most recent years. Data from the most recent one-year post-discharge cohort ($n = 445$, discharged in FY 2015-16) were used in the national comparison.

Results of National Comparison

Each state identified as a possibility for comparison varied in its definition of recidivism, the time period used to capture recidivism, and in the overall availability of data on recidivism rates. It is important to acknowledge that for the purposes of this analysis, definitions of recidivism were matched as closely as possible. Each juvenile correctional system, however, may be structured differently or have population-specific considerations which make it unique.

Table 6 represents the six states that were identified as methodologically comparable to Colorado in terms of defining juvenile recidivism. Respective recidivism rates are reported by state in ascending order.

Table 6: National Comparison

States with Comparable Juvenile Recidivism Measures			
State	**One-Year Recidivism Rate**	**Two-Year Recidivism Rate**	**Three-Year Recidivism Rate**
Maryland	16.7%	29.7%	39.0%
Idaho[1,2]	30.0%	N/A	N/A
Colorado	31.5%	49.2%	55.2%
District of Columbia[1]	36.0%	N/A	N/A
Maine[3]	36.8%	53.8%	N/A
Virginia	41.6%	65.0%	74.2%
Florida[1]	45.0%	N/A	N/A

[1]State only tracks youth for a one-year follow-up time period.

[2]State defines "discharge" as the start of parole; the recidivism measurement period includes parole.

[3]State analyzes data on youth who were released from a facility *for the first time* during the time period of interest.

When comparing the one-year post-discharge recidivism rates between comparable states, Colorado's rate (31.5%) appears to reside toward the top of the performance range (16.7% - 45%). The two states with rates lower than Colorado are Maryland (16.7%) and Idaho (30%).

Last year, Colorado had the fourth lowest one-year juvenile recidivism rate (30.9%) after Maryland (19.1%), Idaho (23%) and Maine (26.7%). It is important to note that Idaho currently defines "discharge" as the start of parole, as their juvenile parole services are handled at the county level rather than the Idaho Department of Juvenile Corrections. Thus, youth on parole are considered "discharged" from their agency and currently included in their recidivism data collection process. While this difference in when the one-year post-discharge recidivism follow-up period begins clearly differs from Colorado's, it was determined that there were sufficient similarities and adequate rigorous design elements to warrant keeping Idaho among the pool of states with similar research methodologies.

Maine had the greatest change in recidivism rates, from reporting a 26.7% rate in FY 2014-15 to reporting a rate of 36.8% in FY 2015-16. Other states reporting recidivism data were mostly consistent in their comparability and had similar ranking order and recidivism rates reported for this year. Data from all other states (not shown in Table 7) were sought out and examined when available, but were ultimately excluded because they either could not be found, did not report a recidivism rate, or due to differences in their definition or measurement of recidivism. For instance, Ohio defines a recidivist

act as "a return to the Department of Youth Services (DYS)" or any juvenile "incarcerated in the adult correctional system." Using this definition might result in a misinterpretation of the true comparability of this state's recidivism rate and Colorado's.

TIME TO RECIDIVIST OFFENSE

TIME TO NEW OFFENSE

Youth from all three discharge cohorts (FY 2013-14, FY 2014-15, and FY 2015-16) were included in the time to new offense analysis ($N = 1,477$). For youth who committed a recidivist act within the prescribed time period ($n = 681$), Figure 22 depicts the points in time when the new offenses occurred. As shown in the histogram, more than three quarters of youth who recidivated did so within the first year after discharge (76%). At two years post-discharge almost all youth who did recidivate had done so (96%). Finally, at three years post-discharge, 100% of youth who recidivated during the follow-up time period had done so. The graph illustrates that as time progresses, fewer and fewer youth commit new offenses. The literature is robust with findings supporting the desistence from criminal activity, or "aging out" of crime and delinquency. Similarly, the age at which a youth discharged from DYS was found to be statistically significant in terms of recidivism, with recidivists being significantly younger than non-recidivists ($p < 0.001$). In the current analysis, only the first recidivist offense was reported among those youth with multiple recidivist offenses.

Figure 22: Time to Recidivist Act

Length of Time from Discharge to New Offense
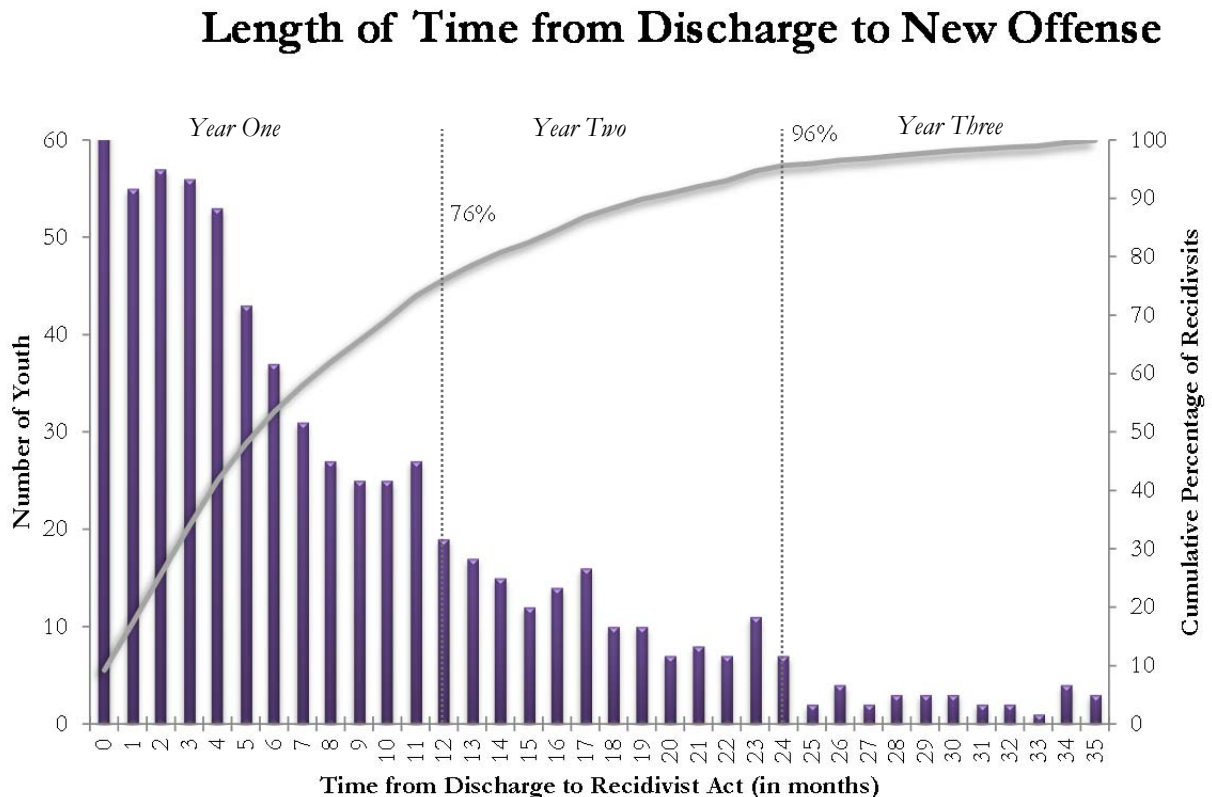
The True Recidivism Rate is Unknown

Recidivism is defined by Colorado's youth services system as a new felony/misdemeanor conviction/adjudication for an offense committed within a specified follow-up time period. Given this definition, recidivism rates are, at best, merely an estimate. The rates reported are as close to the true rate as is currently possible; however, they are still an underestimate. Several challenges exist that reduce the accuracy of these estimates.

1) *Denver County Cases Not Included*

The Denver County Court System is the only county court system in the State whose data is not captured by the Judicial Department's data system. Thus, adult misdemeanor convictions processed by Denver County Court are not included in this study. Many former DYS youth included in the multi-year follow-up periods were at or over 18 years of age, and thus fall under this "gap" in reported cases. Denver County adult felony convictions are captured in the data collection process because they are processed by the Denver District Court, which is a part of the Judicial Department's data system. Denver Juvenile Court processes juvenile misdemeanor and felony adjudications, therefore all juvenile adjudications from Denver are included in this study.

2) *Youth Discharged to the Department of Corrections/Adult Corrections Not Included as Recidivists*

For all intents and purposes, youth who are discharged from DYS directly to the adult correctional system would be considered recidivists by most people's standards. Most of these youth are transferred to the Department of Corrections (DOC) because they commit offenses while at DYS (which is captured as pre-discharge recidivism not post-discharge recidivism); however, due to the restrictions of the methodology in the current analysis that defines a recidivist act as occurring within a defined time period post-discharge, the youth who are discharged directly to DOC do not have the same opportunities to commit recidivist acts as do youth who are discharged to the community. The only way a youth who is discharged to DOC can be considered a recidivist, using the current definition, is if he/she is charged with an offense while at an adult correctional facility. This study does capture those offenses as described. This limitation will be experienced by any state defining juvenile recidivism using the same methodology as Colorado.

3) Offenses Committed in Other States Not Captured

This study only uses data from the Colorado Judicial System; therefore, if a youth commits an offense in another state, it remains undetected and is not included in the analysis. While it would be more accurate to include offenses committed in other states, the reality of obtaining highly confidential data from 49 states is simply not feasible.

4) Offenses While on Parole Status are Not Considered Recidivist Offenses

Offenses committed while a youth is on parole status are not considered to be recidivist acts because they did not occur *after the youth fully discharged from the Division*. While a youth is on parole status, he/she remains under the supervision of the Division, and the recidivism clock does not start until all DYS supervision has ended. Offenses committed on parole are considered to be pre-discharge recidivism. Pre-discharge recidivism rates are calculated internally, but are not reported in the current analysis.

5) Time-at-Risk (actual increases)

Time-at-risk increases when follow-up periods are extended (such as the two- and three-year follow-up periods). Increased time-at-risk results in "net widening," during which more re-offending behavior is detected, and results in increased recidivism rates. For example, in a one-year follow-up period, a youth has 365 days at-risk, or one year's opportunity to re-offend. Similarly, in a two-year follow-up period, that same youth has twice as much time-at-risk, thus doubling the opportunity to re-offend (730 days). It has been demonstrated that with increased time-at-risk, an increased number of youth recidivate.

6) Judicial Process Delays Erroneously Decrease Recidivism Rates

A recidivist act, as described in the methodology section of this analysis, is determined by a guilty finding leading to a new adjudication or conviction. The Judicial process involved in obtaining a guilty finding includes committing an offense, being arrested, having the offense filed in court, various court proceedings (hearings, trials, etc.) and then being found guilty by the court. This process can take a substantial amount of time, and due to several possible Judicial delays, many filings remain open when the data used to create this report is extracted from the Judicial database. This means that a youth may ultimately be guilty of a new offense but the verdict has not been determined at the time when the data is extracted for analysis. Filing charge findings (i.e., guilty, not guilty) can come days, months, or even years following a filing, particularly among more serious offenses. Youth who had open cases with missing findings during the one-year follow-up period are not considered to be recidivists---as the definition of recidivism is a new adjudication or conviction, and a finding is necessary to determine whether or not a youth recidivated. Although these youth are not captured as recidivists in year one, they will most likely be captured with extended two- and three-year follow-up periods. When data is more complete, more adjudications and convictions are captured, and this in turn increases recidivism rates.

7) *Misclassification Bias*

Many of the analyses in this report are based on the analysis cohort, or three years of the most recent DYS discharge cohorts combined into one, larger cohort. Naturally, the Division wants to know information on the most recently discharged youth; however, many of the youth who are identified as non-recidivists after one year ultimately do recidivate in the subsequent two or three years. This means that for many of the analyses they are labeled as "non-recidivists" when in fact they will be "recidivists."

RECOMMENDATIONS

Discharge Assessments

When youth are committed to DYS, they undergo a battery of assessments. These assessments help to formulate the youth's treatment plan while they are committed and serve their parole sentences. It is recommended that the Division also re-assess youth on more of these evaluations so that treatment progress can be measured. Currently, the CJRA is the only re-assessment given at discharge.

Unified Statewide Data Systems

The single largest barrier to in-depth, criminological research surrounding juvenile recidivism in Colorado is the lack of data systems that can "talk" to one another. The current process has been as streamlined and automated as the data allow, but still relies on months of "hand matching" Judicial records to youth in the discharge cohort. Infrastructure that allows for unique identifiers or links between DYS, Judicial, DOC, etc. would greatly assist in the process, allowing for the bulk of time spent producing the report to be focused on the actual analysis rather than on the exhaustive data cleaning and matching process.

Parole Rating at Discharge

The results of many years of analyses, including the current analysis, have pointed to the importance of this rating in predicting future recidivism. While currently the Division's client managers assign this rating to youth upon discharge, if a similar rating system could be implemented earlier in the parole process (perhaps mid-way through parole, or even 60-90 days into parole), youth flagged as "adjusting" unsatisfactorily to the parole period could potentially have certain services bolstered or new services put in place. These additional services or interventions may impact future discharge ratings and ultimately, the likelihood of future offending. In addition, developing a more nuanced measure that delineates the specific areas on which a youth receives an "Unsatisfactory" rating and which resources, programs, treatments, etc. were made available would create insight into potential areas of continued concern for youth discharging from parole (substance abuse, associating with criminally involved peers, etc.).

High Risk on the Aggression, Attitudes & Behavior, and Relationships Domains (CJRA)

Discharged youth scoring High risk on the CJRA Aggression domain have proven **for nine consecutive years** to be at statistically higher risk of recidivating, while discharged youth scoring High risk on the Attitudes & Behavior and the Relationships domains have proven for eight of nine

consecutive years to be at statistically higher risk of recidivating. The Division should strive to provide increased treatment services to those deemed High risk on these domains at Assessment and at time of Parole. While DYS already strives to match aggression-reduction therapy to youth, and work with youth to identify triggers and build appropriate coping skills, this domain (Aggression) has proven to be a consistent red flag for future offending. Similarly, the Division currently works with youth to augment prosocial attitudes, behaviors, and relationships while striving to bolster skills and competencies to mitigate the effects of negative influences and thought processes, given their consistent association with future offending. It is recommended that the Division focus on these treatment need areas and ensure that those youth exhibiting a High risk domain levels are receiving the appropriate treatment, modality, dosage, and frequency of services for these concerns.

Appendix A – Works Cited

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FACTORS TESTED BUT FOUND NOT TO DIFFER STATISTICALLY BETWEEN
RECIDIVISTS AND NON-RECIDIVISTS (ANALYSIS COHORT)

	Non recidivists		Recidivists		*p*-value	Total
	n	%	*n*	%		
Mean Length of Residential Commitment	19.5 months		19.1 months		0.55	
Mean Length of Parole	6.6 months		6.8 months		0.26	
Mean Number of Prior Out-of-Home Placements	2.06		2.1		0.81	
Primary Race/Ethnicity						
White	456	44.4%	170	38.7%		42.7%
Black/African American	177	17.2%	82	18.7%	0.07	17.7%
Hispanic	359	35.0%	178	40.5%		36.6%
Other	35	3.4%	9	2.1%		3.0%
DYC Committing Offense Charge						
Felony	595	57.9%	265	60.4%		58.7%
Misdemeanor	431	24.0%	174	39.6%	0.57	41.3%
Petty	1	0.1%	0	0.0%		0.1%
DYC Committing Offense Type						
Person	448	43.6%	164	37.4%		41.7%
Property	386	37.6%	180	41.0%		38.6%
Drug	55	5.4%	30	6.8%		5.8%
Weapon	51	5.0%	22	5.0%	0.32	5.0%
Other	77	7.5%	35	8.0%		7.6%
Status	1	0.1%	0	0.0%		0.1%
Traffic	9	0.9%	8	1.8%		1.2%
Mental Health						
No formal mental health intervention required at commitment	466	45.6%	209	47.9%	0.41	46.3%
Formal mental health intervention required at commitment	556	54.4%	227	52.1%		53.7%
Original Security Level						
Secure	277	27.0%	109	24.8%		26.3%
Staff-Supervised	382	37.2%	185	42.1%	0.21	38.7%
Community	368	35.8%	145	33.0%		35.0%
Sex Offender						
Not Sex Offender	896	87.2%	398	90.7%	0.63	88.3%
Sex Offender	131	12.8%	41	9.3%		11.7%

	Non recidivists		Recidivists		p-value	Total
	n	**%**	**n**	**%**		
Discharge Placement						
Home	786	80.5%	316	79.6%		80.2%
Adult Jail/Adult Corrections	130	13.3%	61	15.4%		13.9%
Group Living	10	1.0%	2	0.5%	0.55	0.9%
Escape	5	0.5%	0	0.0%		0.4%
Other	42	4.3%	17	4.3%		4.3%
Data not available	4	0.4%	1	0.3%		0.4%
Prior Number of New Commitments						
None	977	95.1%	416	94.8%		95.0%
1	48	4.7%	20	4.6%	0.34	4.6%
2	2	0.2%	3	0.7%		0.3%

A test of the model without any independent variables included indicated that the model correctly classified 69.2% of youth as recidivists. Generally speaking, this indicates the model's ability to predict whether or not youth in the population are recidivists using only the most common value in the dependent variable (non-recidivist status, in this case). By first excluding all independent variables in the model, it is then possible to compare a model based on the most common, or average, value of the dependent variable to one that includes those independent variables found to have a significantly relationship with the dependent variable. In this case, after including each of the 13 independent variables in the equation, the model improved slightly and was able to correctly classify 70.8% of youth as recidivists. Although the observed increase in the ability to correctly classify recidivists appears to be small (1.6%), an analysis sample of this size is capable of producing a high level of statistical significance for a relatively small effect size.

An omnibus test of the model coefficients indicated the model was statistically significant, meaning it is significantly better at predicting which youth are recidivists compared to a model without any independent variables and based on chance ($p < 0.001$; see Table 7). In addition, the Hosmer and Lemeshow goodness of fit test was non-significant, indicating that the model was a good fit to the data ($p = .687$). Unlike most statistical tests, a non-significant finding is the desired outcome for the Hosmer and Lemeshow goodness of fit test.

Table 7: Overall Statistical Significance of the Model

| Omnibus Tests of Model Coefficients				
		Chi-square	Degrees of Freedom	p
Step 1	Step	119.648	20	0.000
	Block	119.648	20	0.000
	Model	119.648	20	0.000

As a test of the overall fit of the model, a Receiver Operating Characteristic (ROC) curve was generated (see Figure 25). The ROC curve is a plot of sensitivity versus one minus specificity and can be used to calculate an overall measure of discrimination. In terms of the analysis, discrimination is thought of as the ability of a binomial logistic regression model to accurately discriminate or recognize those participants with and without the characteristic of interest; in this case: being a recidivist or not. When interpreting the results of the ROC curve, the further the curved blue line extends above the straight red line, the better the model is able to discriminate those with the characteristic of interest. Thus, the area under the curve (AUC) is a visual representation of how well the model is able to discriminate. The AUC can range from 0.5 to 1.0 with higher values representing better discrimination (see Table 8). The

area under the ROC curve was .679 (95% CI, .649 to .709), which is a poor level of discrimination approaching acceptable discrimination according to Hosmer et al. (2013)[22].

Table 8: Area under Curve (AUC) Interpretation

AUC	Classification	Results
0.5	Suggests no discrimination.	
0.5 < AUC < 0.7	Suggests poor discrimination.	AUC = 0.68
0.7 ≤ AUC < 0.8	Suggests acceptable discrimination.	
0.8 ≤ AUC < 0.9	Suggests excellent discrimination.	
AUC ≥ 0.9	Suggests outstanding discrimination.	

Figure 23: ROC Curve

Diagonal segments are produced by ties.
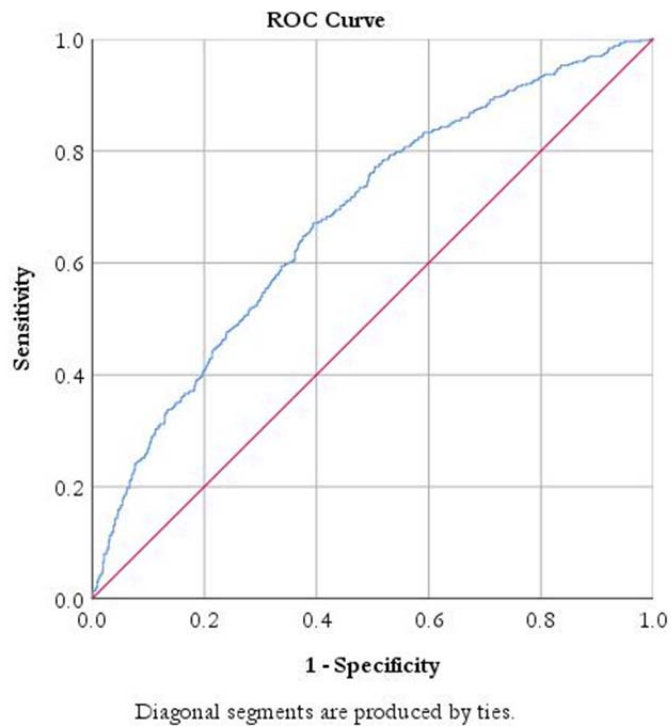
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