THE MONTANA BACK ON TRACK RISK ASSESSMENT INSTRUMENT: AN ASSESSMENT AND VALIDATION STUDY

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EXCECUTIVE SUMMARY

INTRODUCTION

The primary research objective in the current investigation is a performance assessment of the Montana Back on Track (BOT) risk assessment instrument. The BOT is used in all 56 counties in Montana to determine whether a youth poses a low, medium, or high risk to recidivate when released. The analysis focuses on the accuracy of the BOT predicting recidivism when the full sample is used compared to sub-samples broken down by race and gender. This analysis also investigates why some youth receive a BOT while others do not and the impact that the BOT has on youth outcomes. To achieve this objective, four main research questions were examined:

1. Is the BOT's risk score a significant predictor of recidivism on the full sample?
    - Does the accuracy of the BOT vary by the type of recidivating offense being predicted?
    - Do all risk factors on the BOT increase the prediction accuracy of the BOT?
2. Does the BOT perform equally well for both males and females in the sample?
    - Does the BOT predict all types of offenses equally well for males and females?
    - Are certain risk factors on the BOT more/less associated with recidivism for males or females?
3. Does the BOT perform equally well when the sample is broken down by race?
    - Does the BOT predict all types of offenses equally well for each race?
    - Are certain risk factors on the BOT more/less associated with recidivism for each race?
4. Why some youth are administered a BOT and others are not?
    - Does the likelihood of a youth being administered a BOT change based on race, gender, age, or offense type?
    - What impact does the BOT have on youth outcomes?

This report is the result of a contract between the Montana's Office of the Court Administrator for the Supreme Court and the University of Montana's Criminology Research Group. The University of Montana via the Social Sciences Research Laboratory provided the services of Department of Sociology Professor Dusten Hollist, Assistant Professor Jackson Bunch, Research Associate Patrick McKay, and graduate Research Assistants Daniel Acton and Taylor Tillman.

METHODOLOGY

The initial data set was queried by Montana's Office of the Court Administrator for the Supreme Court for the Criminology Research Group. The data set contains demographic, recidivism, and pre-screen BOT variables on all first time offending Montana youth who were cited with an offense and placed on formal or informal probation during the time period of January 1st, 2011 to December 31st, 2014. All data was analyzed using the Statistical Package for the Social Sciences (SPSS). Only youth who were given a BOT within 30 days of their intake date were included in the analysis to determine how well the instrument works when it is administered correctly.

Recidivism is defined in this study as the commission of a new status, misdemeanor, or felony offense within the risk period. The risk period begins on the youths' initial intake date and extends for one year. Any offense committed after the risk period does not count toward the youth as a recidivating offense. In the data set, recidivism is broken down into status recidivism, misdemeanor recidivism, felony recidivism, any recidivism, and multiple recidivism. Multiple recidivism is defined as the commission of more than one status, misdemeanor, or felony recidivating offenses within the risk period. Technical offenses were not included in this recidivism data. All recidivism variables are dichotomously coded where "1" equals "Yes," the youth committed that particular recidivating offense and "0" equals "No," the youth did not commit that particular recidivating offense.

The initial data set was comprised of 1,069 unduplicated youth. To be included in the analysis, the youth must have been in the sample for at least one year from their intake date. This requirement confirmed that all youth had an equal risk period to commit a recidivating offense. With this constraint, the final sample now consists of 757 unduplicated first time offending youth.

To analyze accuracy on the BOT "subsequent offense by risk level tables," receiver operator characteristic (ROC) analysis, and logistic regression were used. The "subsequent offense by risk level table" is a simple analysis that presents a meaningful output. If the instrument is an accurate predictor of recidivism, the "ideal pattern" will be presented. The *ideal pattern* occurs when recidivism rates increase with each unit increase in risk level. The statistic derived from ROC analysis, known as the area under the ROC curve (AUC), allows for a simple accuracy reading. An AUC score of .7 or above indicates strong prediction performance, between .6 and .7 indicates moderate performance, and anything below .6 indicates poor performance. Odds ratios, derived from logistic regression estimates, describe whether there is an increased or decreased likelihood of correctly predicting if a youth will recidivate when their overall risk score is known while accounting for the influence of the other variables in the model. Together these three statistical techniques provide a thorough analysis of the instrument's predictive abilities, and also allow for the ability to compare findings between similar instruments used throughout the U.S.

To investigate the administration of the BOT a new set of data was queried by the Montana's Office of the Court Administrator for the Supreme Court. This data contained all youth cited for an offense during the time period from January 1st, 2011 to December 31st, 2014 who were placed on formal or informal probation regardless of whether they were administered a BOT or not. This data allowed for the comparison of two distinct samples: youth who were administered a BOT within 30 days from their initial intake (BOT sample: n=1031) and youth that were not administered the BOT (No BOT sample: n=1508). Youth that received a BOT outside the 30 day timeframe were placed into the "No BOT" sample. Additionally, any youth that did not receive a BOT for their initial offense but then received a BOT during a recidivating offense were also placed into the "No BOT" sample regardless of the timeframe in which this occurred. The purpose of this analysis is to investigate why some youth are administered the BOT while others are not and what impact the decision to administer the BOT has on youth outcomes.

SUMMARY OF RESULTS

FULL SAMPLE ACCURACY ANALYSIS

Throughout the report the following asterisks will be used to indicate statistical significance: p<.05=*; p<.01=**; p<.001=***.

- Offense Type:
  - The BOT's performance varied by the type of offense being predicted.
  - All offense outcomes were predicted with better than chance performance except for status offenses. Felony and multiple recidivating offenses were predicted with the highest accuracy and misdemeanors provided slightly lower accuracy results. Below are the results from ROC analysis:
    - Multiple Recidivism: AUC: .625***
    - Felony Recidivism: AUC: .648**
    - Misdemeanor Recidivism: AUC: .562*
    - Status Recidivism: AUC: .453
- Risk Factors:
  - The analyses of the risk factors were consistent with the results above. Status recidivism was only significantly correlated to 7.5% (7) of the risk factors found on the BOT. Misdemeanors were statistically correlated to 38.71% (36) of the risk factors, felonies were statistically correlated to 34.41% (32) of the risk factors, and multiple recidivating offenses were statically correlated to 51.61% (48) of the risk factors.
- Accuracy of the BOT compared to other similar instruments:
  - The BOT's accuracy was in the range of Florida's Positive Achievement Change Tool (PACT) and Vermont's Youth Assessment Screening Instrument (YASI) when predicting any recidivism in a 12-month time frame.
  - The BOT was also in range of the Washington State Juvenile Assessment (WSJCA) when predicting only misdemeanor or felony offenses.
    - The WSJCA report used an 18-month time frame and only investigated misdemeanor and felony recidivating offenses.
  - The comparison of ROC analysis for each assessment is provided below:
    - Montana: AUC: .571* ; AUC: .592* = (Misd. and Felony)
    - Vermont: AUC: .57*
    - Florida: AUC: .593*
    - Washington: AUC: .64*

GENDER

- Offense Type:
  - The BOT's prediction accuracy varied by gender.
  - Males: The BOT predicted all offenses with better than chance accuracy except for status recidivism. Felony and multiple recidivism was predicted with the highest accuracy followed by a lower accuracy for the prediction of misdemeanors. Results from ROC analysis are provided below:
    - Multiple Recidivism: AUC: .653***

        - Felony Recidivism: AUC: .612*
        - Misdemeanor Recidivism: AUC: .584**
        - Status Recidivism: AUC: .438
    - Females: The BOT only predicted felony recidivism in the female sample with better than chance accuracy. Results from ROC analysis are provided below:
        - Multiple Recidivism: AUC: .580
        - Felony Recidivism: AUC: .802**
        - Misdemeanor Recidivism: AUC: .520
        - Status Recidivism: AUC: .479
- Risk Factors:
    - Differences found between risk factor significance illuminates the differences between predicting recidivism for males and females.
    - In the male sample, 30.11% (28) of the risk factors on the BOT are statistically correlated to recidivism. 15 of the risk factors that are statistically correlated to recidivism for males were unique for males.
        - Risk factors that are unique for predicting male recidivism are *school factors*, *anti-social friends*, *current drug use*, and *mental health issues*.
    - In the female sample, 29.03% (27) of the risk factors on the BOT are statistically correlated to recidivism. 14 of the risk factors that are statistically correlated to recidivism for females were unique for females.
        - Risk factors that are unique for predicting female recidivism are *running away/kicked out*, *history of alcohol use*, *history of drug use*, and *history of abuse*.

RACE

- Offense Type:
    - The BOT's prediction accuracy varied by race.
    - White: The BOT predicted felony and multiple recidivating offenses with better than chance performance. Status and misdemeanor offenses were not predicted with greater than chance accuracy. Results from ROC analysis are below:
        - Multiple Recidivism: AUC: .655***
        - Felony Recidivism: AUC: .652**
        - Misdemeanor Recidivism: AUC: .553
        - Status Recidivism: AUC: .447
    - American Indian: The BOT did not predict any offense for the American Indian sample with greater than chance accuracy. Below are the results from ROC analysis:
        - Multiple Recidivism: AUC: .450
        - Felony Recidivism: AUC: .578
        - Misdemeanor Recidivism: AUC: .536
        - Status Recidivism: AUC: .537
    - "Other" sample: Misdemeanor offenses were the only offense predicted with greater than chance accuracy for the "Other" sample. Below are the results from ROC analysis:
        - Multiple Recidivism: AUC: .686
        - Felony Recidivism: AUC: .706
        - Misdemeanor Recidivism: AUC: .733*

        - Status Recidivism: AUC: .468
    - Small sample sizes in the analyses for the American Indian and "Other" samples have impacted the results and should be used with caution.
- Risk Factors:
    - In the White sample, 31.18% (20) of the risk factors are correlated to recidivism
        - Risk factors unique to White youth are *school factors*, *anti-social friends*, and *current alcohol use*.
    - In the American Indian sample, 10.8% (10) of the risk factors are correlated to recidivism
        - Risk factors unique to American Indian are *history of older siblings in jail*, *parent problems*, and *sexual abuse*.
    - In the "Other" sample, 15.05% (14) of the risk factors are correlated to recidivism.
        - The risk factor unique to the "Other" sample is *history of alcohol use.*

ADMINISTRATION OF THE BOT

- Gender:
    - Female: 42.6% (359) of the female sample was administered the BOT, 57.4% (483) were not.
    - Male: 39.6% (672) of the male sample was administered the BOT, 60.4% (1025) were not.
    - Based on the similarities in which males and females are administered the BOT it can be concluded youths' gender does not affect the decision to administer the BOT.
- Race:
    - White: 41.7% (867) of the White sample was administered the BOT, 58.3% (1212) were not.
    - American Indian or Alaskan Native: 33.7% (105) of the American Indian or Alaskan Native sample was administered the BOT, 66.3% (207) were not.
    - American Indian or Alaskan Native youth are administered the BOT less frequently than their white counterpart. The difference is statistically significant ($p<.01$).
    - Possible Explanations:
        - American Indian youth are referred back to their tribal council before a BOT can take place.
        - Differences could be found at district level. Districts with a higher proportion of American Indian youth may be administered the BOT less than average causing this disproportion to occur.
- Age at Offense:
    - Patterns emerged that show younger youth are more likely to not receive a BOT.
    - There is a statistically significant correlation ($p<.001$) between increase in age and increased likelihood of being administered the BOT.
    - Age does impact the decision to administer a BOT.
    - Possible Explanation:
        - Younger youth are dealt with less formally and are assumed to be lower risk which removes the need for a BOT to be administered.
- Current Offense:
    - Status/City Ordinance: 42.3% (152) of the sample was administered the BOT, 57.7% (207) were not.

    - Misdemeanor: 41.0% (700) of the sample was administered the BOT, 59.0% (1006) were not.
    - Felony: 62.4% (295) of the sample was administered the BOT, 37.6% (178) were not.
    - The similarities between offense type and whether or not the youth received a BOT indicates severity of offense does not impact the decision to administer a BOT.
    - These unexpected findings provide evidence that the BOT is not being used in the manner that it is intended to be used.
    - There should be an emphasis on administering the BOT to youth with more severe offenses because it is this population of youth who have the most to gain from intervention strategies found with the administration of the BOT.
- Recidivism:
    - No Recidivating Offense: 43.3% (755) of the sample was administered the BOT, 56.7% (989) were not.
    - Had a Recidivating Offense: 35.7% (276) of the sample was administered the BOT, 65.3% (519) were not.
    - Youth who were not administered a BOT were more likely to have a recidivating offense. Found to be statistically significant ($p<.001$).
- Type of Recidivating Offense:
    - Youth who were not administered a BOT were more likely to have a more severe recidivating offense.
    - Possible Explanations:
        - Youth with more severe offenses are being formally screened differently, or pending investigatory procedures may be delaying administration of the BOT.
        - Small sample sizes may be skewing these results and should be interpreted with caution.
- District Comparison:
    - On average districts administer BOTs 40.1% of the time.
    - Districts vary in their use of the BOT
        - Highest rate of BOT administration: Ravalli County 82.4%
        - Lowest rate of BOT administration: Fergus County 12.0%
    - Differential use of the BOT at the district level may be the cause of all differences found in BOT administration analysis.

PRACTITIONER IMPLICATIONS

- Increase the administration of the BOT with emphasis on those youth who are cited with the most severe offenses:
    - Approximately 60% of all youth, cited for an offense and placed on formal or informal probation, were NOT administered the BOT.
    - Only 37.6% of youth who committed a felony offense and were placed on formal or informal probation were administered the BOT.
    - In the current study, had all eligible youth been administered the BOT, the sample size would have increased by 1,508 youth which could have significant impacts on the findings from the accuracy evaluation.
- Increase use of the BOT as an tool to guide rehabilitation strategies:

    - Recidivism rate was lower for the sample that used the BOT (26.8% versus 34.4%).
    - Recidivating offenses were less severe for the sample that used the BOT.
    - If the BOT was administered to all youth and these patterns remained, there would be tangible evidence of the BOT's effectiveness to reduce recidivism.
- Develop a standardized approach to administering the BOT (if this is not already done):
    - When, where, and who should receive the BOT?
    - Standardizing the administration of the BOT will increase the validity of the data and more accurately pinpoint youth needs.
- Discuss/Address the barriers to using the BOT with fidelity:
    - The evidence shows variation across district with regard to the fidelity in which the BOT is used. What are the leading reasons behind this?
        - Buy-In?
        - Time?
        - Personnel?
        - Other Barriers?
    - What barriers can be overcome?
    - What needs to be done before these barriers can be overcome?
    - Create a discussion as to the costs and benefits of using the BOT

LIMITATIONS AND FUTURE RESEARCH

- Limitations:
    - Only using first time offending youth:
        - Lowered sample size which impacted the subsamples in the analysis of race and gender.
        - Eliminates a population of youth who are at a higher risk to recidivate.
        - Removes the ability to analyze certain risk factors on the BOT that are focused on the youth's past offense history.
        - Findings can only be generalized to first time offenders instead of the entire population of juvenile youth.
    - Small Sample:
        - Made comparisons between subsamples based on gender and race difficult.
        - It is unknown if these small subsamples of youth are representative of the larger populations they are intended to represent.
    - Why Districts vary in their use of the BOT
        - While it is apparent that districts vary in their use of the BOT, barriers that cause these differences between districts are unknown.
        - Possible Barriers:
            - Buy-In?
            - Time?
            - Personnel?
            - Others?
- Future Research:
    - Include past offending youth in the analysis:
        - This will increase sample sizes and make results more generalizable to the population of juveniles.
    - Investigate why districts vary in their use of the BOT

        - If all eligible youth were administered BOTs the sample size would increase by 1,508 youth.
    - Investigate factors found on the full BOT:
        - The Full BOT contains an expansive list of variables that could be included in the pre-screen to increase prediction accuracy for those subsamples of youth who were not as well predicted (females, American Indian).
        - It would also be beneficial to investigate how needs are assessed on the full BOT. This could help create more comprehensive treatment plans for those youth found to be in need of services.
    - Analyze the process of administrating the BOT:
        - How information is collected by practitioners.
        - Standardize the process of collecting data.
    - Investigate how, why, and when districts use the BOT and if the BOT is used as a tool to inform intervention strategies.

CONCLUSION

This study has provided a baseline examination of the BOT. The sample in this report contained 757, first-time offending youth who were place on formal or informal probation from January, 1st 2011 to December, 31st 2014. Statistical techniques that are the current standard in risk assessment validation research were incorporated in this report. The results provided sufficient evidence to support the validity of the BOT to predict which youth are at an increased risk of committing additional offenses in a 12-month period of risk. Slight differences were discovered for gender and race and should be further investigated. The findings in this analysis indicated that the BOT's performance was comparable to other similar instruments being used throughout the U.S. Decisions to administer the BOT were largely the product of individual district use of the tool. Districts varied in their use of the BOT from a low of 12% of the time to a high of 82.4% of the time with an average use of only 40.1%. Reasons that districts vary so drastically in their use of the BOT are unknown. The BOT is an important instrument intended to help Montana youth by identifying high risk youth and determining the correct rehabilitation strategy that will increase the youth's potential for future success. Keeping this in mind, future research should strive to increase prediction accuracy, increase usability, and increase buy-ins from practitioners using the instrument.

INTRODUCTION

The Back on Track (BOT) survey was created in 1998 by the Washington State Institute for Public Policy and the Washington Association of Juvenile Court Administrators and Assessments. When the BOT was created it was known as the Washington State Juvenile Court Assessment (WSJCA). Florida's "Positive Achievement Change Tool" (PACT), Vermont's "Youth Assessment and Screening Instrument" (YASI), and Montana's "Back on Track" (BOT) are adaptations of Washington State's instrument. These instruments consist of both a pre-screen assessment and a full assessment. The pre-screen assessment is a shortened version of the full assessment that quickly indicates whether a youth is low (1), moderate (2), or high (3) risk to re-offend. Those youth who receive a moderate or high risk score are given the full assessment. The full assessment is meant to identify risk and protective factors that can help guide rehabilitation.

This study investigates the validity of the Montana BOT. The findings provide an empirical assessment as to whether this tool performs well in the Montana juvenile population and if the performance varies for gender and race. This study also investigates the administration of the BOT and what impact the BOT has on youth outcomes.

REVIEW OF THE LITERATURE

RISK ASSESSMENT RESEARCH

Researchers have been studying formal prediction methodologies for over 80 years. In 1928, Ernest W. Burgess created one of the first risk assessment instruments using what would later be called the Burgess Method (Burgess 1928). This is a linear additive model that looks at several risk-predicting variables. For each risk variable that applies to an individual, one point is added to their total score. Thus, the more points an individual scores on the instrument, the more likely the individual is to act out the risk behavior being predicted (e.g., recidivate). Since the creation of the Burgess Method, researchers have been examining ways to increase the predictability of risk behavior by finding both alternate models that predict risk and ways to add meaningful weight to risk predicting variables.

Andrews, Bonta, and Wormith (2006) describe four generations of risk assessment. The first generation is now commonly called "clinical judgment," or "clinical assessment." This generation relied on experience, knowledge, and intuition to assess the risk a youth may pose. The second generation was the creation of the actuarial risk assessment instrument (Burgess Method). The instrument considers a series of risk factors to determine the amount of risk, instead of relying on professional judgment alone. An actuarial instrument is preferable over clinical judgment alone because it allows for more reliable, consistent, and unbiased judgment (Hilton, Harris and Rice 2006; Bishop and Trout 2002; Wilcox, Beech, Markall, and Blacker 2009).

The first actuarial risk assessment instrument was based almost exclusively on static risk factors. Static risk factors are historical characteristics of the youth that cannot be changed, such as age at first offense or gender. These risk assessment instruments were able to discern high and low risk but were unable to provide intervention strategies with the use of only static risk factors.

The third generation of risk assessment methodology includes both static and dynamic risk factors in the actuarial risk assessment instrument. Dynamic risk factors are factors that can potentially be changed with intervention. Examples of dynamic risk factors are friends, school performance, and activities the youth takes part in (Van der Put, Dekovic, Stams, Van der Laan, Hoeve, and Amelsfort 2010). Having dynamic risk factors in the actuarial risk assessment instrument allows for some insight into potential intervention strategies that could lower a youth's risk. For example, an intervention strategy for a high risk youth who has a lot of unstructured free time, could be a program like Big Brothers Big Sisters.

The fourth generation risk assessment instrument includes protective factors. Protective factors are positive factors in a youth's life that are negatively correlated to the youth recidivating. Examples of protective factors are positive neighborhood, family or friend influences, structured activities, and academic excellence. All youth have risk and protective factors that are pushing and pulling them into delinquency. Both risk and protective factors are important to recognize when determining the risk a youth may pose. In addition to the inclusion of protective factors, the fourth generation of risk assessment is designed to link youth with a case management plan that addresses their specific needs (Andrews, Bonta, and Wormith 2006). Montana's BOT is a model example of a fourth generation risk assessment instrument, complete with static, dynamic, and protective factors with the ability to guide intervention strategies.

GENDER

Risk assessment instruments are typically assumed to be gender and race neutral. This assumption is often made without testing for specific differences in accuracy based on gender or race. Literature that examines the accuracy of risk assessments on gender and race have found mixed results and may vary by which risk assessment tool is being used. For example, instruments that use a wide variety of risk factors, such as the YLS/CMI, PACT, and the WSJCA, have been found to be valid for both females and males (Jung and Rawana 1999; Schmidt, Hoge, and Gomez 2005; Ilacqua, Coulson, Lombardo, and Nutbrown 1999; Baglivio 2009; Barnoski 2004; Olver, Stockdale, and Wormith 2009; Schwalbe 2008; Smith, Cullen, and Latessa 2009; Thompson and McGrath 2012). Baglivio and Jackowski (2013) found prediction accuracy was valid across gender, however, results across subgroups differed significantly. In response, research has attempted to increase prediction accuracy by incorporating "gender responsive risk factors." These attempts again provide mixed results, both successfully and unsuccessfully increasing prediction accuracy (Bloom, Owen, and Covington 2004; Reisig, Holfreter, and Morash 2006; Salisbury, Van Coorhis, and Spiropoulos, 2008; Baglivio and Jackowski 2013).

Research has examined risk factors that are designed to measure the specific criminogenic needs of women (Andrews, Bonta and Hoge 1990; Van Voorhis, Wright, Salisbury, and Bauman 2010). For example, evidence supports the inclusion of risk factors measuring relationships, self-esteem, parenting, mental illness, victimization, and depression that would better guide practitioners designing effective treatment strategies for female offenders (Blanchette and Brown 2006; Hardyman and Van Voorhis 2004; Simourd and Andrews 1994; Van Voorhis, Wright, Salisbury, and Bauman 2010). According to Belknap and Holsinger (2006:65), the identification of early childhood traumas (e.g., abuse victimizations) was a "strong precursor to delinquency." In their sample, a large percentage of the females felt their involvement in delinquency was related to abuse they experienced during childhood and adolescence. Moreover, recent emphasis has focused on the possibility of a gender bias in treatment strategies and case management plans for female offenders. Further analyses into the abusive life-events of adjudicated female youth may increase

gender equality in prevention and treatment strategies (Schwalbe 2008). Research also suggests the pathways that lead to criminality and desistance from offending behavior, often differ between males and females. (Reisig, Holtfreter, and Morash 2006).

Females have additional "criminogenic needs that cluster in personal and emotional domains" (Blanchette 2002:35). Females have been found to internalize the effects of abusive situations and traumatic experiences differently than males (Belknap and Holsigner 2006) and may begin to criminally offend as a coping mechanism. Robert Agnew's (1992, 2001) general strain theory posits that females and males will experience strain differently, suggesting females experience equal or more strain than males (Broidy 2001; Broidy and Agnew 1997; Kaufman 2009). Studies by Broidy and Agnew (1997) have consistently found that serious types of strains are gendered and processed more subjectively by females. Females are also more likely to respond to strain with depression and anger (Agnew 1992) when confronted with negative treatment while also manifesting shame, fear, and guilt (Broidy 2001; Kaufman 2009) possibly leading to criminogenic behaviors. Females become increasingly susceptible to strains when their close social bonds and associations with small, intimate groups (family and peers) become threatened by undesirable effects (e.g., loss of closeness, increased emotional distance, and indifference). As a result, some females are exhausting many of the legitimate pathways to cope with aggravating strains and are relying on deviant means to release negative emotionality (Kaufman 2009). Reisig, Holtfreter, and Morash (2006) stressed "adequate social capital" has been shown to be a protective factor that reduces female offending. As such, early "life events" that involving maltreatment or childhood victimizations have been shown to affect the pathways of criminal behavior for females.

Reisig, Holtfreter, and Morash (2006:35) state, "Whether actuarial risk tools… can effectively gauge women offenders' risk and needs, continues to be debated." Nonetheless, there is growing support for adding variables in risk assessments that are more specific to correlates of female offending and recidivism risk.

RACE

Similar to the findings on gender, literature that investigates the impacts of race and risk assessment instrument accuracy has presented mixed results. Baglivio and Jackowski (2013) validated the Florida PACT, presenting evidence that the overall risk score found on the PACT was a significant predictor of recidivism for all races investigated (White, African American, and Hispanic/Latino). While the overall risk score was found to be a significant predictor in the PACT, differences were discovered between individual risk factor's ability to predict recidivism. Differences between prediction accuracy and race is commonly found in the literature (Fass, Heilbrun, DeMatteo, and Fretz 2008; Schwalbe, Fraser, Day and Cooley 2006). The literature that examines the impact that race has on risk assessment focuses mainly on White, African American, and Hispanic/Latino youth. There appears to be no literature that examines how risk assessment instruments perform on American Indian youth.

Family influences are one of the main differences found between White and American Indian youth in the literature. It is common for White youth to live with one or more parents and siblings. For American Indian youth, a "typical family" consists of one or two parents, siblings, extended family (e.g., grandparents, aunts, uncles, cousins), and at times, unrelated individuals (Donelan 1999). Living with a larger family could be seen as a protective factor. If the youth is surrounded by several positive role models, many of them adults, their delinquent propensity may be reduced (Mmari, Blum, and Teufel-Shone 2009). The opposite could also hold true. Being surrounded by a large

family, where one or more members are negative role models, could increase the likelihood of delinquency. American Indian youth also experience higher rates of both victimization and crime, are more likely to be arrested for alcohol and drug possession, achieve lower levels of education, and experience lower levels of occupational attainment than White youth. As a result, a high rate of American Indian families live below the poverty line (Donelan 1999; Maupin, and Bond-Maupin 2005; Freiburger and Burke 2010; Duclos et al. 1998; Potthoff et al. 1998).

Mmari, Blum, and Teufel-Shone (2009) conducted research investigating risk and protective factors among American Indian youth. Results indicate that inadequately trained teachers, negative peer groups, the erosion of the traditional extended family system, the prevalence of drugs and alcohol within families, the lack of parental presence, and the lack of parental/caregiver discipline all increased the likelihood of delinquency. Alternatively, knowing the tribal language and having a supportive relationship with a parent could protect youth from the likelihood of delinquency. Considering the differences between American Indian and White youth, it is reasonable to question the predictive accuracy a risk assessment instrument will have for American Indian youth.

LOGIC OF ANALYSIS

MEASURING ACCURACY

Risk assessment accuracy is an imperfect measurement and must be considered in a relative context. A risk assessment may be determined as "accurate" in the justice system while not being considered "accurate" in the medical sciences. At the same time, one measurement that determines accuracy does not necessarily exist. It is important to run a variety of tests that allow for the examination of accuracy and comparison between samples and between similar instruments. The following strategy provides the ability to effectively determine accuracy on a relative scale in the justice system.

The first step in measuring accuracy is to examine the percentage of youth within each level of risk (1: Low, 2: Moderate, and 3: High) that had a recidivating offense. This is a simple analysis that presents a meaningful output. If the instrument is an accurate predictor of recidivism, the "ideal pattern" will be presented. The *ideal pattern* occurs when recidivism rates increase with each unit increase in risk level. The following analysis will be conducted for all samples using the tables titled "Subsequent Offense by Risk Level." In these tables, patterns presenting the *ideal pattern* are highlighted.

The second step to measure predictive accuracy is a technique common in risk assessment validation known as receiver operator characteristic (ROC) analysis. The statistic derived from ROC analysis, known as the area under the ROC curve (AUC), allows for a simple accuracy reading. The AUC statistic answers the question, "If we randomly select one youth from the recidivist group and one youth from the non-recidivist group, what is the probability that the risk assessment instrument would have assigned a higher risk level to the youth from the recidivist group?" (Mossman 2013). An AUC of 0 indicates perfect negative prediction, .5 indicates no better than chance prediction, and an AUC of 1 indicates perfect positive prediction (Van der Put, Van Vugt, Stams, and Van der Laan 2012). AUC interpretations vary based on the field it is being used in. It is common in the criminology and psychology risk assessment literature that an AUC score of .7 or above indicates strong prediction performance, between .6 and .7 indicates moderate performance,

and anything below .6 indicates poor performance (Barnoski 2004: Douglas and Reeves 2010; Mossman 2013). ROC analysis also provides a test of statistical significance. This statistic determines if the AUC derived in ROC analysis is statistically different from chance performance in the population.

The final step investigating risk assessment accuracy incorporates the use of logistic regression. (Baglivio and Jackowski 2012; Baglivio 2009; Conley, Spurzem, Marsh, and Hazlett 2009). In this analysis, the overall risk score, determined by the BOT, is the independent variable and the dependent variable is whether the youth committed a recidivating offense (coded as 1) or not (coded as 0). Race and gender are also included as independent variables in these models to hold their impact on recidivism constant. Logistic regression presents a statistic known as the odds ratio (OR). The odds ratio describes if there is an increased or decreased likelihood of correctly predicting if a youth will recidivate when their overall risk score is known while holding all other variables constant. Together these three statistical techniques provide a thorough analysis of the instrument's predictive abilities, and also allow for the ability to compare findings between similar instruments used throughout the U.S.

RISK FACTORS AND PROTECTIVE FACTORS

The pre-screen BOT is comprised of 39 questions (risk factors/protective factors) that contribute to a youth's final risk score. To analyze these questions, bivariate regression using Pearson's r correlations, will be used to investigate each question's association with recidivism. This analysis will pinpoint differences found between the prediction of offense types and between different samples (full, gender, race). This analysis will serve as a starting point to help determine if gender and race specific risk factors should be used to increase prediction accuracy.

ADMINISTRATION OF THE BOT

To analyze the administration of the BOT a series of cross-tabulations were created to investigate similarities and differences between the sample of youth who were administered the BOT and the sample of youth who were not administered a BOT. Gender, race, age, offense type, recidivism, recidivism type, and district will be investigated to determine what factors increase the likelihood of administering a BOT to youth and the impact that administering a BOT has on the youths' outcomes. When applicable difference in means testing and Pearson's r Correlations will be implemented.

THE PRESENT STUDY

The initial data set was queried by Montana's Office of the Court Administrator for the Supreme Court, for the Criminology Research Group. The data set contains demographic, recidivism, and pre-screen BOT variables on all first-time offending, Montana youth, who were cited with an offense and placed on formal or informal probation during the time period of January 1st, 2011 to December 31st, 2014. Only youth who were administered a BOT within 30 days of their intake date were queried in the accuracy analysis to determine how well the instrument works when it is administered correctly.

Recidivism is defined in this study as the commission of a new status, misdemeanor, or felony offense within the risk period. The risk period begins on a youth's initial intake date and extends for twelve months. Any offense committed after the risk period does not count toward the youth as a recidivating offense. In the data set, recidivism is broken down into status recidivism, misdemeanor recidivism, felony recidivism, any recidivism, and multiple recidivism. Multiple recidivism is defined as the commission of more than one status, misdemeanor, or felony recidivating offense within the risk period. Technical offenses were not included in this recidivism data. All recidivism variables are dichotomously coded where "1" equals "Yes," the youth committed that particular recidivating offense and "0" equals "No," the youth did not commit that particular recidivating offense.

The initial data set was comprised of 1,069 unduplicated youth. To be included in the analysis, the youth must have been in the sample for at least one year from their intake date. This requirement ensured that all youth had an equal risk period to commit a recidivating offense. With this constraint, the final sample now consists of 757 unduplicated, first-time offending youth. Table 1 below provides descriptive statistics for the demographic variables in the sample.

Youth in the sample range in age from eight to 18 years with an average age of 14.98. Males make up the majority of the sample with 64.9% (491), while females account for slightly over one third of the sample (35.1%, 266). White youth make up 82.4% (624) of the sample and American Indians are the largest minority with 11.6% (88). For this analysis, all other minority youth will be placed in an "Other" race category to account for their small sample sizes (Asian .5% [4], African American1.5% [11], Hispanic/Latino 3.3% [25], and Other .7% [5]).

Table 1: Eligible Sample (*n* =757)

Demographic Indicators	Min	Max	M	St. Dev	Freq.	%
Age	8	18	14.98	1.703		
Gender						
Female					266	35.1%
Male					491	64.9%
Race/Ethnicity						
White					624	82.4%
American Indian					88	11.6%
Asian					4	0.5%
African American					11	1.5%
Hispanic/Latino					25	3.3%
Other					5	0.7%

The initial offense and recidivating offenses youth were cited for in the eligible sample are presented, in Table 2, below. The majority of youth (67.5% 511) were included in the sample due to a misdemeanor citation, 17% (129) were cited for a felony offense, and 15.3% (116) were cited for a status offense. There was a single youth included in the sample as the result of a city ordinance offense.

Instead of selecting the earliest recidivating offense in time, the most serious offense in one year was selected as the recidivating offense to be used in the analysis. This ensured that those recidivating youth who committed a status offense or a city ordinance followed by a misdemeanor

or felony offense in one year would be classified as a misdemeanor or felony recidivist instead of a status/city ordinance recidivist. The overall recidivism rate for the sample is 34.35% (260). Of those youth who committed a recidivating offense, 66.54% (173) committed a misdemeanor, 17.69% (46) a status, and 15.77% (41) a felony offense. Out of the youth who committed a recidivating offense, 32.31% (84) committed more than one recidivating offense (status, misdemeanor, or felony) in the risk period and 18.85% (49) committed more than one misdemeanor or felony offense in the risk period.

Table 2: Initial and Recidivating Offense (*n* =757)			
Initial Offense		Freq.	%
	City Ordinance	1	0.10%
	Status	116	15.30%
	Misdemeanor	511	67.50%
	Felony	129	17.00%
Recidivism in 1 Year (n=260; 34.35%)			
	Status	46	17.69%
	Misdemeanor	173	66.54%
	Felony	41	15.77%
Multiple Recidivism in 1 Year			
	Multiple Offenses (Any)	84	32.31%
	Multiple Offenses (Misdemeanor and/or Felony)	49	18.85%

ANALYSIS AND FINDINGS

The first objective of the analysis is to determine if the BOT predicts all types of recidivism for youth in the full sample. The next step is determining if the BOT predicts recidivism equally well for youth across race and gender. Both of these steps utilize the recidivism rate by risk level table, ROC analysis, and logistic regression to determine and compare prediction accuracy. After the analysis of prediction accuracy, the findings from the analysis of individual risk factors are presented. The BOT's prediction accuracy is then compared to other similar instrument used throughout the U.S. The final step investigates the administration of the BOT.

BOT ACCURACY ANALYSIS

FULL SAMPLE

Table 3 is the subsequent offense by risk level table for the full sample. As shown, the results are presented in categories by recidivating offense type. The majority of the sample (82.8%; 627) were placed in the low risk category. This is expected for first time offending youth, as several questions on the BOT ask about history of offenses. Only 13.3% (101) of the sample were placed in to the moderate risk category and 3.8% (29) in the high risk category.

If the BOT is accurate at predicting recidivism, it is expected that as the risk level increases, so too will the recidivism rate for each type of offense (ideal pattern). The *ideal pattern* is found for felony

and multiple recidivating offenses. Only 3.7% (23) of the low risk category committed a felony recidivating offense, followed by 10.9% (11) of the moderate risk category, and 24.1% (7) of the high risk category. Similarly, 8.1% (51) of the low risk category committed multiple recidivating offenses in one year, followed by 24.8% (25) of the moderate risk category, and 27.6% (8) of the high risk category. These patterns provide evidence supporting the accuracy of the BOT in predicting felony and multiple recidivating offenses in the risk period for the full sample.

Misdemeanor recidivism does not follow the *ideal pattern* but the lowest rate of recidivism is in the low risk category, providing partial evidence of the BOT's effectiveness. Subsequently, the BOT appears to perform poorly when predicting status offenses. The majority of the status recidivists are found in the low risk category with 6.7% (42), followed by moderate risk with 4% (4), and 0% (0) of high risk.

Table 3: Subsequent Offense by Risk Level (Full Sample n=757)			
	Low Risk n=627	**Moderate Risk n=101**	**High Risk n=29**
Status (n=46)	6.7%(42)	4.0%(4)	0%(0)
Misdemeanor (n= 173)	20.1%(126)	38.6%(39)	27.6%(8)
Felony (n=41)	3.7%(23)	10.9%(11)	24.1%(7)
Multiple (n=84)	8.1%(51)	24.8%(25)	27.6%(8)
None (n= 497)	69.5%(436)	46.5%(47)	48.3%(14)
Ideal Pattern			

Table 4 below provides the findings from the ROC analysis. These findings are consistent with the evidence found in Table 3. Status offenses are the only offense where the BOT does not predict recidivism greater than chance (AUC = .453). Misdemeanor offenses are predicted with low to moderate accuracy (AUC = .563) and felony and multiple recidivating offenses are predicted with the highest accuracy in the moderate performance range (AUC = .648 and AUC = .625 respectively).

Table 4: Full Sample Accuracy (*n* =757)	
	AUC
Status (n=46)	.453
Misdemeanor (n= 173)	.563*
Felony (n=41)	.648**
Multiple (n=84)	.625***

*p≤.05; **p<.01; ***p<.001

Table 5 present the results from logistic regression. Any recidivism (yes/no) for a status, misdemeanor, or felony offense within 12 months is the dependent variable. The overall risk score from the BOT is the predictor variable while holding race and gender constant. Categorical variables were created for race and gender: males are the reference category in the gender variable; White is the reference category in the race variable.

Based on the evidence from the logistic regression models, overall risk level is found to be a significant predictor of recidivism (P<.001) while holding race and gender constant. When the overall risk score is known, the likelihood of correctly predicting which juveniles will recidivate in 12 months increases by 95% (OR=1.95) for each unit increase in the overall risk score. This

provides evidence that youth who are assessed as higher risk to re-offend on the BOT are more likely to do so within the one year follow up, compared to low risk offenders.

Table 5: Overall Risk and Recidivism (*n* =757)		
Overall Risk (1=low, 2=med, 3=high)	B(SE)	.668*** (.154)
	Exp(B)	1.95
Sex: (Male =1)	B(SE)	.21 (.166)
	Exp(B)	1.234
Race: (White =1)	B(SE)	.039 (.207)
	Exp(B)	1.039

*p≤.05; **p<.01; ***p<.001

GENDER

Analyzing the accuracy of the BOT to predict recidivism for race and gender followed the same steps outlined above. It is important to keep in mind when gender and race are broken down into subcategories, small sample sizes become a concern when trying to generalize findings to the larger population. Table 6 and Table 7 present the subsequent offense by risk level tables separated into an all-male sample and an all-female sample respectively. In the male sample, 81.5% (400) of youth are in the low risk category, 14.3% (70) in the moderate risk category, and 4.3% (21) in the high risk category. In the female sample, 85.3% (227) of youth are in the low risk category, 11.7% (31) in the moderate risk category, and 3% (8) in the high risk category.

The BOT appears to predict felony recidivism better than all other offenses for the males. The *ideal pattern* is presented with the lowest felony recidivism rate in the low risk category and as risk level increases, so too does the rate of felony recidivism. The *ideal pattern* is not found for the prediction of misdemeanor or multiple recidivating offenses, however, the lowest percent of recidivists, for these offenses, are found in the low risk category. The results again indicate the BOT performs poorly at predicting status recidivating offenses for the males. The highest percent of status offense recidivists are in the low risk category (6.5% 26), followed by the moderate risk category (2.9% 2), and then the high risk category (0% 0).

Table 6: Subsequent Offense by Risk Level (Male *n* =491)			
	Low Risk n=400	**Moderate Risk n=70**	**High Risk n=21**
Status (n=28)	6.5%(26)	2.9%(2)	0.0%(0)
Misdemeanor (n=116)	19.8%(79)	45.7%(32)	23.8%(5)
Felony (n=34)	5.3%(21)	11.4%(8)	23.8%(5)
Multiple (n=52)	7%(28)	27.1%(19)	23.8%(5)
None (n=313)	68.5(274)	40% (28)	52.4%(11)
Ideal Pattern			

In the female sample (Table 7), misdemeanor, felony, and multiple recidivating offenses all present the *ideal pattern.* All categories showing the lowest rate of recidivism for the low risk category followed by a higher rate of recidivism in the moderate risk category and the highest rate of recidivism in the high risk category. Similar to the findings for males, the BOT performs poorly at

predicting status offenses for females. Small samples sizes for the high (n=8) and moderate (n=31) categories will impact the results for ROC analysis and logistics regression. The results should therefore be interpreted with caution.

Table 7: Subsequent Offense by Risk Level (Female *n* =266)			
	Low Risk n=227	**Moderate Risk n=31**	**High Risk n=8**
Status (n=18)	7.0%(16)	6.5%(2)	0.0%(0)
Misdemeanor (n=57)	20.7%(47)	22.6%(7)	37.5%(3)
Felony (n=7)	.9%(2)	9.7%(3)	25.0%(2)
Multiple (n=32)	10.1%(23)	19.4%(6)	37.5%(3)
None (n=184)	71.4%(162)	61.3%(19)	37.5%(3)
Ideal Pattern			

Findings from ROC analysis, in Table 8, confirm that the BOT predicts status offenses with no better accuracy than chance for both males and females. For males, the BOT predicts all other offenses (misdemeanor, felony, and multiple) with better than chance performance. The prediction of misdemeanors are in the poor to moderate range (AUC=.584), and the prediction of felonies and multiple recidivating offenses are in the moderate range (AUC=.612; AUC=.653 respectively). For females, only the prediction of felony offenses is greater than chance performance. The BOT predicts felony offenses for females in the high accuracy range (AUC = .802).

Table 8: BOT Accuracy on Gender (AUC) (*n* =757)				
	Status	**Misdemeanor**	**Felony**	**Multiple**
Males (n=491)	.438	.584**	.612*	.653***
Females (n=266)	.479	.520	.802**	.580

*p≤.05; **p<.01; ***p<.001

Table 9 below presents the findings from logistic regression for males and females. Any recidivism (yes/no) for status, misdemeanor, or felony offenses within 12 months is the dependent variable, and the overall risk score, is the predictor variable holding race constant. For males, the BOT overall risk score is a significant predictor of recidivism (p< .001). When the overall risk score is known, the likelihood of correctly predicting which juveniles will recidivate in 12 months increases by 106.8% (OR=2.068) for each unit increase in the overall risk score. Alternatively, the overall risk score for females does not quite reach statistical significance as a predictor of recidivism (p=.051). When the overall risk score is known for females, the likelihood of correctly predicting which juveniles will recidivate in 12 months increases by 72.9% (OR=1.729) for each unit increase in overall risk score.

Table 9: Overall Risk and Recidivism (*n* =757)			
		Male (n=491)	**Female (n=266)**
Overall Risk (1=low, 2=med, 3=high)	B(SE) Exp(B)	.727*** (.186) .186	.548† (.280) 1.729
Race: (White=1)	B(SE) Exp(B)	.324 (.278) 1.383	-.351 (.313) .704

†p<.1; *p<.05; **p<.01; ***p<.001

The BOT performs well for males. It can be expected that the BOT will predict recidivism with better than chance performance for misdemeanors, felonies, and multiple recidivating offenses and will not perform well when predicting status offenses. Alternatively, the BOT can be expected to predict felony offenses for females with greater than chance performance but evidence is limited for predicting all other offenses.

RACE

Tables 10 through 12 present the subsequent offense by risk level for White youth (Table 10), American Indian youth (Table 11), and "Other" youth (Table 12).

White youth make up 82.4% (624) of the sample, as a result, patterns that emerge from the subsequent offense by risk level table for the White sample mirror those from the full sample. 85.25% (532) of the White sample are in the low risk category, followed by 11.38% (71) in the moderate risk category, and 3.37% (21) in the high risk category.

According to Table 10, the BOT predicts felony and multiple recidivating offenses with the highest degree of accuracy, presenting the *ideal pattern*. Misdemeanors are not predicted as well with the lowest recidivism rate in the low risk category but the highest recidivism rate in the moderate risk category. Status offenses, once again, are shown to be poorly predicted.

Table 10: Subsequent Offense by Risk Level (White *n* =624)			
	Low Risk n=532	**Moderate Risk n=71**	**High Risk n=21**
Status (n=40)	7.1%(38)	2.8%(2)	0.0%(0)
Misdemeanor (n=138)	19.9%(106)	38.0%(27)	23.8%(5)
Felony (n=35)	3.8%(20)	14.1%(10)	23.8%(5)
Multiple (n=6)	7.1%(2)	20.0%(3)	50.0%(1)
None (n=411)	69.2%(368)	45.1%(32)	52.4%(11)

Ideal Pattern

Low numbers of youths in the American Indian and the "Other" samples make comparisons between races difficult. In the American Indian sample, 76.13% (67) are in the low risk category, followed by 17.04% (15) in the moderate risk category, and 6.82% (6) in the high risk category. According to Table 11, the BOT appears to predict misdemeanor recidivism for American Indian youth with more accuracy than all other offenses presenting the *ideal pattern*. Status, felonies, and multiple recidivating offenses do not follow *the ideal pattern* but do show the lowest recidivism rates in the low risk category.

Table 11: Subsequent Offense by Risk Level (American Indian *n* =88)			
	Low Risk n=67	**Moderate Risk n=15**	**High Risk n=6**
Status (n=3)	3.0%(2)	6.7%(1)	0.0%(0)
Misdemeanor (n=24)	25.4%(17)	33.3%(5)	33.3%(2)
Felony (n=3)	3.0%(2)	0.0%(0)	16.7%(1)
Multiple (n=15)	19.4%(13)	0.0%(0)	33.3%(2)
None (n=58)	68.7%(46)	60.0%(9)	50.0(3)
Ideal Pattern			

In the "Other" sample (Table 12), 62.22% (28) are in the low risk category, followed by 33.33% (15) in the moderate risk category, and 4.44% (2) in the high risk category. Surprisingly, the BOT appears to predict recidivism better for the "Other" sample than the American Indian sample. All offenses, other than status recidivism, present the *ideal pattern*. However, with only 45 cases in the sample it's difficult to reach conclusions about prediction accuracy. Differences found between these two minority samples may be the product of sampling error.

Table 12: Subsequent Offense by Risk Level (Other *n* =45)			
	Low Risk n=28	**Moderate Risk n=15**	**High Risk n=2**
Status (n=3)	7.1%(2)	6.7%(1)	0.0%(0)
Misdemeanor (n=11)	10.7%(3)	46.7(7)	50.0%(1)
Felony (n=3)	3.6%(1)	6.7%(1)	50.0%(1)
Multiple (n=6)	7.1%(2)	20.0%(3)	50.0%(1)
None (n=28)	78.6%(22)	40.0%(6)	0.0%(0)
Ideal Pattern			

According to ROC analysis in Table 13, The BOT predicts felony and multiple recidivating offenses for White youth with moderate to high accuracy and is significantly different from chance performance. However, both status and misdemeanor offenses, were not predicted better than chance. For American Indian youth, the BOT does not predict any type of recidivism with better than chance accuracy. AUC scores for the "Other" sample are all, except status, around the moderate to high accuracy range. Due to the small sample size, only misdemeanors are predicted well enough that results indicate better than chance performance in the population.

Table 13: BOT Accuracy on Race (AUC) (*n* =757)				
	Status	**Misdemeanor**	**Felony**	**Multiple**
White (n=624)	.447	.553	.652**	.655***
American Indian (n=88)	.537	.536	.578	.450
Other (n=45)	.468	.733*	.706	.686

*p≤.05; **p<.01; ***p<.001

Logistic regression results, in Table 14 below, are consistent with the findings from ROC analysis. Any recidivism (status, misdemeanor, and felony) is again the dependent variable with overall risk level from the BOT as the predictor variable holding sex constant. For White youth, the BOT is a significant predictor of recidivism (p<.001). When the overall risk score is known, the likelihood of

correctly predicting which juveniles will recidivate in 12 months increases by 85.8% (OR=1.858) for each unit increase in overall risk score. Consistent with previous findings, the overall risk score for American Indian youth is not a significant predictor of recidivism. Finally, overall risk in the "Other" sample is a significant predictor of recidivism (p<.01). When the overall risk score is known in the "Other" sample, the likelihood of correctly predicting which juveniles will recidivate in 12 months increases by 554.3% (OR=6.443) for each unit increase in overall risk score. The odds ratio is inflated due to the small sample size and would be expected to lower as sample size increases.

Table 14: Overall Risk and Recidivism (*n* =757)

		White (n=624)	American Indian (n=88)	Other (n=45)
Overall Risk (1=low, 2=med, 3=high)	B(SE) Exp(B)	.620***(.178) 1.858	.443 (.377) 1.557	1.863** (.657) 6.443
Sex: (Male =1)	B(SE) Exp(B)	.340 (.186) 1.405	-.423 (.463) .655	.175 (.748) 1.192

*p≤.05; **p<.01; ***p<.001

While sample sizes have made comparisons between races difficult, several important race findings emerged. First, the BOT will predict instances of felony and multiple recidivism with moderate accuracy for White youth. When all offenses are put together the overall risk score will predict recidivism better than chance alone for the White sample. Second, with all of the information that is presented, there is no evidence to support the position that the BOT predicts recidivism for American Indian youth. The small sample size could be partially responsible, but looking at a much smaller "Other" sample, the BOT is found to be a significant predictor of recidivism and is shown to predict misdemeanor recidivism with moderate to high accuracy. These findings suggest there may be differences between the American Indian sample and all other samples when predicting recidivism using the BOT. Increasing these minority sample sizes will provide more concrete evidence of their similarities or differences.

RISK FACTORS

The BOT is a compilation of risk and protective factors. It is reasonable to assume that differences found between offense type, race, and gender are due to differences between factors' correlations to recidivism. There are 39 questions on the BOT but many of the individual questions contain multiple risk factors. For example, question 8a "*History of alcohol use*" contains seven risk factors in itself: 1) *history of any alcohol problems*, 2) *past use*, 3) *alcohol disrupted education*, 4) *caused family conflict*, 5*) interfered with pro-social friends*, 6) *caused health problems*, and 7) *alcohol contributed to criminal behavior*. After all individual questions are broken down into multiple risk factors there are a total of 93 risk factors, on the pre-screen BOT.

Appendix A, B, and C present correlation coefficient tables between risk factors and recidivism. Appendix A contains correlations between different offense types on the full sample. Appendix B is a comparison between the male and female samples, and Appendix C is a comparison between White, American Indian, and "Other" samples. Cells highlighted in yellow indicate a statistically significant correlation, and cells highlighted in green indicate a statistically significant correlation that is unique for that category. Appendix D presents the risk factors that were not significantly correlated in any of the correlation tables.

Examining the evidence in Appendix A, it is apparent why status offenses are so poorly predicted by the BOT. Only 7.5% (7) of the risk factors are found to have a statistically significant correlation to status recidivism. All other offenses were predicted with greater than chance accuracy and are correlated to a much larger percent of risk factors. Misdemeanors are statistically correlated to 38.71% (36) of the risk factors, felonies are statistically correlated to 34.41% (32) of the risk factors, and multiple recidivism is significantly correlated to 51.61% (48) of the risk factors.

Risk factors that are highly correlated to recidivism are important to risk assessment accuracy but the raw count of risk factors that are statistically correlated to the outcome is not the only determinate of prediction accuracy. If this were the case, it would be expected that the BOT would predict misdemeanor recidivism better than felony recidivism in the full sample, but this is inconsistent with the findings. Other items that impact accuracy are strength and direction of the association and collinearity between risk factors. Collinearity addresses how highly correlated a particular risk factor is with the other risk factors. For example, does "*past alcohol use*" have any unique effect on predicting recidivism that is not accounted for by "*current alcohol use*?" If these two variables are too highly correlated, one variable may be just as useful at predicting recidivism as two. Depending on the level of collinearity, the influence of both variables could be eliminated since they do not add any additional understanding, when combined, as opposed to a single item.

According to the evidence in Appendix B, the count of risk factors that are statistically correlated to recidivism are similar for males and females. For males, 30.11% (28) of the risk factors are significantly correlated with recidivism. For females, 29.03% (27) are significantly correlated. Interestingly, 15 of the 28 risk factors that show a significant correlation to recidivism for males are unique to males, and 14 of the 28 risk factors significantly correlated to recidivism for females are unique to females. Risk factors that are unique to males are *school factors*, *anti-social friends*, *current drug use*, and *mental health issues*. Risk factors that are unique to females are *running away/kicked out*, *history of alcohol use, history of drug use*, and *history of abuse*. Risk factors that are significant for both males and females are *past/current offenses*, *age at first offense*, *jail history of household*, *attitudes and beliefs toward anti-social behavior*, and *reported problem behaviors*. These findings provide further evidence that predicting female recidivism is very different from predicting male recidivism on the BOT.

Finally, Appendix C presents the correlations of risk factors to any recidivism categorized by race. The analysis above found that the BOT was not accurate at predicting recidivism for American Indian youth. This is also found in the correlation table. American Indian youth have the fewest number of statistically significant correlations between recidivism and risk factors. Only 10.8% (10) of the risk factors are shown to be important predictors of recidivism at the bivariate level for American Indian youth. In the White sample, 31.18% (29) of the risk factors are significantly correlated and in the "Other" sample 15.05% (14) are significantly correlated. Risk factors unique to White youth are *school factors*, *anti-social friend factors*, and *current alcohol use*. Risk factors unique to the American Indian youth are *history of older siblings in jail*, *parent problems*, and *sexual abuse*. The risk factor unique to the "Other" sample is *history of alcohol use*.

Findings in the correlation tables provide a useful starting point when trying to increase prediction accuracy. Eliminating risk factors that show little correlation to recidivism and increasing the amount of risk factors that are correlated to recidivism will inevitably increase accuracy. This may be especially important when trying to increase accuracy for American Indian and female youth.

A COMPARISON OF ASSESSMENTS

Washington, Florida, and Vermont have all validated their versions of the BOT. Table 15 below present the AUCs from each states' validation report to compare to Montana's BOT. The AUC derived from ROC analysis is unique in the fact that it does not rely on the recidivism base rate like all other statistics, which makes comparisons between different samples and risk assessments possible. Montana's validation report is the only state that investigated first-time offending youth. All states used a risk period of 12 months and defined recidivism as any offense except for Washington, which used an 18 month risk period and only examined misdemeanor and felony recidivism. All instruments are shown to predict recidivism with better than chance performance. Compared to Florida and Vermont, Montana's BOT provided almost identical accuracy results. When recidivism is constricted to the prediction of only misdemeanor or felony offenses in 12 months, the Montana BOT's AUC increases to .592 which is well within the accuracy range of the Washington instrument in 18 months (AUC = .64).

Table 15: Prediction Accuracy Comparison

	Montana BOT 2014 (n=757)	Vermont YASI 2011 (n=344)	Florida PACT 2009 (n=8132)	Washington WSJCA 2004 (n=2339)
Risk Period	12 Months	12 Months	12 Months	18 Months
Type of Recidivism	Any	Any	Any	Misdemeanor or Felony
AUC	.571*	.57*	.593*	.64*

* Statistically Significant

ADMINISTRATION OF THE BOT

To investigate the administration of the BOT a new set of data was queried by the Montana's Office of the Court Administrator for the Supreme Court. This data contained all youth cited for an offense during the time period from January 1st, 2011 to December 31st, 2014 who were placed on formal or informal probation regardless of whether they were administered a BOT or not. This data allowed for the comparison of two distinct samples: youth who were administered a BOT within 30 days from their initial intake (BOT sample: n=1031) and youth that were not administered the BOT (No BOT sample: n=1508). Youth that received a BOT outside the 30 day timeframe were placed into the "No BOT" sample. Additionally, any youth that did not receive a BOT for their initial offense but then received a BOT during a recidivating offense were also placed into the "No BOT" sample regardless of the timeframe in which this occurred. The purpose of this analysis is to investigate why some youth are administered the BOT while others are not and what impact the decision to administer the BOT has on youth outcomes.

ANALYSIS AND FINDINGS

GENDER

Consistent with previous research and existing juvenile delinquency literature, gendered differences in the sample size were expected. There are roughly twice as many males in the sample as females. According to table 16, there appears to be little difference between males and females who were administered the BOT as opposed to those who were not administered a BOT. In the female sample, 57.4% (483) were not given a BOT and 42.6% (359) were given the BOT. Similar results are found for the male sample, 60.4% (1025) of the males were not given a BOT and 39.6% (672) were given the BOT. The decision to administer the BOT to males and females only differed

by three percentage points which is too small to be considered a difference that would be observed between males and females in the population. With these findings, it can be concluded that the youths' gender does not affect the decision to administer the BOT.

Table 16: Gender (*n* =2539)

	No BOT	BOT	Total
Female	57.4% (483)	42.6% (359)	100% (842)
Male	60.4% (1025)	39.6% (672)	100% (1697)
Total	59.4% (1508)	40.6% (1031)	100% (2539)

RACE

The sample was disproportionately comprised of White youth (81.9%; 2079) with American Indians (12.3%; 312), a distant second. Although sample sizes are much smaller for non-white youth, some notable findings were observed. The BOT was not administered to 58.3% (1212 out of 2079) of White youths. American Indians were given the BOT less frequently. Only 33.7% (105 out of 312) of the American Indian youth were administered the BOT. This is a difference of eight percentage points between White and American Indian youth who received the BOT. This difference is statistically significant ($p<.01$) indicating that in the population of youth in Montana, American Indian youth are given the BOT less frequently than their White counterpart. A possible explanation for these findings is American Indian youth are referred back to their home reservations prior to a probation decision where the BOT would be administered. Additionally, the explanation for this difference could be variation at the district level. Districts with a higher proportion of American Indian youth may be administering the BOT less than average causing this disproportion to occur.

Table 17: Race (*n* =2539)

	No BOT	BOT	Total
White	58.3% (1212)	41.7% (867)	100% (2079)
American Indian or Alaska Native	66.3% (207)	33.7% (105)	100% (312)
Asian	44.4% (4)	55.6% (5)	100% (9)
Black or African American	63.3% (31)	36.7% (18)	100% (49)
Hispanic or Latino	64.2% (52)	35.8% (29)	100% (81)
Other	22.2% (2)	77.8% (7)	100% (9)
Total			**100% (2539)**

AGE AT FIRST OFFENSE

Analysis of the juveniles' age presents a pattern similar to the *age-crime curve* found in criminological theory and juvenile delinquency literature. Juvenile offending increases in late childhood, persists through adolescence (teenage years), and tapers off during late adolescence and early adulthood. This pattern was found in both the administered BOT sample and the No BOT sample. Table 18 presents an interesting pattern indicating younger youth are more likely to not have a BOT administered. No youth between the ages of six and seven had a BOT administered and as the age increases there is a persistent pattern of increased use of the BOT. Using Pearson's r Correlation a statistically significant correlation ($p<.001$) was found between the increase in age and increased of administered BOTs. These findings present evidence that age does impact the decision to administer the BOT. One obvious explanation for this finding is that younger youth

brought into the system are dealt with less formally and are assumed to be lower risk, which removes the need for a BOT to be administered.

Table 18: Age at First Offense (*n* =2539)			
	No BOT	**BOT**	**Total**
6 yrs	100% (3)	0% (0)	100% (3)
7 yrs	100% (3)	0% (0)	100% (3)
8 yrs	72.7% (8)	27.3% (3)	100% (11)
9 yrs	69.2% (18)	30.8% (8)	100% (26)
10 yrs	71.4% (25)	28.6% (10)	100% (35)
11 yrs	70.5% (55)	29.5% (23)	100% (78)
12 yrs	62.1% (90)	37.9% (55)	100% (145)
13 yrs	64.6% (177)	35.4% (97)	100% (274)
14 yrs	57.8% (255)	42.2% (186)	100% (441)
15 yrs	56% (286)	44% (225)	100% (511)
16 yrs	58.2% (311)	41.8% (223)	100% (534)
17 yrs	57.9% (274)	42.1% (199)	100% (473)
18 yrs	50% (2)	50% (2)	100% (4)
Missing	100% (1)	0% (0)	100% (1)
Total			**100% (2539)**

CURRENT OFFENSE

Table 19 presents the results of the initial offense and if the youth was given a BOT or not. Youth who committed a status or city ordinance offense, as their initial offense, have the highest percent of BOTs administered with 42.3% (152) followed closely by misdemeanors with 41.0% (700) and finally felonies with only 37.6% (178). It is expected that the administration of the BOT would increase with the severity of the offense, but there is no evidence to suggest that this occurs. There appears to be very little difference between offense types and whether or not the youth received a BOT, indicating that severity of initial offense does not impact the decision to administer a BOT. These findings raise questions about the administration of the BOT in Montana. Why are low level first time offending youth being given the BOT at a higher rate than youth who committed more severe offenses? While the BOT is expected to be used on all youth cited for an offense there should be an emphasis on those youth who committed more severe offenses. It is this population of severe offenders that have the most to gain from intervention strategies found with the administration of the BOT. The unexpected pattern presented in this table might also express the lack of buy in from practitioners. Practitioners may not see the BOT as a useful instrument and use the BOT randomly instead of intentionally. Future research would benefit from investigating how, when, and why practitioners use the instrument at the district level.

Table 19: Current Offense (*n* =2538)			
	No BOT	**BOT**	**Total**
Status/City Ordiance	57.7% (207)	42.3% (152)	100% (359)
Misdemeanor	59.0% (1006)	41.0% (700)	100% (1706)
Felony	62.4% (295)	37.6% (178)	100% (473)
Total			**100% (2538)**

RECIDIVISM

The majority of youth in the sample did not have a recidivating offense, however results indicate a noticeable difference in recidivism rates between youth who were administered the BOT and youth who were not. Those youth who were administered a BOT had a recidivism rate of 26.8% (276) compared to 34.4% (519) of youth who were not administered a BOT. This difference was found to be statistically significant ($p<.001$) indicating that in the population of youth who did not receive a BOT, the likelihood of recidivating is greater than the population of youth who did receive a BOT. These findings provide initial evidence the BOT is an effective instrument for decreasing the likelihood of recidivism.

Table 20: Recidivism (*n* =2539)

	No BOT	BOT	Total
No	65.6% (989)	73.2% (755)	68.7%(1744)
Yes	34.4% (519)	26.8%% (276)	31.3% (795)
Total	100% (1508)	100% (1031)	**100% (2539)**

RECIDIVATING OFFENSE

According to Table 21, with the exception of misdemeanor and felony gun violations, juveniles with serious recidivating offenses were more likely to not be administered a BOT (e.g., felony drug, felony sex, and felony against public administration). A couple possible explanations for this finding could be that high risk juveniles are being formally screened differently or, pending investigatory procedures may be delaying administration of the BOT. Small samples of offense types may be skewing some results and should be interpreted with caution.

Table 21: Recidivating Offense (*n* =2539)

Offense Type	No BOT	BOT	Total
Misdemeanor Sex Offense	100% (4)	0% (0)	100% (4)
Felony Against Public Admin	100% (4)	0% (0)	100% (4)
Misdemeanor Criminal Contempt	100% (1)	0% (0)	100% (1)
Felony Drug Offense	78.9% (15)	21.1% (4)	100% (19)
Felony Sex Offense	76.9% (10)	23.1% (3)	100% (13)
City Ordinance	75% (3)	25% (1)	100% (4)
Misdemeanor Against Public Admin	69% (20)	31% (9)	100% (29)
Technical Violation	68.4% (13)	31.6% (6)	100% (19)
Misdemeanor Property Offense	68.3% (157)	31.7% (73)	100% (230)
Misdemeanor Against Public Order	67.2% (39)	32.8% (19)	100% (58)
Misdemeanor Offense Against Person	67% (71)	33% (35)	100% (106)
Status Offense	62% (88)	38% (54)	100% (142)
Felony Offense Against Person	60.9% (14)	39.1% (9)	100% (23)
Misdemeanor Drug Offense	59.4% (60)	40.6% (41)	100% (101)
No Recidivating Offense	56.7% (989)	43.3% (755)	100% (1744)
Felony Property Offense	51.3% (20)	48.7% (19)	100% (39)
Misdemeanor Gun	0% (0)	100% (1)	100% (1)
Felony Gun	0% (0)	100% (2)	100% (2)
Total			**100% (2539)**

DISTRICT COMPARISON

Figure 1 presents each district's use of the BOT for first time offending youth who were placed on formal or informal probation. The percent (y axis) and count (labels) of BOTs successfully administered for each district are presented in ascending order. The reference line is placed at

40.1% which is the average percent of BOTs administered for all first time offending youth who are on formal or informal probation. District 10 (Fergus) administered the lowest percent of BOTs. Only 12% (12) of the first time offending youth in the district received a BOT. Findings are similar for district 16 (Custer), with only 14.9% (13) of youth receiving a BOT. In contrast, district 21 (Ravalli) successfully administered the BOT to 82.4% (103) of their youth. This is 18.7 percentage points higher than the second most successful district (district 19 Lincoln). Table 22 below present these findings in a cross-tab for a reference of actual percentages. Differences found at the district level appear to be the largest deciding factor on which youth are administered a BOT or not.

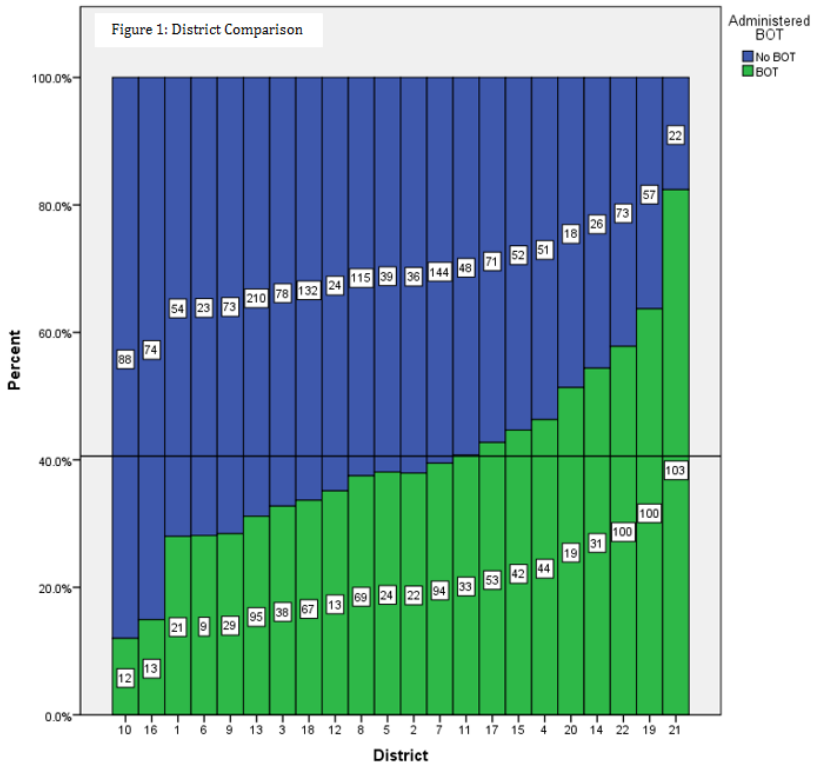

Table 22: District (*n* =2539)			
	No BOT	**BOT**	**Total**
10 Fergus	88% (88)	12% (12)	100% (100)
16 Custer	85.1% (74)	14.9% (13)	100% (87)
1 Lewis & Clark	72% (54)	28% (21)	100% (75)
6 Park	71.9% (23)	28.1% (9)	100% (32)
9 Glacier	71.6% (73)	28.4% (29)	100% (102)
13 Yellowstone	68.9% (210)	31.1% (95)	100% (305)
3 Powell	67.2% (78)	32.8% (38)	100% (116)
18 Gallatin	66.3% (132)	33.7% (67)	100% (199)
12 Hill	64.9% (24)	35.1% (13)	100% (37)
8 Cascade	62.5% (115)	37.5% (69)	100% (184)
2 Silver Bow	62.1% (36)	37.9% (22)	100% (58)
5 Madison	61.9% (39)	38.1% (24)	100% (63)
7 Dawson	60.5% (144)	39.5% (94)	100% (238)
11 Flathead	59.3% (48)	40.7% (33)	100% (81)
17 Blaine	57.3% (71)	42.7% (53)	100% (124)
15 Roosevelt	55.3% (52)	44.7% (42)	100% (94)
4 Missoula	53.7% (51)	46.3% (44)	100% (95)
20 Lake	48.6% (18)	51.4% (19)	100% (37)
14 Musselshell	45.6% (26)	54.4% (31)	100% (57)
22 Big Horn	42.2% (73)	57.8% (100)	100% (173)
19 Lincoln	36.3% (57)	63.7% (100)	100% (157)
21 Ravalli	17.6% (22)	82.4% (103)	100% (125)
Total			**100% (2539)**

CONCLUSIONS AND RECOMMENDATIONS

SUMMARY OF FINDINGS

The BOT's performance varied by the recidivating offense predicted. The overall risk score was found to be a significant predictor of recidivism in the full sample and is expected to predict: felony and multiple recidivism with moderate accuracy, misdemeanors with low accuracy, and no better than chance performance for status offenses. The risk factors' correlations supported this finding. Status offenses are correlated to only 7.5% of the risk factors and all other offenses are significantly correlated to 34% to 51% of the risk factors. These findings highlight the importance of using the BOT as an instrument to predict the increased likelihood of a youth committing a misdemeanor, felony, or multiple recidivating offenses, but should not be used for the prediction of status offenses. Status offenses may be inherently different from other offenses which causes them to be less predictable. Additionally, the evidence supports the validity of the instrument relative to other similar instruments used throughout the U.S.

The BOT's performance varied by gender. For males, felony and multiple recidivating offenses were predicted with the highest accuracy, lower accuracy in the prediction of misdemeanors, and no accuracy in the prediction of status offenses. For females, only the prediction of felony offenses was greater than chance performance. Differences between males and females were illustrated in the risk factor correlation tables. Out of the 28 risk factors that are statistically correlated to recidivism for males, 53.6% (15) are unique to males. In addition, out of the 27 risk factors statistically correlated to recidivism for females, 51.9% (14) are unique to females. Overall, findings provide

initial evidence that the BOT performs differently for first time offending males and females. Adding greater weight to those risk factors that are more associated with recidivism for both male and females could increase prediction accuracy.

The BOT's performance also varies by race. The overall risk level has been found to be a significant predictor of recidivism for White youth. Felony and multiple recidivating offenses are predicted with moderate to high accuracy and misdemeanors and status offenses are not predicted with greater than chance accuracy. For American Indian youth, the overall risk score is not a significant predictor of recidivism and no offense is predicted with greater than chance performance. In the "Other" sample, the overall risk score is a significant predictor of recidivism and was only found to predict misdemeanor recidivism with greater than chance performance. The correlation table supports these findings showing recidivism in the White youth sample is correlated to 31% of the risk factors on the BOT. Additionally, recidivism in the "Other" sample is correlated to 15% of the risk factors, and recidivism for American Indian youth is correlated to just under 11% of the risk factors on the BOT. Similar to the findings based on gender, there is evidence to suggest there are differences between White and minority youth when predicting recidivism. Investigating risk factors that are more associated with recidivism for the American Indian sample could increase prediction accuracy.

The findings for the administration of the BOT show gender and current offense did not impact the decision to implement the BOT. The evidence shows differences between White youths and American Indian youth. White youth were shown to be more likely to be administered the BOT than American Indian youth. This can be partially explained by examining the differences between districts. Districts with large American Indian populations (e.g., Glacier, Yellowstone, Hill, and Cascade) administered the BOT less frequently than the average district, thus lowering the amount of American Indian youth who received the BOT. Findings show that younger youth were less likely to be administered a BOT and those youth who did not receive a BOT were more likely to recidivate over those youth who did receive a BOT. Notably, the recidivating offenses for those youth who did not receive a BOT were often more severe. Differences between districts appear to be the main reason some youth receive a BOT while others do not. Each district varied in their use of the BOT ranging from a low of 12% to a high of 82.4%. The differential use of the BOT at the district level may be the cause of all differences found in the administration analysis. Future research should determine why districts vary so drastically in their administration of the BOT and increasing buy-in from districts could increase the overall effectiveness of the BOT on Montana youth.

LIMITATIONS

In this analysis, only first-time offending youth were included in the sample. The decision to investigate first-time offending youth was based on several considerations: first-time offenders provided a starting point for the validation of the BOT, there are no duplicate cases in the data file, and the majority of youth cited for an offense are first-time offenders. However, only analyzing first-time offenders has implications: it lowers the sample size of eligible youth which has the largest impact on the smaller samples of minority youth, it eliminates a population of youth who are at a higher risk to recidivate, and it removes the ability to investigate certain risk factors (e.g. history of offenses, history of confinement/escapes).

As referenced above, sample size is a limitation in this investigation. This problem is a symptom of the population of youth in Montana and the fidelity in which districts use the BOT. The full sample

of youth (n=757) is large enough to conduct an assessment on the accuracy of the BOT, but when the samples are broken down by gender and especially race, sample sizes may not be large enough to generalize findings. The findings in this report provide initial evidence, but more information is required before it can be concluded that differences do exist between gender and race on the accuracy of the BOT.

Analyzing the administration of the BOT provides only a one sided answer to the factors that increase or decrease the use of the BOT. It was discovered that the main reason some youth are administrated the BOT while others are not are district decisions. This analysis lacks the ability to describe why districts vary in their use of the BOT.

PRACTITIONER IMPLICATIONS

- Increase the administration of the BOT with emphasis on those youth who are cited with the most severe offenses:
    - Approximately 60% of all youth, cited for an offense and placed on formal or informal probation, were NOT administered the BOT.
    - Only 37.6% of youth who committed a felony offense and were placed on formal or informal probation were administered the BOT.
    - In the current study, had all eligible youth been administered the BOT, the sample size would have increased by 1,508 youth which could have significant impacts on the findings from the accuracy evaluation.
- Increase use of the BOT as an tool to guide rehabilitation strategies:
    - Recidivism rate was lower for the sample that used the BOT (26.8% versus 34.4%).
    - Recidivating offenses were less severe for the sample that used the BOT.
    - If the BOT was administered to all youth and these patterns remained, there would be tangible evidence of the BOT's effectiveness to reduce recidivism.
- Develop a standardized approach to administering the BOT (if this is not already done):
    - When, where, and who should receive the BOT?
    - Standardizing the administration of the BOT will increase the validity of the data and more accurately pinpoint youth needs.
- Discuss/Address the barriers to using the BOT with fidelity:
    - The evidence shows variation across district with regard to the fidelity in which the BOT is used. What are the leading reasons behind this?
        - Buy-In?
        - Time?
        - Personnel?
        - Other Barriers?
    - What barriers can be overcome?
    - What needs to be done before these barriers can be overcome?
      Create a discussion as to the costs and benefits of using the BOT

FUTURE RESEARCH

Future research is imperative to address the limitations in this study. Two limitations in this study can be addressed by incorporating first time offending and past offending youth into the sample. This will allow for an analysis of those risk factors that are not applicable when only first-time

offending youth are used and it will boost the sample size for all sub-samples. Sample size could also be increased by investigating ways to boost district participation. If all youth who were cited for an offense and under formal or informal probation were administered the BOT the sample size would increase by 1,508 youth.

To determine the validity of the information being collected it may be necessary to investigate how practitioners obtain information from youth. Is there a standardized approach to administering a BOT or does this vary by district? There may be faulty data collected on the BOT if there is no standardized approach to administering the BOT which will impact all aspects of the instrument.

Additional work should be done to incorporate the risk and protective factors found on the full BOT to investigate ways to increase prediction accuracy as well as investigate how needs are assessed. This study only investigated the pre-screen instrument, which contained 39 risk and protective factors but neglected the 121 risk and protective factors found on the full BOT. Risk and protective factors on the full BOT could be important when examining ways to increase prediction accuracy and to create a more comprehensive treatment plan for youth found to be in need of services.

Future research should also investigate how, when, and why the instrument is being used at the district level. Is the BOT used as a tool to determine what should happen to the youth to increase their chances of success? What options are available for youth who are low, moderate, or high risk? The decision to administer a BOT varies drastically by district. Future research should investigate barriers standing in the way of using the BOT with fidelity. Ravalli County has the highest rate of BOT competition with 82.4%. What is Ravalli County doing differently and how are they able to navigate the barriers that cause other districts to fail in their administration of the BOT. Are there measureable differences between those districts that use the BOT with fidelity and those districts who do not? Additionally, creating a training curriculum could standardize the process of when to use the BOT, who should be administered a BOT, and what should come from using the BOT.

CONCLUSION

This study has provided a baseline examination of the BOT. The sample in this report contained 757, first-time offending youth who were place on formal or informal probation from January, 1st 2011 to December, 31st 2014. Statistical techniques that are the current standard in risk assessment validation research were incorporated in this report. The results provided sufficient evidence to support the validity of the BOT to predict which youth are at an increased risk of committing additional offenses in a 12-month period of risk. Slight differences were discovered for gender and race and should be further investigated. The findings in this analysis indicated that the BOT's performance was comparable to other similar instruments being used throughout the U.S. Decisions to administer the BOT were largely the product of individual district use of the tool. Districts varied in their use of the BOT from a low of 12% of the time to a high of 82.4% of the time with an average use of only 40.1%. Why districts vary so drastically in their use of the BOT is unknown. The BOT is an important instrument intended to help Montana youth by identifying high risk youth and determining the correct rehabilitation strategy that will increase the youth's potential for future success. Keeping this in mind, future research should strive to increase prediction accuracy, increase usability, and increase buy-in from practitioners using the instrument.

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APPENDIX A: RISK FACTOR CORRELATION TO RECIDIVISM BY TYPE OF OFFENSE

Pre-Screen Risk Factors	Status	Misdemeanor	Felony	Multiple	Category
Age at First Offense	-X*	-X**		-X**	Past/Current Offense
Total Number of Misdemeanor Referrals		X**	X*	X**	
Total Referrals for Against person misdemeanor		X*		X**	
Total Referrals for Against Person Felony			X**		
Number of Times the Minor was Physically Detained in Detention Facility			X**	X**	
Total Number of Escapes			X**		
Youth's Conduct in the Most Recent Term		-X**		-X**	School
Youth's Attendance in the Most Recent Term		-X**		-X**	
Youth's Academic Performance in the Most Recent school Term		-X**	-X*	-X**	
History of Anti-Social Friends		X**		X**	Anti-Social Friends
Currently has Anti-Social Friends		X**		X*	
Currently is a Gang Member/Associate		X*		X*	
History of Out of Home and Shelter Care Placement Exceeding 30 Days			X*	X**	Placement and Runaway History
History of Runaways or Times Kicked Out of Home			X**	X**	
History of Jail of Any Persons Ever Involved in Household For > 3 Months		X**		X*	Jail History of Household
History of Mother/Female Caretaker Being Placed in Jail For > 3 Months		X**			
History of Father/Male Caretaker Being Placed in Jail for > 3 Months		X**			
History of Younger Sibling Being Placed in Jail for > 3 Months	X**				
Problem History of Parents Who Are Currently Involved in Household		X**			Parent Problems
Parental Alcohol Problem History		X**			
Current Parental Authority and Control		-X**	-X**	-X**	
History of Any Alcohol Probs			X*	X*	Drug and Alcohol Problems
Past Use of Alcohol			X*	X*	
History of Alcohol Disrupting Education				X**	
History of Alcohol Causing Family Conflict				X**	
History of Alcohol Interfering With Keeping Pro-Social Friends			X*	X**	
History of Any Drugs Probs		X*	X*	X**	
Past Use of Drugs		X*	X*	X**	
History of Drugs Disrupting Education		X*	X*	X**	
History of Drugs Causing Family Conflict		X*	X**	X**	
History of Drugs Interfering With Keeping Pro-Social Friends	X*	X**	X**	X**	
History of Drugs Causing Health Problems			X*		
History of Drugs Contributing to Criminal Behavior			X*	X**	
Current Alcohol Probs	X*			X*	
Currently Using Alcohol	X*			X*	
Currently Alcohol Interferes With Keeping Pro-Social Friends			X*	X**	
Currently Alcohol Contributes to Criminal Behavior	X*				
Current Drug Probs		X**		X**	
Currently Using Drugs		X**		X**	
Currently Drugs Disrupts Education			X*	X**	
Currently Drugs Causes Family Conflict		X**	X*	X**	
Currently Drugs Interfere With Keeping Pro-Social Friends		X*	X**	X**	
Currently Drugs Cause Health Problems	X*		X*		
Currently Drugs Contribute to Criminal Behavior		X*	X**	X**	
History of Any Physical Abuse		X*		X**	Abuse and Neglect
History of Physical Abuse by Family Member		X*		X**	
History of Any Sexual Abuse		X*		X*	
History of Sexual Abuse by Family Member		X*		X*	
History of Being a Victim of Neglect				X*	
Mental Health Problems			-X**	X**	Mental Health
Attitudes Towards Responsible Law Abiding Behavior		-X**	-X**	-X**	Attitudes and Beliefs
Accepts Responsibility for Anti-Social Behavior		-X**	-X**	-X**	
Belief in Yelling and Verbal Aggression to Resolve Disagreement or Conflict		X**	X**	X**	
Belief in Fighting and Physical Aggression to Resolve a Disagreement		X**	X**	X**	
Reports/Evidence of Any Violence Not Included in Criminal History		X**	X**	X**	Reported Problem Behavior
Reports of Violent Outbursts, Temper, Uncontrolled Anger		X**	X**	X**	
Reports of Deliberately Inflicting Physical Pain				X**	
Reports of Violent Destruction of Property		X*		X**	
Reports of Animal Cruelty			X**		
*p<.05; **p<.01; ***p<.001					
Statistically Significant =					
Unique Correlation =					

APPENDIX B: RISK FACTOR CORRELATION TO RECIDIVISM BY GENDER

Correlations to Any Recidivism (Gender)

Pre-Screen Risk Factors:	Male	Female	Category
Age at First Offense	-X**	-X**	Past/Current Offense
Total Number of Misdemeanor Referrals	X**	X**	
Total Referrals for Against person misdemeanor		X**	
Youth's Conduct in the Most Recent Term	-X**		School
Youth's Attendance in the Most Recent Term	-X**		
Youth's Academic Performance in the Most Recent school Term	-X**		
History of Anti-Social Friends	X**		Anti-Social Friends
Currently has Anti-Social Friends	X**		
Currently is a Gang Member/Associate	X**		
History of Runaways or Times Kicked Out of Home		X**	Runaway/Kicked Out
History of Jail of Any Persons Ever Involved in Household For > 3 Months	X**	X**	Jail History of Household
History of Mother/Female Caretaker Being Placed in Jail For > 3 Months	X*		
History of Father/Male Caretaker Being Placed in Jail for > 3 Months	X*	X*	
History of Older Sibling Being Placed in Jail for > 3 Months	X*	X*	
Problem History of Parents Who Are Currently Involved in Household			Parent Problems
Parental Alcohol Problem History	X*		
Parental Mental Health Problem History		X*	
Current Parental Authority and Control	-X**	-X**	
History of Alcohol Disrupting Education		X*	Drug and Alcohol Problems
History of Alcohol Causing Family Conflict			
History of Alcohol Interfering With Keeping Pro-Social Friends		X*	
History of Drugs Disrupting Education		X*	
History of Drugs Causing Family Conflict	X*		
History of Drugs Interfering With Keeping Pro-Social Friends		X*	
History of Drugs Causing Health Problems		X*	
Currently Alcohol Interferes With Keeping Pro-Social Friends	X*		
Current Drug Probs	X*	X*	
Currently Using Drugs	X*		
Currently Drugs Causes Family Conflict	X*		
Currently Drugs Interfere With Keeping Pro-Social Friends	X**		
Currently Drugs Contribute to Criminal Behavior	X**		
History of Any Physical Abuse		X*	Abuse
History of Physical Abuse by Family Member		X*	
History of Any Sexual Abuse		X**	
History of Sexual Abuse by Family Member		X**	
Mental Health Problems	X**		Mental Health
Attitudes Towards Responsible Law Abiding Behavior	-X**	-X**	Attitudes and Beliefs
Accepts Responsibility for Anti-Social Behavior	-X**	-X**	
Belief in Yelling and Verbal Aggression to Resolve Disagreement or Conflict	X**	X**	
Belief in Fighting and Physical Aggression to Resolve a Disagreement	X**	X**	
Reports/Evidence of Any Violence Not Included in Criminal History	X**	X**	Reported Problem Behavior
Reports of Violent Outbursts, Temper, Uncontrolled Anger	X**	X**	
Reports of Deliberately Inflicting Physical Pain		X**	
Reports of Violent Destruction of Property		X**	
*p<.05; **p<.01; ***p<.001			
Statistically Significant =			
Unique Correlation =			

APPENDIX C: RISK FACTOR CORRELATION TO RECIDIVISM BY RACE

Corrleations to Any Recidivism (Race)

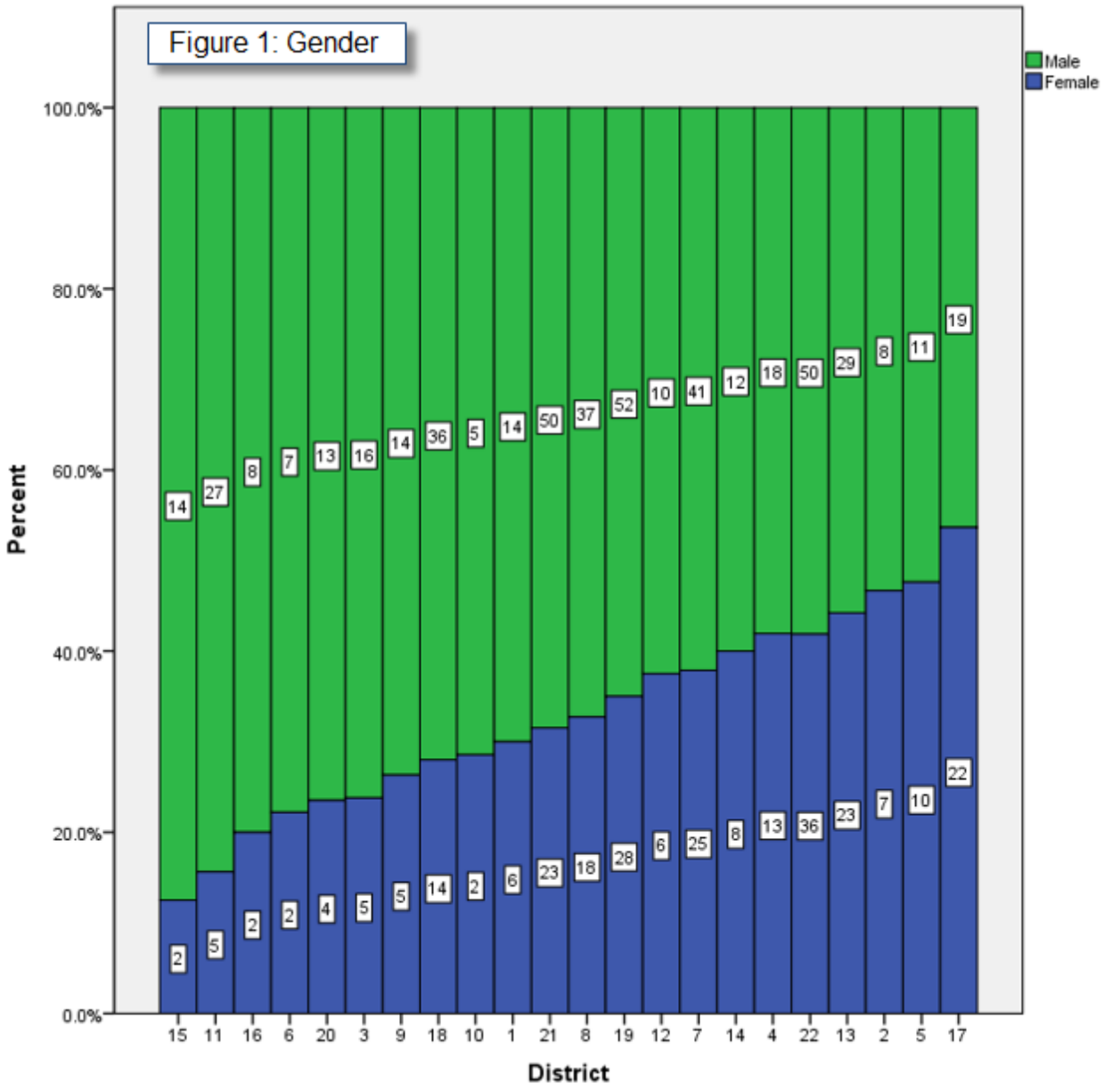
Pre-Screen Risk Factors:	White	American Indian	Other	Category
Age at First Offense	-X**		-X**	Past/Current Offense
Total Number of Misdemeanor Referrals	X**	X**	X*	
Total Referrals for Against person misdemeanor			X**	
Youth's Conduct in the Most Recent Term	-X**		-X**	School
Youth's Attendance in the Most Recent Term	-X*			
Youth's Academic Performance in the Most Recent school Term	-X**			
History of Anti-Social Friends	X**			Anti-Social Friends
Currently has Anti-Social Friends	X*			
Currently is a Gang Member/Associate	X**			
History of Out of Home and Shelter Care Placement Exceeding 30 Days			X*	Placement and Runaway History
History of Runaways or Times Kicked Out of Home	X*		X*	
History of Jail of Any Persons Ever Involved in Household For > 3 Months	X**	X**		Jail History of Household
History of Mother/Female Caretaker Being Placed in Jail For > 3 Months				
History of Father/Male Caretaker Being Placed in Jail for > 3 Months	X*			
History of Older Sibling Being Placed in Jail for > 3 Months		X**		
Problem History of Parents Who Are Currently Involved in Household		X**		Parent Problems
Parental Alcohol Problem History		X**		
Current Parental Authority and Control	-X**		-X**	
History of Alcohol Disrupting Education			X**	Drug and Alcohol Problems
History of Alcohol Causing Family Conflict			X*	
History of Alcohol Interfering With Keeping Pro-Social Friends			X**	
History of Drugs Disrupting Education	X*	X*		
History of Drugs Causing Family Conflict	X*			
History of Drugs Interfering With Keeping Pro-Social Friends			X**	
Currently Alcohol Interferes With Keeping Pro-Social Friends	X*			
Current Drug Probs	X**			
Currently Using Drugs	X*			
Currently Drugs Causes Family Conflict	X**			
Currently Drugs Interfere With Keeping Pro-Social Friends	X**			
Currently Drugs Contribute to Criminal Behavior	X**			
History of Physical Abuse by Family Member	X*			
History of Any Sexual Abuse		X**		
History of Sexual Abuse by Family Member		X**		
Mental Health Problems	X**			Mental Health
Attitudes Towards Responsible Law Abiding Behavior	-X**		-X**	Attitudes and Beliefs
Accepts Responsibility for Anti-Social Behavior	-X**			
Belief in Yelling and Verbal Aggression to Resolve Disagreement or Conflict	X**		X*	
Belief in Fighting and Physical Aggression to Resolve a Disagreement	X**		X*	
Reports/Evidence of Any Violence Not Included in Criminal History	X**	X*		Reported Problem Behavior
Reports of Violent Outbursts, Temper, Uncontrolled Anger	X**			
Reports of Deliberately Inflicting Physical Pain		X*		
Reports of Violent Destruction of Property	X**			
*p<.05; **p<.01; ***p<.001				
Statistically Significant =				
Unique Correlation =				

APPENDIX D: RISK FACTORS SHOWING NO CORRELATION TO RECIDIVISM

Pre-screen Risk Factors Not Statistically Significant for Gender, Race, or Recidivating Offense Type
Total Number of Felony Referrals
Total Weapon Referrals
Total Referrals for Against Person Felony
Total Referrals for Sexual Misconduct Misdemeanor
Total Referrals for Sexual Misconduct Felony
Number of Times the Minor was Physically Detained in Detention Facility
Disposition Orders Where Youth Served At Least One Day Confined Under State Juvenile Corrections
Total Number of Escapes
Total Number of Failure to Appear in Court that Resulted in a Warrant Being Issued
Current School Enrollment Status
Has Ever Had Consistent Friends or Companions
History of Pro-Social Friends
Been a Gang Member/Associate
Currently has Consistent Friends or Companions
Currently has Pro-Social Friends
History of Younger Sibling Being Placed in Jail for > 3 Months
History of Other Member in Household Being Placed in Jail for > 3 Months
Parental Drug Problem History
Parental Physical Health Problem History
Parental Employment Problem History
History of Any Alcohol Probs
Past Use of Alcohol
History of Alcohol Causing Health Problems
History of Alcohol Contributing to Criminal Behavior
History of Drugs Contributing to Criminal Behavior
Current Alcohol Probs
Currently Using Alcohol
Currently Alcohol Disrupts Education
Currently Alcohol Causes Family Conflict
Currently Alcohol Causes Health Problems
Currently Alcohol Contributes to Criminal Behavior
Currently Drugs Disrupts Education
Currently Drugs Cause Health Problems
History of Physical Abuse by Someone Outside the Family
History of Sexual Abuse by Someone Outside the Family
History of Being a Victim of Neglect
Reports of Using/Threatening With a Weapon
Reports of Fire Staring
Reports of Animal Cruelty
Reports/Evidence of problems with Any Sexual Aggression Not Included in Criminal History
Reports of Aggressive Sex
Reports of Sex for Power
Reports of Young Sex Partners
Reports of Child Sex
Reports of Voyeurism
Reports of Exposure

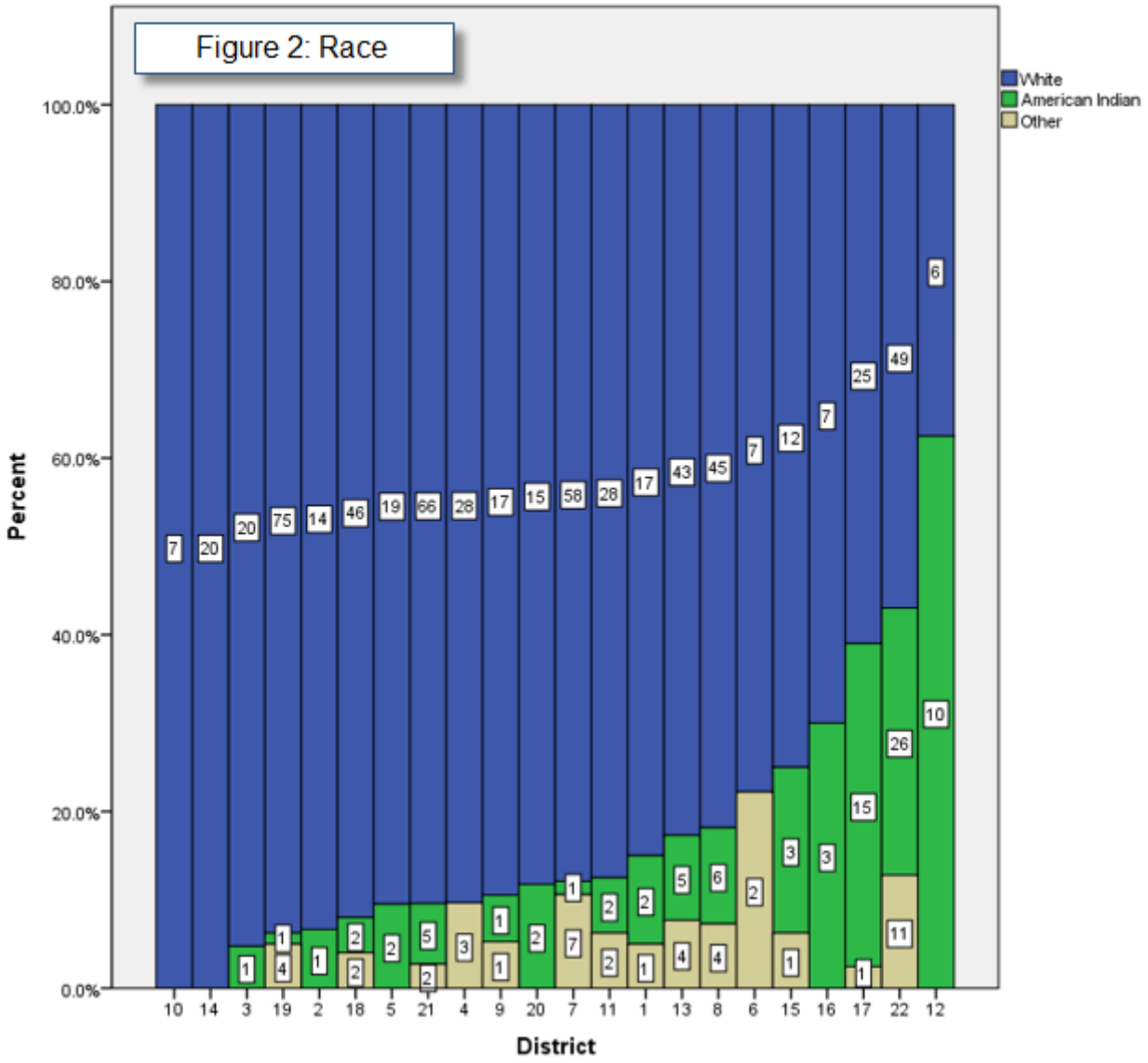
APPENDIX E: DISTRICT COMPARISONS

Gender:



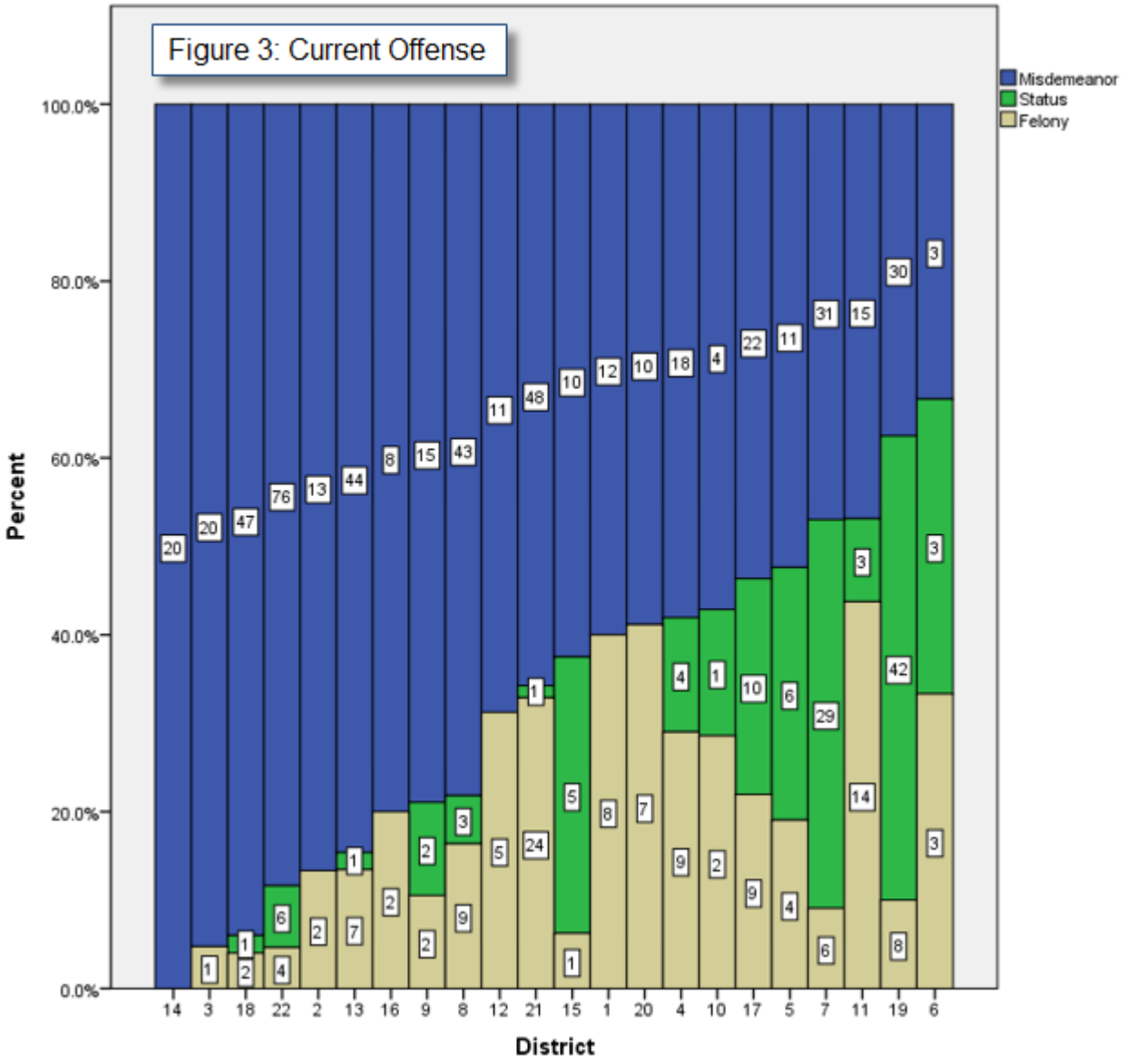
1 Lewis & Clark	2 Silver Bow	3 Powell	4 Missoula	5 Madison	6 Park
7 Dawson	8 Cascade	9 Glacier	10 Fergus	11 Flathead	12 Hill
13 Yellowstone	14 Musselshell	15 Roosevelt	16 Custer	17 Blaine	18 Gallatin
19 Lincoln	20 Lake	21 Ravalli	22 Big Horn		

Race:



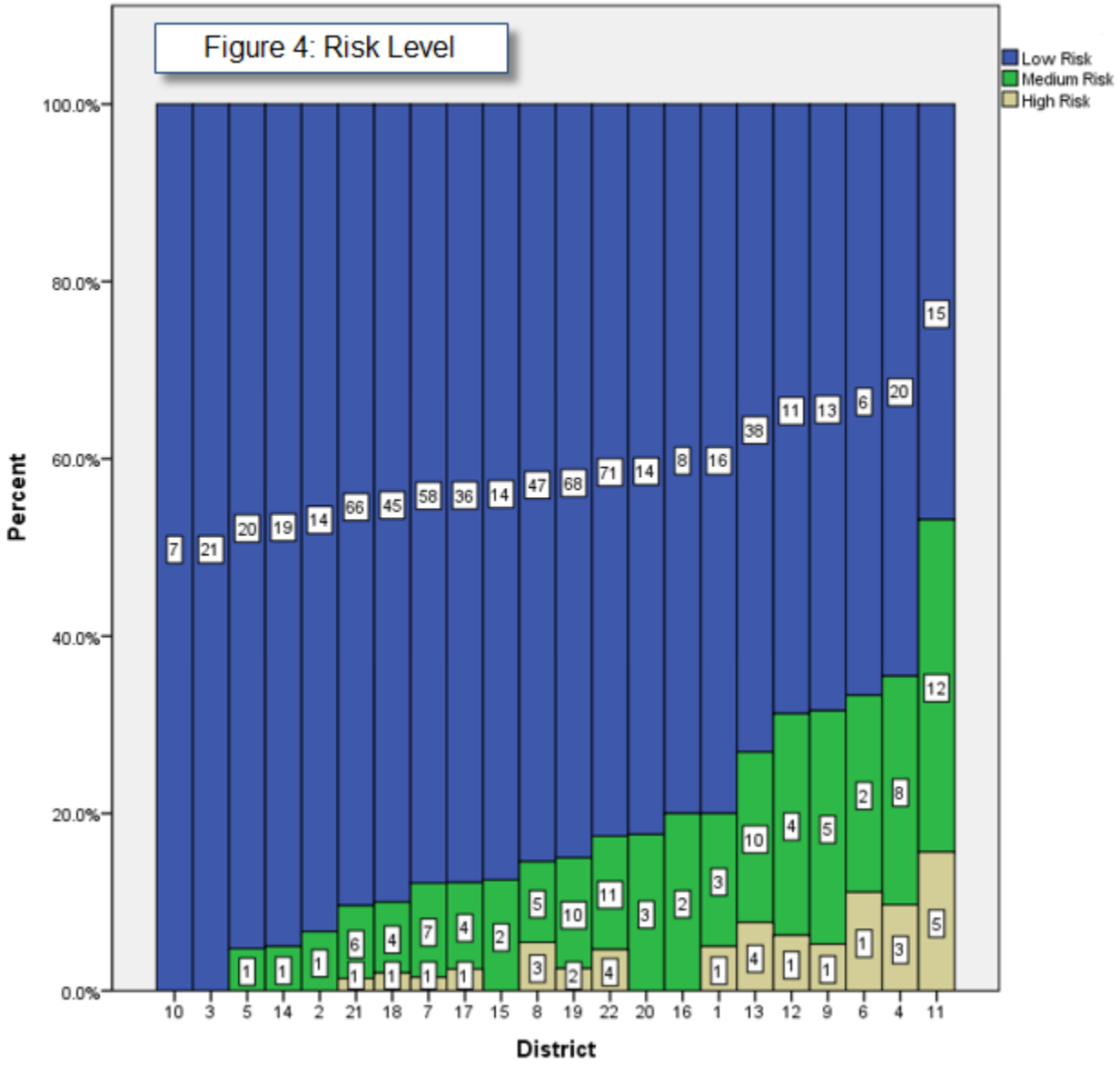
1 Lewis & Clark	2 Silver Bow	3 Powell	4 Missoula	5 Madison	6 Park
7 Dawson	8 Cascade	9 Glacier	10 Fergus	11 Flathead	12 Hill
13 Yellowstone	14 Musselshell	15 Roosevelt	16 Custer	17 Blaine	18 Gallatin
19 Lincoln	20 Lake	21 Ravalli	22 Big Horn		

Current Offense:



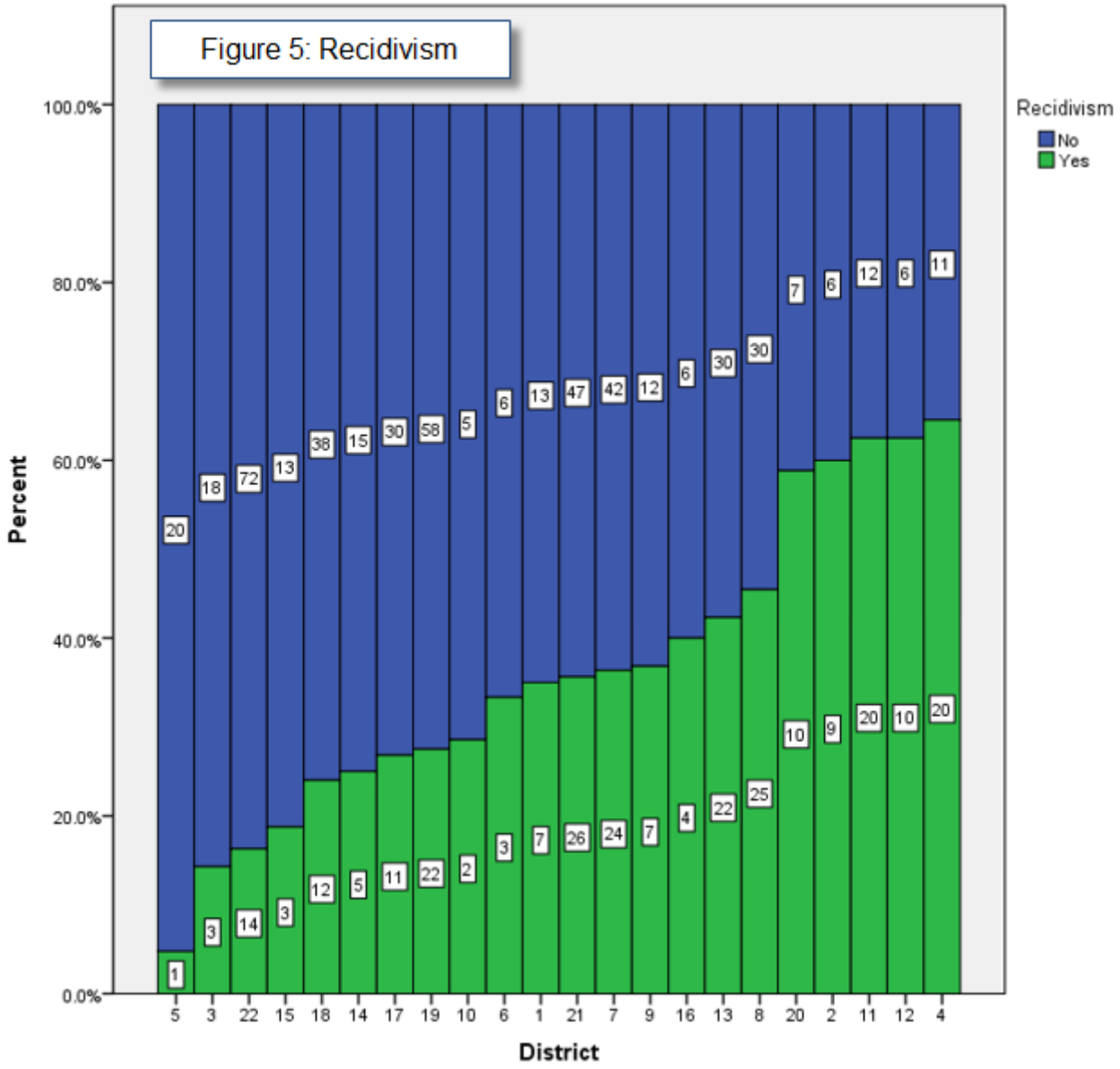
1 Lewis & Clark	2 Silver Bow	3 Powell	4 Missoula	5 Madison	6 Park
7 Dawson	8 Cascade	9 Glacier	10 Fergus	11 Flathead	12 Hill
13 Yellowstone	14 Musselshell	15 Roosevelt	16 Custer	17 Blaine	18 Gallatin
19 Lincoln	20 Lake	21 Ravalli	22 Big Horn		

Risk level



1 Lewis & Clark	2 Silver Bow	3 Powell	4 Missoula	5 Madison	6 Park
7 Dawson	8 Cascade	9 Glacier	10 Fergus	11 Flathead	12 Hill
13 Yellowstone	14 Musselshell	15 Roosevelt	16 Custer	17 Blaine	18 Gallatin
19 Lincoln	20 Lake	21 Ravalli	22 Big Horn		

Recidivism:



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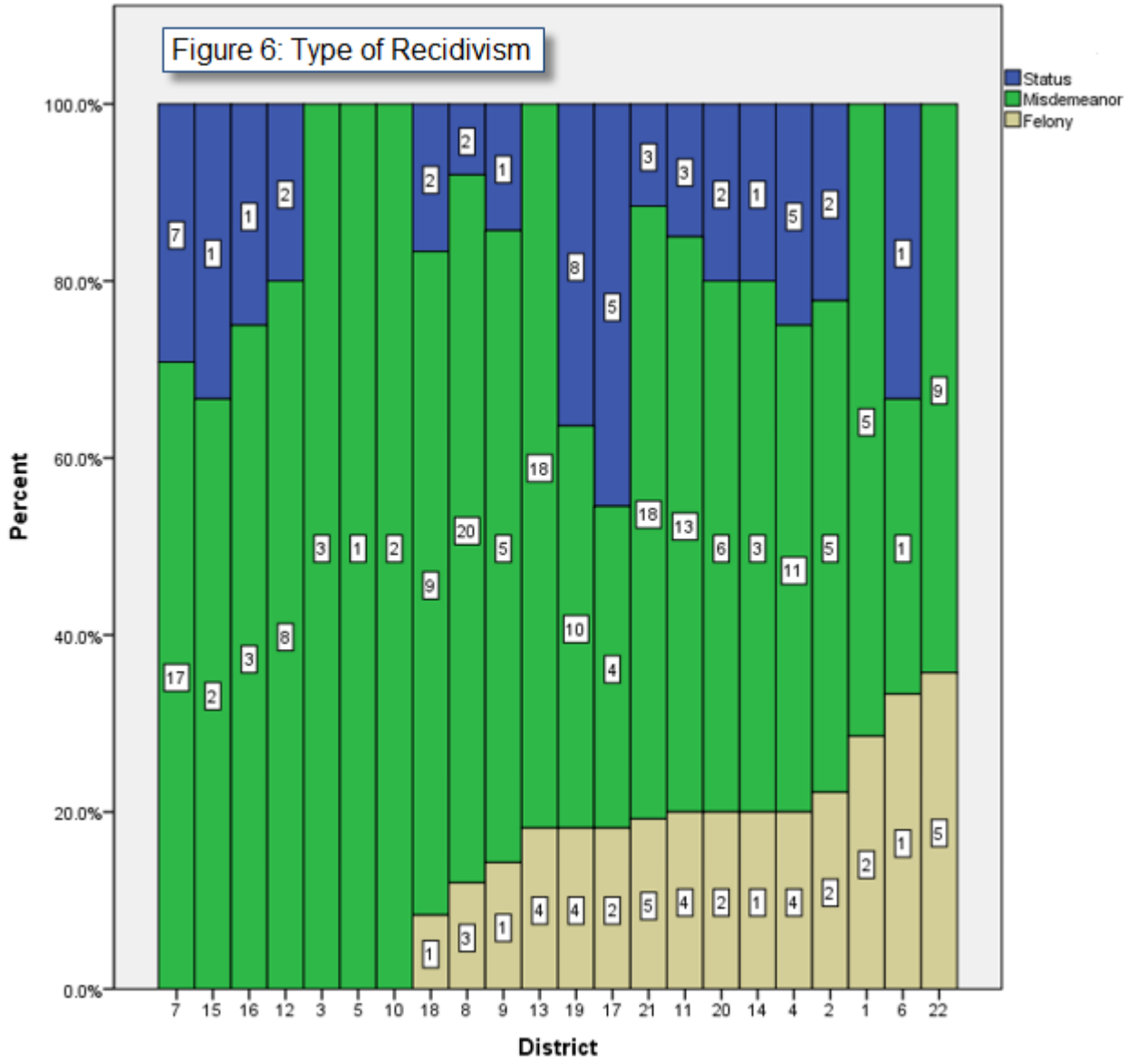
7 Dawson	8 Cascade	9 Glacier	10 Fergus	11 Flathead	12 Hill
13 Yellowstone	14 Musselshell	15 Roosevelt	16 Custer	17 Blaine	18 Gallatin
19 Lincoln	20 Lake	21 Ravalli	22 Big Horn		

Type of Recidivism:



1 Lewis & Clark	2 Silver Bow	3 Powell	4 Missoula	5 Madison	6 Park
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13 Yellowstone	14 Musselshell	15 Roosevelt	16 Custer	17 Blaine	18 Gallatin
19 Lincoln	20 Lake	21 Ravalli	22 Big Horn		