



Escalation from County Probation to the Oregon Youth Authority on a New Crime or Probation Violation

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Rationale and Purpose

In Oregon, nearly 3,000 youth per year are placed on county probation for a criminal referral. Many of those escalate to the Oregon Youth Authority (OYA), either through new criminal offence[s] or violation of county probation.

Although Oregon currently utilizes several recidivism risk assessments (e.g., Juvenile Crime Prevention Risk Assessment [JCP; Malsch, Mackin, & Tarte, 2011; OYA, 2013]; Oregon Youth Authority Recidivism Risk Assessment [ORRA; OYA, 2011a]), no assessments are currently designed specifically to predict the likelihood that a youth will escalate to OYA from county probation. Previous research has demonstrated that models designed to predict violations of supervision and models designed to predict recidivism are not the same (OYA, 2011b). In fact, some of the variables that are risk factors for the supervision violation model are protective factors for the recidivism model.

In view of the findings above, it is possible that the current risk assessments might not accurately predict escalation from county probation to OYA because much of the escalation may be a result of probation violations. Knowing which youth might escalate would require assessments that model both the risk of escalations due to probation violations and the risk of escalation due to new crimes. Focusing resources on the youth most likely to escalate, particularly for a new crime, might decrease the number of youth who do escalate.

The project was divided into two separate studies.

The purpose of the first study was to answer the following research questions:

- (a) What proportion of youth escalates from county probation to OYA?
- (b) What proportion of youth escalates on probation violations?
- (c) What proportion of youth escalates on new crimes?
- (d) How accurate are the Juvenile Crime Prevention Risk Assessment (JCP) and the OYA Recidivism Risk Assessment (ORRA) for predicting escalation to OYA?

The purpose of the second study was to answer the following research questions:

- (a) What factors are associated with escalation from county probation to OYA on a new crime and how accurately do they predict that escalation?

- (b) What factors are associated with escalation from county probation to OYA on a probation violation and how accurately do they predict that escalation?
- (c) How does the model for escalation to OYA for a new crime differ from the model for escalation to OYA for a probation violation?
- (d) Is there an association between escalation to OYA on a new crime and escalation to OYA on a probation violation?
- (e) Does escalation to OYA on a probation violation reduce recidivism?

Methods for Study One and Two

Participants

Participants for both studies include all youth placed on county probation prior to their 18th birthday from January 1, 2006 through August 29, 2013. Youth with multiple placements of county probation were randomly selected so that only one placement was used for each youth. The final sample included 19,452 youth. [Appendix A](#) provides the demographic and most serious crime information for those youth.

For Study 2, a subsample was derived from the sample above and only included youth with JCPs that were not Interstate Compact¹ (n=13,955; 74%). [Appendix B](#) provides the demographic information for those youth.

Data

Data for this analysis were extracted from the Oregon Juvenile Justice Information System (JJIS). Specifically, two reports comprised the dataset: JJIS Report 00524 – ORRA Event Extract (demographics, crimes, dispositions and ORRA) and JJIS Report 00262 – Assessment Extract (JCP).

¹ Interstate Compact youth (N=567) were excluded from Study Two because they cannot escalate on a probation violation; and youth without JCP assessments (n=4,930) were also excluded for the study because of missing data.

Analysis

Descriptive statistics on criminal and demographic variables profiled youth who escalated from county probation to OYA, either on a probation violation or a new crime. Area under the Receiver Operator Characteristic Curve (AUC) estimated the accuracy of the ORRA, JCP, and the models developed in this study. Logistic regression developed the models. Chi-square goodness-of-fit analysis estimated the effects of probation violations on the actual versus expected recidivism rates of youth who escalated to OYA for a probation violation and youth who didn't escalate for a probation violation. All statistical procedures were applied in International Business Management Statistical Package for Social Sciences (IBM/SPSS) software.

Dependent Variables

Three dependent variables were evaluated in this study: (a) Escalation to OYA, (b) escalation to OYA on a probation violation, and (c) escalation to OYA on a new crime. The variables were determined by examination of the allegations and dispositions. Youth with an escalated disposition to OYA following placement on county probation were considered an escalation to OYA; youth with an escalated disposition on the same allegation associated with placement on county probation were considered an escalation to OYA on a probation violation; and youth who received an escalated disposition on an allegation that was not associated with placement on county probation were considered an escalation to OYA on a new crime (includes misdemeanors and felonies).²

Independent Variables

Three types of independent variables were evaluated in this study: (a) Demographics (e.g., gender, age, race/ethnicity, and location), (b) crime factors (e.g., type, severity), and (c) items on the JCP. The JCP is comprised of a number of items developed to predict the likelihood that a youth would recidivate on a new crime within one year. JCP items indicate yes if the item was present, no if the item was not present, or more information was needed. These items were recoded so that yes=1, no=0, and more information needed was coded as missing. All missing variables were recoded as the mean for that item because missing variables are not included in logistic regression. Options for addressing the missing variable issue

² This is a simplified description of the process used to determine the dependent variables

include excluding the case altogether or substituting the mean of all other responses on that item. Substituting the mean method was chosen because it increases the number of cases available for the analysis. A complete list of all the items used in this study from the JCP is provided in Appendix C. The list of demographic and crime type variables used in this study is presented in Appendix D.

Results: Study One

What proportion of youth escalates to OYA? On new crimes? On probation violations?

Table 3 provides the proportion of youth who escalated to OYA. About 15% of the youth placed on county probation escalated to OYA. That was a little more than one youth a day. Seven and a half percent of the youth on county probation escalated to OYA for a probation violation and almost 8 percent escalated on a new crime. The county breakdown of escalation is presented in Appendix E.³

Table 3

All Youth Placed on County Probation before their 18th birthday by Escalation Reason: January 2006 through August 2013		
Escalation Reason	#	%
Probation Violation (PV)	1,458	7.5%
New Crime	1,495	7.7%
Either PV or New Crime	2,953	15.2%
Total	19,452	100.0%

³ Because difference between the counties is influenced by numerous factors beyond the control of this study, analysis of those differences is not provided in this report. Any rationale for those differences could only be speculation and would go beyond the scope of this study; however, further discussion of this issue is provided in the Limitations section of this report.

Table 4

All Youth Placed on County Probation* before their 18th birthday with Juvenile Crime Prevention Risk Assessments by Escalation Reason: January 2006 through August 2013		
Escalation Reason	#	%
Probation Violation (PV)	1,143	8.2%
New Crime	1,087	7.8%
Either PV or New Crime	2,230	16.0%
Total	13,955	100.0%

* Excluding youth on Interstate Compacts

Table 4 reports the proportion of youth who escalated to OYA that had a JCP (excluding Interstate Compact youth). Almost 16% of the youth on county probation with JCPs escalated to OYA. Eight percent escalated on a probation violation and 7.8% escalated on a new crime.

How accurate is ORRA and JCP in predicting escalation?

Table 5

AUC by Type of Escalation and Type of Assessment			
	Any Escalation	Escalation for a New Crime	Escalation for a Probation Violation
ORRA	0.62	0.67	0.56
JCP	0.69	0.67	0.68

AUC^{4,5} determined the accuracy of assessments to predict escalation. Table 5 reports the AUCs for each of the assessments and each of the dependent variables. Although the AUCs for the JCP are all in the moderate range in term of predicting escalation, the AUCs for ORRA were all in the low range except for escalation for a new crime which was in the moderate range.

In fact, the AUC for ORRA predicting escalation for a probation

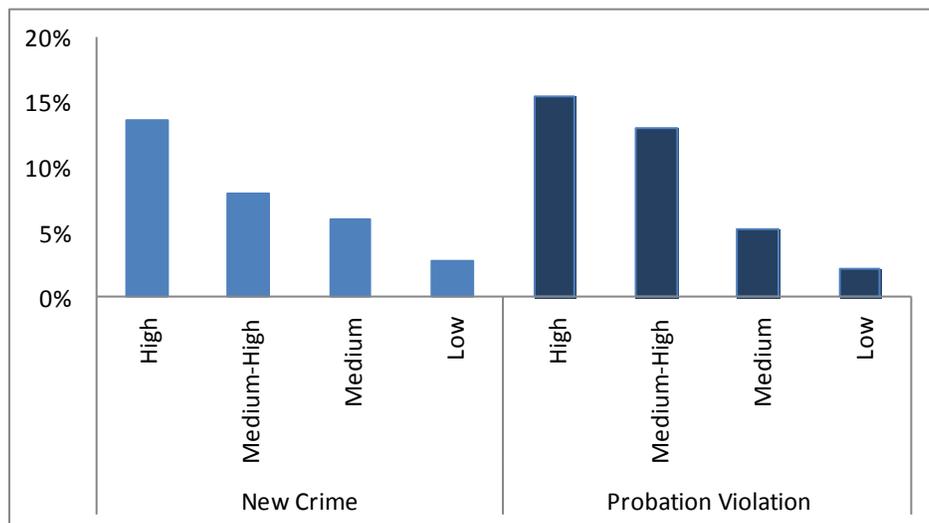
⁴ The predictive accuracy of an assessment can be assessed using the AUC. Essentially, the AUC coefficient is the probability that a randomly selected youth who recidivated will have a higher score than a randomly selected youth who did not recidivate. The AUC can range from 0 to 1:0. When the AUC equals 1.0, the assessment is identifying the outcome (e.g., recidivism) for all individuals without error. Low AUC estimates suggest the assessment does not accurately differentiate outcome groups (e.g., recidivists from non-recidivists).

⁵ According to Rice and Harris (2005), effect sizes were considered large if AUC was above .714; medium if the AUC was between .639 and .714; and small if the AUC was below .639. These ranges are referred to as high, moderate, and low in this study.

violation was only 6% above chance; suggesting that the ORRA was not useful for predicting escalation to OYA for a probation violation.

As Table 5 indicates, JCP scores were slightly more accurate predicting escalation for a probation violation than for escalation for a new crime. The JCP assessment also provides risk levels that are used by counties to determine who gets services. Chi-square analysis was used to determine the validity of the JCP risk levels for predicting escalation on new crimes and probation violations. Figure One presents a graphic illustration of the analysis. Both outcomes were statistically significant; however, as with the AUC, JCP risk levels were slightly better at predicting the outcomes for probation violation $\chi^2(3, N = 13,713) = 540.63$ than for new crimes $\chi^2(3, N = 13,713) = 334.79$.

Figure One: Escalation Rate to OYA from County Probation by JCP Risk Levels



Results: Study Two

Factors associated with escalation from county probation to OYA on a new crime and probation violation

Stepwise Logistic regression (a) identified the factors associated with escalation from county probation to OYA on a new crime, and (b) developed an equation that identified the likelihood a youth escalates for a new crime. The list of all JCP variables entered in the stepwise regression at the initial stage is presented in

Appendix C. The list of all other variables initially entered into the regression is presented in Appendix D. Results of the analysis are presented in Table 5.⁶ Variables are listed in the order they enter the model. The variable with the strongest association with the outcome (measured by the lowest level of significance) enters the model first, followed by the variable with the next strongest association with the outcome, and so on until all significant variables have entered the model.

The odds ratios indicate the likelihood the outcome will occur for each unit change when the variable is present. With positive parameter estimates and dichotomous variables (e.g., yes/no) the interpretation is relatively straight forward. For example, youth with 3 or more referrals for criminal offenses (odds ratio = 2.08) were twice as likely to escalate on a new crime as otherwise identical youth. A different interpretation is required for both negative parameter estimates and variables with more than a dichotomous scale. Again, the interpretation of the odds ratio is of each unit change. So, youth are 35% ($1/.736$) less likely to escalate on a new crime for each year youth are older than otherwise identical youth. In other words, the younger the youth, the more likely they are to escalate on a new crime.

⁶ See limitations page 15 and 16.

Table 5: Logistic Regression: Parameter Estimates for the Equation Modeling Escalation on New Crimes — Variables Listed by Order of Entry (N = 13,955; Nagelkerke R² = .15; Hosmer Lemeshow test, p < .11) — See Limitations pages 15 and 16

PREDICTOR VARIABLES*	VALUES	PARAMETER ESTIMATE	SIGNIFICANCE LEVEL	ODDS RATIO
Three or more referrals for criminal offenses (R4.3)	No = 0, Yes = 1	.760	.000	2.138
Age at Disposition	Age at dispo.	-.303	.000	.738
Anti-social thinking, attitudes, values, beliefs (R7.1)	No = 0, Yes = 1	.320	.000	1.377
Disposition Crime Severity Scale - Oregon Juvenile: Low number=less severity	min=-5, max=19	-.085	.000	.918
Multnomah County	No = 0, Yes = 1	.509	.000	1.663
Sex	F = 0, M = 1	.688	.000	1.991
Recent runaway (C4.7)	No = 0, Yes = 1	.437	.000	1.549
Hispanic	No = 0, Yes = 1	.449	.000	1.567
Chronic aggressive, disruptive behavior at school starting before age 13 (R4.1)	No = 0, Yes = 1	.309	.000	1.363
Clackamas County	No = 0, Yes = 1	.603	.000	1.828
Youth preoccupied with delinquent or antisocial behavior (T7.6)	No = 0, Yes = 1	.249	.004	1.283
African American	No = 0, Yes = 1	.526	.000	1.693
Communicates effectively with family members (PF5.1)	No = 0, Yes = 1	-.201	.008	.818
Behavior hurts youth or puts her/him in danger (R4.10)	No = 0, Yes = 1	.203	.005	1.225
Has friends who are academic achievers (PF3.4)	No = 0, Yes = 1	-.190	.013	.827
Lane County	No = 0, Yes = 1	-.289	.030	.749
Youth accepts responsibility for behavior (T7.3)	No = 0, Yes = 1	-.159	.044	.853
Intercept	Constant	1.424	.000	4.154

*All JCP item numbers are in parentheses: R=risk, PF=protective factor, C=change, T=test variable. All missing JCP variables coded as mean.

Table 6⁷ presents the parameter estimates for the stepwise logistic regression modeling escalation for a probation violation. With this outcome, youth who had higher severity scores for the crime they were placed on probation for were more likely to escalate on probation violations.

⁷ See limitations on pages 15 and 16.

Table 6: Logistic Regression: Parameter Estimates for the Equation Modeling Escalation on Probation Violations – Variables Listed by Order of Entry (N = 13,955; Nagelkerke R² = .28; Hosmer Lemeshow test, p < .37) – See Limitations pages 15 and 16

PREDICTOR VARIABLES*	VALUES	PARAMETER ESTIMATE	SIGNIFICANCE LEVEL	ODDS RATIO
Disposition Crime Severity Scale - Oregon Juvenile: Low number=less severity	min=-5, max=19	.224	.000	1.252
Youth preoccupied with delinquent or antisocial behavior (T7.6)	No = 0, Yes = 1	.384	.000	1.468
Recent runaway (C4.7)	No = 0, Yes = 1	.569	.000	1.766
Age at Disposition	Age at dispo.	-.248	.000	.780
Significant school attachment/commitment (PF2.1)	No = 0, Yes = 1	-.253	.005	.777
Three or more referrals for criminal offenses (R4.3)	No = 0, Yes = 1	.460	.000	1.585
Disposition - County Probation for a Sex Offense	No = 0, Yes = 1	1.351	.000	3.862
Substance use beyond experimental use (R6.1)	No = 0, Yes = 1	.405	.000	1.499
Chronic runaway history (R4.6)	No = 0, Yes = 1	.447	.000	1.564
Clackamas County	No = 0, Yes = 1	.775	.000	2.170
Washington County	No = 0, Yes = 1	.511	.000	1.667
Chronic aggressive, disruptive behavior at school starting before age 13 (R4.1)	No = 0, Yes = 1	.276	.000	1.318
Jackson County	No = 0, Yes = 1	.511	.000	1.667
Academic failure (R2.2)	No = 0, Yes = 1	.211	.011	1.234
Klamath County	No = 0, Yes = 1	.699	.000	2.012
Lane County	No = 0, Yes = 1	.334	.004	1.396
Friends disapprove of unlawful behavior (PF3.1)	No = 0, Yes = 1	-.211	.018	.809
Linn County	No = 0, Yes = 1	.381	.017	1.464
Hispanic	No = 0, Yes = 1	.248	.003	1.281
Communicates effectively with family members (PF5.1)	No = 0, Yes = 1	-.217	.007	.805
Substance use began at age 13 or younger (R6.3)	No = 0, Yes = 1	.258	.003	1.294
African American	No = 0, Yes = 1	.469	.001	1.599
Multnomah County	No = 0, Yes = 1	-.444	.001	.641
Douglas County	No = 0, Yes = 1	-.635	.010	.530
Deschutes County	No = 0, Yes = 1	-.716	.012	.489
Suspension(s) or expulsion(s) during past 6 months (R2.5)	No = 0, Yes = 1	.173	.022	1.189
Youth talks about the future in a positive way (T7.5)	No = 0, Yes = 1	-.168	.043	.845
Intercept	Constant	-2.247	.000	.106

*All JCP item numbers are in parentheses: R=risk, PF=protective factor, C=change, T=test variable. All missing JCP variables coded as mean.

Accuracy and model fit

Accuracy of the models was measured by AUC described above. AUC was .76 for the escalated on a new crime model, and .84 for the escalated on a probation violation model. Both measures indicated highly accurate models.

Model fit suggests the extent to which a model improves the prediction of an outcome over the mean model and is measured by the difference between the observed and expected values. Models are considered a poor fit when the difference between the observed and expected values is statistically significant. For this analysis, model fit was measured by the Hosmer Lemeshow "goodness-of-fit" test. With this test, models fit best when $p > .05$. The Hosmer Lemeshow test was $p > .10$ for the escalated on a new crime model and $p > .36$ for the escalated on a probation violation model. Hence, both models had good fit.

In addition, Nagelkerke's R^2 also indicates the amount the model improve prediction over the mean model. With logistic regression, the purpose of this measure is to indicate how much can be gained or lost by the addition or subtraction of variables. When R^2 is lower, removing variables may not be an option. When R^2 is higher, adding variables may not be necessary. Often R^2 is used in addition to AUC determining to optimum number of variables for a model. However, the purpose of this analysis was to identify what variables were associated with the outcome. R^2 for the escalated on a new crime model was .15, indicating that the model may not be fully specified (i.e., variables may be missing from the model); R^2 for the escalated on a probation violation model was .28, indicating that the model is more complete than the escalated on a new crime model but also may not be fully specified.

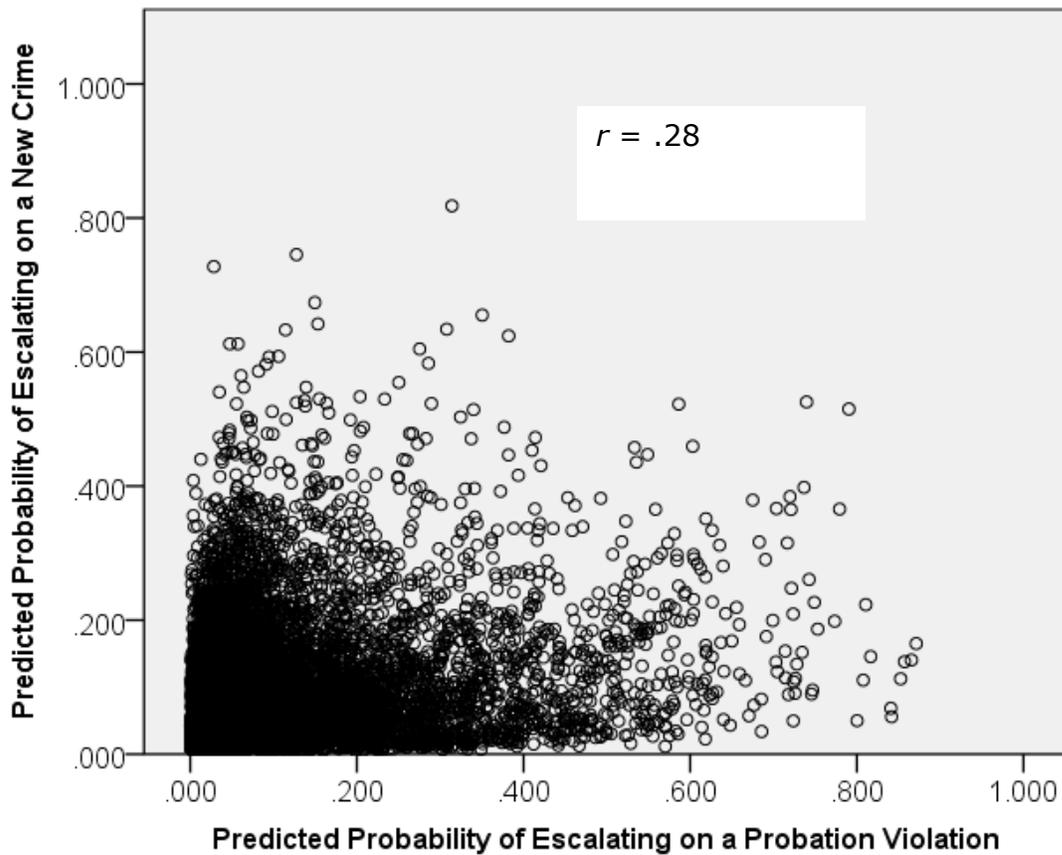
In sum, although improvements could be made with more variables, both models were adequately accurate and had good fit.

Relationship between the models

Statistically, the relationship between the models was measured using Person's r on the predicted probabilities for each model. The results indicated a weak but statistically significant relationship between escalation on a new crime and escalation on a probation violation ($r=.28, p<.001$). In addition, a visual analysis of the scatter plot is provided in Figure Two. Clearly, there is little relationship between the predicted probabilities except in the low ranges of each measure.

The relationship between in these models was also analyzed by comparing and contrasting the similarities and differences in the model variables. Given the

Figure Two: Relationship between the predicted probabilities of each of the models.



complexities and number of variables in each of these models an exhausting examination of models would go beyond the scope of this paper. Therefore, this analysis only includes selected variables that emphasizes similarities and differences.⁸

⁸ Caution is advised when comparing the variables across the models because the strength of the association between variables is relative to all the other variables in the model — both dependent and independent. So, the odds ratio may be higher in one model for the same variable but the reason for the difference may not be apparent.

Similarities between the Models

Nine variables entered both models in the same direction of associations; however, the order the variables entered the models and the strength of the associations were not always the same (see Appendix F). For example, "Three or More Referrals for Criminal Offenses" (youth with Three or More Referrals were more likely to escalate) had the strongest association with escalation for a new crime (odds ratio = 2.14) but was the sixth variable to enter the probation violation model (odds ratio = 1.59). "Age at Disposition" (younger youth were more likely to escalate) was near the top of both models and the strength of the associations was very similar (new crime odds ratio = .74; probation violation odds ratio = .78).

Differences between the Models – Variables Only in the New Crime Model

Appendix G presents the variables that only came into the new crime model. "Anti-Social Thinking, Attitudes, Values, and Beliefs" only came into the new crime model and it was the third variables to enter. "Sex" entered the model in the sixth position and indicated that boys were almost twice as likely as girls to escalate on a new crime, but they were no more likely to escalate on a probation violation. "Having Friends who are Academic Achievers" protected youth from escalating for a new crime but didn't protect youth from escalating for a probation violation. Notably, most of the variables that only came into the new crime model were dynamic (i.e., changeable), suggesting the opportunities to decrease the likelihood that a youth would escalate on a new crime.

Differences between the Models – Variables Only in the Probation Violation Model

Variables that only came into the probation violation model are presented in Appendix H. Youth with a "Significant School Attachment/Commitment" were about 30% less likely to escalate on a probation violation but were not less likely to escalate on a new crime. Youth placed on county probation for a "sex offense" were nearly 4 times more likely to escalate on a probation violation (note: this was by far the highest odds ratio in either model) and not more likely to escalate for a new crime. And, youth who were "using substances beyond experimental use" were about 50% more likely to escalate on a probation violation but not more likely to escalate on a new crime.

Differences between the Models – Variables with Associations in Opposite Directions

Variables with associations in opposite directions are presented in Appendix I. Three variables came into the models in opposite directions: “Crime Severity,” “Multnomah County,” and “Lane County.” Youth placed on probation for high severity crimes were less likely to escalate on a new crime but more likely to escalate on a probation violation. Youth placed on county probation from Multnomah County were more likely to escalate on a new crime but less likely to escalate on a probation violation. And, youth placed on county probation from Lane County were less likely to escalate on a new crime but more likely to escalate on a probation violation.

Distribution of Predicted Probabilities by Population Outcome Groups

New Crime Model

Finally, differences in the models were evident in the distribution of different outcomes by probability estimates. Appendix J illustrates those differences with the probability estimates from the new crime model. As expected, youth who escalated on a new crime had lower proportions of youth in the lower risk range and greater proportions of youth in the higher risk range compare to the other outcome groups. Youth who escalated on a probation violation had lower proportion of youth in the low range than youth who did not escalate but higher proportions of youth than those who escalated on a new crime. Youth who escalated on a probation violation also had higher proportions of youth in the high risk range than youth who did not escalate and lower proportions of youth than those who escalated on a new crime. Youth who did not escalate had the highest proportion of youth in the low range and the highest proportion of youth in the high range. In addition, the groups appear to separate at about an 18% probability that they will escalate on a new crime, indicating a natural point to mark the separation between low and high risk youth.

Probation Violation Model

Appendix K illustrates the differences between the groups in probability estimates for the probation violation model. As expected, youth who escalated on a probation violation had lower proportions of youth in the lower risk range (note that this difference was rather extreme for this group with the line nearly flat) and greater

proportions of youth in the higher risk range compare to the other outcome groups. Youth who escalated on a new crime had lower proportion of youth in the low range than youth who did not escalate but higher proportions of youth than those who escalated on a probation violation. Youth who escalated on a new crime also had higher proportions of youth in the high risk range than youth who did not escalate and lower proportions of youth than those who escalated on a probation violation. Youth who did not escalate had the highest proportion of youth in the low range and the highest proportion of youth in the high range. In addition, the groups appear to separate at about a 20% probability that they will escalate on a probation violation, indicating a natural point to mark the separation between low and high risk youth.

Effects of escalation from County Probation to OYA on a Probation Violation

The effectiveness of escalation to OYA from county probation on a probation violation was evaluated by examining the percent difference between the actual expected recidivism rates of (a) youth who escalated on a probation violation, and (b) youth who did not escalate on a probation violation. Table 7 presents the results of that analysis. All of the youth from the study were included in the analysis if they had at least 36-months in the tracking period (tracking started the day the youth

Table 7: Actual versus Expected 36-Month Recidivism Rates for all Youth Placed on County Probation from January 1, 2006 thru June 30, 2010

Actual versus Expected 36-Month Recidivism Rates for all Youth Placed on County Probation from January 1, 2006 thru June 30, 2010					
Outcome Group	n	Actual	Expected	Percent Difference	p*
Did Not Escalate on a Probation Violation	11,546	16.1%	15.8%	1.9%	<.05
Did Escalate on a Probation Violation	1,030	26.5%	18.2%	45.6%	<.001

* Based on z

were placed on county probation up to 36-months past the start date). Recidivism was defined as a felony adjudication/conviction that resulted in supervision within 36-months of the disposition date. Actual recidivism rates were 36-month felony adjudication/conviction recidivism rates. The expected recidivism rates were the mean probability estimates of each outcome group for 36-month recidivism derived from the ORRA. This analysis allows for comparison of groups with varying levels of risk. The results suggest that escalating youth from county probation to OYA on a probation violation did not reduce recidivism. The actual recidivism rate for youth who escalated on a probation violation was over 45% higher than expected; while

the actual recidivism rate for all other youth in the study (including those youth who escalated on a new crime) was only 2% higher than expected.

Limitations

Numerous caveats limit definitive conclusions about youth who escalate to OYA. First, counties vary in terms of the proportion of youth with criminal referrals that are placed on county probation; and, counties over the state as a whole only place about 12% of the youth referred to them on county probation (OYA, 2014). Consequently, most of the youth served by counties (e.g., formal accountability agreements) are not in this analysis.

Second, counties vary in terms of their availability of resources and how they spend those resources. For example, counties with adequate resources are probably more likely to have lower probation violation rates because they can afford services for those youth at the county level. Due to these differences, caution is advised when making comparisons across counties.

Third, 26 counties were not included as independent variables in the logistic regression because they had too few youth in their cohorts (counties were excluded if they had less than 800 youth in their cohorts).

Fourth, the dependent variable has multiple outcomes that may have influenced the models. Specifically, youth could have escalated to OYA probation, YCF, or DOC. It's likely that a different set of variables would come into each of the models aimed at those specific outcomes.

Fifth, it's likely that some youth escalated on a probation violation simply because a residential setting was more appropriate for that youth than the current home setting. If YCF was the only option, those same youth may not have been violated.

Sixth, for this analysis, the dependent variable did not have a specific tracking period. It is likely that age at disposition came into the model because younger youth had more days of opportunity to escalate than older youth. Future studies should use a tracking period long enough to capture most of the youth who escalate.

Seventh, the models were not fully specified. Logistic regression models are considered fully specified when all of the possible predictors are entered into the regression. This is a logistic regression assumption that is often violated; however,

in this case, the violation may be serious enough to increase caution in interpreting the results. For example, the specific location of the youth's residence would likely be associated with either outcome (Sampson, 2012; Sampson, Morenoff & Earls, 1999) enough to affect both AUC and R².

Finally, adding to the problem of specificity, "race/ethnicity" and "county of jurisdiction" need to be removed if the models are to be used for determining out of home placements. Both of these variables predict the probability that a youth escalates and, as a result, would contribute to over and under representation if the variables stayed in the models. For example, African American youth would be disproportionately placed out of home. Also, youth from counties that had a positive association with escalation would place too many youth out of the home, while youth from counties that had a negative association with escalation would place too few youth out of the home. Removing the variables will reduce the representation problems; however, removing those variables may also reduce accuracy and further contribute to the model's lack of specificity.⁹ Although this is an appropriate approach, removing race/ethnicity and counties will further limit the interpretations of the models.

Discussion

Essentially, this project served two purposes: (a) determine the extent and reason for escalation to OYA; and (b) determine what factors were associated with each type of escalation. In addition, subsequent goals included determining the accuracy of existing recidivism assessments to measure escalation, and compare and contrast factors associated with each of the models.

About 16% of youth who were placed on county probation escalated to OYA from 2006-2012. Excluding youth who were placed on county probation for Interstate Compact, this was approximately 450 youth per year; half of those escalated on a new crime and half of those escalated on a probation violation. Apparently, County Probation services were not enough to keep these youth from escalating to OYA. More services for these youth may have reduced those numbers; however, it might

⁹ To test the assumption that removing county and race would decrease the accuracy and specificity of the models those variables were removed and the AUC and R² were recalculated. The AUC for the probation violation model went from .84 to .83; AUC for the new crime model went from .76 to .75; R² for the probation violation model went from .28 to .26; and R² for the new crime model went from .15 to .14. None of these reductions severely limit the predictive power or accuracy of the models.

be difficult targeting the right youth with the right services using the existing recidivism assessments, especially given the low level of accuracy of the existing recidivism risk measures to predict escalation to OYA.

Moreover, factors associated with escalation to OYA on a new crime were not the same factors that predicted escalation to OYA on a probation violation. In general, it is a different youth who escalates to OYA on a new crime than the youth who escalates to OYA on a probation violation. OYA's (2011) revocation study findings were similar; youth who were revoked were not the same as those who recidivated. In fact, some of the same differences were apparent in both studies. For example, youth who were committed for a sex offense were more likely to be revoked or escalated on a probation violation but not more likely to recidivate or escalate on a new crime. And, although there was no association between youth committed for a sex offense and escalation on a new crime, youth committed for a sex offense were far less likely to recidivate in the revocation study.

Not only were there plenty of differences between the models in terms of the factors that enter the equations, the correlation between the predict probabilities of each model also was relatively low ($r=.28$). This correlation was close to that found in the earlier study of revocation and recidivism ($r=.24$). Clearly, there is mounting evidence suggesting that youth who violate probation or parole, and youth who recidivate on new crimes, are not the same. Hence, determining who violates probation and who commits a new crime requires separate models for each outcome.

Overall, however, JCP scores predict the likelihood that a youth will escalate to OYA for either reason relatively accurately and should be considered above ORRA when making decisions concerning the likelihood a youth will escalate. Although the accuracy of those predictions improved when a model was developed that specifically targeted escalation (AUC went from .67 to .79), the current JCP risk scores may provide adequate measures if the models developed in this study are not adopted.

Given that half of the youth who escalated to OYA from county probation did so for a probation violation, and those youth's recidivism rates were over 45% higher than expected, it might be prudent to consider alternatives for these youth. Those alternatives might be out of home placements, but those designed to address the factors that predict the likelihood that a youth will escalate to OYA on a probation violation.

Finally, a more refined model that aims at a one year tracking period for probation violations would be worth automating into the current system. This model should include any limitation listed above (e.g., including all counties). Because both the JCP and ORRA are accurate predictors of new crimes, a new crime model would be redundant and unnecessary.

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Appendix A: Sample Demographic and Crime Variables

Table 1: All Youth Place on County Probation before their 18th birthday: January 2006 through August 2013

	#	%
Total	19,452	100.0%
Female	4,799	24.7%
Male	14,653	75.3%
African American	1,142	5.9%
Asian	253	1.3%
Caucasian	12,638	65.0%
Hispanic	3,767	19.4%
Native American	676	3.5%
Other/Unknown	976	5.0%
Under 12	99	0.5%
12 thru 13	1,952	10.0%
14 thru 15	7,001	36.0%
16 thru 17	10,396	53.4%
Arson	250	1.3%
Criminal Other/Other	3,290	16.9%
Person to Person	3,427	17.6%
Property	7,421	38.2%
Public Order	1,751	9.0%
Robbery	212	1.1%
Sex Offense	814	4.2%
Substance Related	1,736	8.9%
Weapon	551	2.8%

Appendix B: Subsample Demographic and Crime Variables

Table 2: All Youth Placed on County Probation (excluding Interstate Compact Youth) before their 18th birthday with Juvenile Crime Prevention Risk Assessments: January 2006 through August 2013

	#	%
Total	13,955	100.0%
Female	3,367	24.1%
Male	10,588	75.9%
African American	882	6.3%
Asian	1,956	14.0%
Caucasian	8,940	64.1%
Hispanic	2,919	20.9%
Native American	483	3.5%
Other/Unknown	536	3.8%
Under 12	63	0.5%
12 thru 13	1,502	10.8%
14 thru 15	5,284	37.9%
16 thru 17	7,106	50.9%
Arson	191	1.4%
Criminal Other/Other	1,673	12.0%
Person to Person	2,657	19.0%
Property	5,558	39.8%
Public Order	1,315	9.4%
Robbery	178	1.3%
Sex Offense	634	4.5%
Substance Related	1,325	9.5%
Weapon	424	3.0%

Appendix C: JCP variables entered into the Stepwise Logistic Regression

PF2.1 Significant school attachment/commitment
R2.2 Academic failure
R2.3 Chronic truancy
R2.4 School drop-out
R2.5 Suspension(s) or expulsion(s) during past 6 months
PF2.7 Family actively involved in helping youth succeed in school
R2.8 Diagnosed learning disability or concrete evidence of cognitive difficulties
PF3.1 Friends disapprove of unlawful behavior
R3.2 Friends engage in unlawful or serious acting-out behavior
R3.3 Has friends who have been suspended or expelled or dropped out of school
PF3.4 Has friends who are academic achievers
T3.5 Substance abusing friends
PF3.6 There is an adult in youth's life (other than a parent) she/he can talk to
PF3.7 Lives in a low crime and/or stable, supportive neighborhood
R4.1 Chronic aggressive, disruptive behavior at school starting before age 13
C4.2 Aggressive, disruptive behavior at school during past month
R4.3 Three or more referrals for criminal offenses
R4.4 Referred for a criminal offense at age 13 or younger
PF4.5 Involved in constructive extra-curricular activities
R4.6 Chronic runaway history
C4.7 Recent runaway
R4.8 Behavior hurts others or puts them in danger
R4.9 In past month, youth's behavior has hurt others or put them in danger
R4.10 Behavior hurts youth or puts her/him in danger
R4.12 A pattern of impulsivity combined with aggressive behavior toward others
R4.13 Harms or injures animals
R4.14 Preoccupation with or use of weapons
R4.15 Youth has history of setting fires
PF5.1 Communicates effectively with family members
R5.2 Poor family supervision and control
R5.3 Serious family conflicts
R5.4 History of reported child abuse/neglect or domestic violence
R5.6 Criminal family member
R5.7 Substance abusing family or household member(s)
R5.8 Family trauma/disruption during past 12 months
PF5.10 Has close, positive, supportive relationship with at least one family member

Appendix C: Continued

- R6.1 Substance use beyond experimental use
- R6.2 Current substance use is causing problems in youth's life
- R6.3 Substance use began at age 13 or younger
- R6.4 Youth has been high or drunk at school at any time in the past
- R7.1 Anti-social thinking, attitudes, values, beliefs
- T7.2 Youth lacks empathy, remorse, sympathy, or feelings for his/her victim(s)
- T7.3 Youth accepts responsibility for behavior
- T7.4 Youth inaccurately interprets actions and/or intentions of others as hostile
- T7.5 Youth talks about the future in a positive way
- T7.6 Youth preoccupied with delinquent or antisocial behavior
- MH8.1 Actively suicidal or prior suicide attempts
- MH8.2 Depressed or withdrawn
- MH8.3 Difficulty sleeping or eating
- MH8.5 Social isolation
- V13.1 Violence Indicators

Appendix D: Demographic & Crime Variables Entered into Stepwise Logistic Regression

Sex

Age at Disposition

Race/Ethnicity

 African American

 Hispanic

 White

Disposition - County Probation for a Sex Offense

Disposition Most Serious Crime Severity Scale - Oregon Juvenile

Disposition County (Only counties with over 400 cases included)

 Clackamas

 Deschutes

 Douglas

 Jackson

 Klamath

 Lane

 Linn

 Marion

 Multnomah

 Washington

Appendix E: Escalation from County Probation to OYA Rates by County and Escalation Type – All Youth Placed on County Probation before their 18th birthday in Oregon from 1/2006 through 8/ 2013 [excluding Interstate Compact (n=567) and youth who’s jurisdiction was out of state (n=10); see Limitations pages 15 and 16]

Jurisdiction	Total	Any Escalation		Escalated on New Crime		Escalated on Probation Violation	
		#	%	#	%	#	%
Baker	190	17	8.9%	11	5.8%	6	3.2%
Benton	388	30	7.7%	24	6.2%	6	1.5%
Clackamas	975	211	21.6%	93	9.5%	118	12.1%
Clatsop	216	41	19.0%	20	9.3%	21	9.7%
Columbia	260	36	13.8%	13	5.0%	23	8.8%
Coos	472	72	15.3%	37	7.8%	35	7.4%
Crook	632	26	4.1%	22	3.5%	4	.6%
Curry	157	24	15.3%	12	7.6%	12	7.6%
Deschutes	1,020	87	8.5%	60	5.9%	27	2.6%
Douglas	798	81	10.2%	48	6.0%	33	4.1%
Gilliam	54	0	0.0%	0	0.0%	0	0.0%
Grant	48	2	4.2%	2	4.2%	0	0.0%
Harney	89	4	4.5%	4	4.5%	0	0.0%
Hood River	271	29	10.7%	23	8.5%	6	2.2%
Jackson	901	174	19.3%	55	6.1%	119	13.2%
Jefferson	452	48	10.6%	26	5.8%	22	4.9%
Josephine	443	74	16.7%	28	6.3%	46	10.4%
Klamath	1,191	124	10.4%	76	6.4%	48	4.0%
Lake	124	14	11.3%	12	9.7%	2	1.6%
Lane	1,152	243	21.1%	82	7.1%	161	14.0%
Lincoln	261	38	14.6%	20	7.7%	18	6.9%
Linn	883	134	15.2%	65	7.4%	69	7.8%
Malheur	420	63	15.0%	50	11.9%	13	3.1%
Marion	1,972	431	21.9%	203	10.3%	228	11.6%
Morrow	186	9	4.8%	8	4.3%	1	.5%
Multnomah	1,695	351	20.7%	208	12.3%	143	8.4%
Polk	526	67	12.7%	40	7.6%	27	5.1%
Sherman	9	0	*	0	*	0	*
Tillamook	312	14	4.5%	7	2.2%	7	2.2%
Umatilla	387	66	17.1%	31	8.0%	35	9.0%
Union	339	22	6.5%	15	4.4%	7	2.1%
Wallowa	89	8	9.0%	6	6.7%	2	2.2%
Wasco	162	23	14.2%	13	8.0%	10	6.2%
Washington	1,163	272	23.4%	96	8.3%	176	15.1%
Wheeler	19	1	*	1	*	0	*
Yamhill	619	84	13.6%	51	8.2%	33	5.3%
Statewide	18,875	2,920	15.5%	1,462	7.7%	1,458	7.7%

*Percentages are not reported for jurisdictions with less than 30 Placements

Appendix F: Model Similarities

Variables in Both Equations and Associations in the Same Direction Modeling Escalation for a New Crime or Probation Violation					
PREDICTOR VARIABLES*	VALUES	New Crime		Probation Violation	
		PARAMETER ESTIMATE	ODDS RATIO	PARAMETER ESTIMATE	ODDS RATIO
Three or more referrals for criminal offenses (R4.3)	No=0, Yes=1	.760	2.138	.460	1.585
Age at Disposition	Age at dispo	-.303	.738	-.248	.780
Recent runaway (C4.7)	No=0, Yes=1	.437	1.549	.569	1.766
Hispanic	No=0, Yes=1	.449	1.567	.248	1.281
Chronic aggressive, disruptive behavior at school... (R4.1)	No=0, Yes=1	.309	1.363	.276	1.318
Clackamas County	No=0, Yes=1	.603	1.828	.775	2.170
African American	No=0, Yes=1	.526	1.693	.469	1.599
Youth preoccupied with delinquent or antisocial behavior (T7.6)	No = 0, Yes	.249	1.283	.384	1.468
Communicates effectively with family members (PF5.1)	No=0, Yes=1	-.201	.818	-.217	.805

*All JCP item numbers are in parentheses: R=risk, PF=protective factor, C=change, T=test variable. All missing JCP variables coded as mean.

Appendix G: Model Differences – Variables Only in the New Crime Model

Variables Only in the New Crime Model			
PREDICTOR VARIABLES*	VALUES	PARAMETER ESTIMATE	ODDS RATIO
Anti-social thinking, attitudes, values, beliefs (R7.1)	No=0, Yes=1	.320	1.377
Sex	No=0, Yes=1	.688	1.991
Youth preoccupied with delinquent or antisocial behavior (T7.6)	No=0, Yes=1	.249	1.283
Behavior hurts youth or puts her/him in danger (R4.10)	No=0, Yes=1	.203	1.225
Has friends who are academic achievers (PF3.4)	No=0, Yes=1	-.190	.827
Youth accepts responsibility for behavior (T7.3)	No=0, Yes=1	-.159	.853

*All JCP item numbers are in parentheses: R=risk, PF=protective factor, C=change, T=test variable. All missing JCP variables coded as mean.

Appendix H: Model Differences – Variables Only in the Probation Violation Model

Variables Only in the Probation Violation Model			
PREDICTOR VARIABLES*	VALUES	PARAMETER ESTIMATE	ODDS RATIO
Significant school attachment/commitment (PF2.1)	No=0, Yes=1	-.253	.777
Disposition - County Probation for a Sex Offense	No=0, Yes=1	1.351	3.862
Substance use beyond experimental use (R6.1)	No=0, Yes=1	.405	1.499
Chronic runaway history (R4.6)	No=0, Yes=1	.447	1.564
Washington County	No=0, Yes=1	.511	1.667
Jackson County	No=0, Yes=1	.511	1.667
Academic failure (R2.2)	No=0, Yes=1	.211	1.234
Klamath County	No=0, Yes=1	.699	2.012
Friends disapprove of unlawful behavior (PF3.1)	No=0, Yes=1	-.211	.809
Linn County	No=0, Yes=1	.381	1.464
Substance use began at age 13 or younger (R6.3)	No=0, Yes=1	.258	1.294
Douglas County	No=0, Yes=1	-.635	.530
Deschutes County	No=0, Yes=1	-.716	.489
Suspension(s) or expulsion(s) during past 6 months (R2.5)	No=0, Yes=1	.173	1.189
Youth talks about the future in a positive way (T7.5)	No=0, Yes=1	-.168	.845

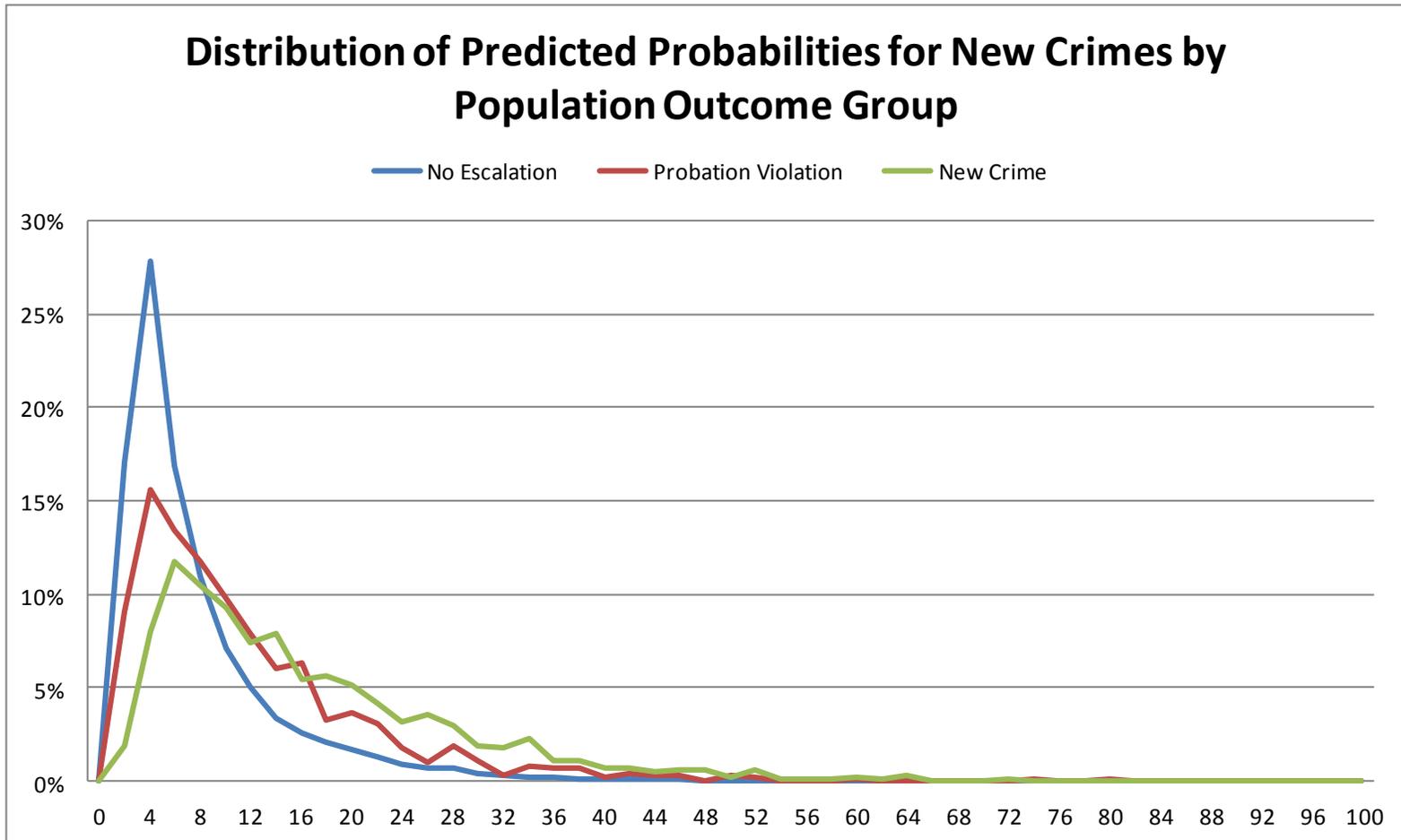
*All JCP item numbers are in parentheses: R=risk, PF=protective factor, C=change, T=test variable. All missing JCP variables coded as mean.

Appendix I: Model Differences – Variables in both Models with Associations in the Opposite Direction

Variables in Both the New Crime or Probation Violation Models with Associations in the Opposite Direction					
PREDICTOR VARIABLES*	VALUES	New Crime		Probation Violation	
		PARAMETER ESTIMATE	ODDS RATIO	PARAMETER ESTIMATE	ODDS RATIO
Disposition Crime Severity Scale - Oregon Juvenile	min=-5, max=19	-.085	.918	.224	1.252
Multnomah County	No = 0, Yes = 1	.509	1.663	-.444	.641
Lane County	No = 0, Yes = 1	-.289	.749	.334	1.396

*All JCP item numbers are in parentheses: R=risk, PF=protective factor, C=change, T=test variable. All missing JCP variables coded as mean.

Appendix J: Distribution of Predicted Probabilities for New Crimes by Population Outcome Group



Appendix K: Distribution of Predicted Probabilities for Probation Violations by Population Outcome Group

