Washington Association of Juvenile Court Administrators

PACT Validation and Weighting Results

Technical Report

Washington State University

Zachary Hamilton, Ph.D.
Jacqueline van Wormer, Ph.D.
Robert Barnoski, Ph.D.

Department of Criminal Justice and Criminology

July 22, 2015

TABLE OF CONTENTS

EXECUTIVE SUMMARY

The proper assessment of risk and need of youth offenders has been at the core of juvenile justice reform and operational practice in Washington State for almost two decades. Launched in 1997 as a way to increase the use of evidence-based practices and make decisions for treatment and services based on risk/need, Washington State has historically been considered the leader in juvenile risk/needs assessment development. The development and roll-out of the Washington State Juvenile Court Assessment (WSJCA), later renamed the Positive Achievement Change Tool (PACT), included a multi-facetted approach. The implementation of the tool focused not only on introducing, training, and launching the tool, but also on ensuring strong adherence through certification and quality assurance to the administration and use of information arising from the tool. Since going live with the tool in 1999, all probation counselor staff have been trained in the use of the tool, a 40 hour training session is mandated at the Juvenile Service Workers academy, and the use of the tool is common practice across all courts.

Given the history and use of the WSJCA/PACT, this research addressed three main objectives:

1) Provide a validation of the prescreen PACT, used to calculate risk for recidivism
2) Analyze the PACT database in order to incorporate and weight additional, available needs information to improve risk prediction of the tool
3) Increase the overall predictive validity of the PACT tool by exploring various model options, broken down by crime type (property, drug, violent, general, all), gender and race/ethnicity.

The study sample was comprised of a total of 70,198 assessments collected across the period from November, 2003 to January, 2013. For this project, we utilize youths' scores to predict recidivism and assess the predictive validity of the PACT tool across a variety of dimensions. In order to improve the predictive performance of the tool, we created new prediction models isolating specified offense types in order to "dig deeper" into the population and create models that will allow for scarce resources to be more strategically applied. Supervision levels, techniques and treatment/interventions can become more targeted as specific models are utilized.

In order to deepen the understanding of risk prediction by specialized populations, new risk prediction models were specified and built as follows:

- Analyses were run separating males and females in order to assess gender responsivity and item specificity.
- Assessments were conducted of race/ethnicity differences.
- Different models based on crime type were developed and analyzed., such as felony drug, property, and violent crimes in addition to general felonies and misdemeanors

In order to measure the strength of recidivism model prediction, a statistical measure termed the area under the curve (AUC) was calculated. The AUC is calculated by using the youth's continuous risk score, calculated from a given model, to predict the observed recidivism events. AUC values range from 0.5 to a value of 1 (perfect prediction). Rice and Harris (2005) outlined the magnitude of AUC values, and maintain that:

- values below 0.55 are considered "negligible or weak"
- values between 0.56 and 0.63 are considered "small"
- values between 0.64 and 0.71 are considered "moderate"
- "strong" values are indicated at 0.72 or above.

Through this research and the development of different models, we focus on finding model "fits" in order to increase the predictive validity of the PACT with regard to "any" recidivism (misdemeanor or felony), which would be indicated by increased AUC values over the original PACT validation AUC of .64.

Findings:

After constructing the sample and models, it is clear that the current PACT prescreen models are valid recidivism prediction scales for both male and female youth. However, the current scoring has a simplistic weighting approach and does not make model adjustments for recidivism offense types. After further testing and development we can now report numerous important findings across the different models, which are highlighted as follows:

Prescreen:

- Utilizing over 32,000 youth assessment and criminal history records from a ten-year period, we have been able to increase the predictive validity of the pre-screen tool.
- By separating males and females, and by crime type in the sample, we are able to increase the predictive performance of the tool, in some cases substantially. For example:

	Male		Female	
Model	Current Prescreen AUC	New Prescreen AUC	Current Prescreen AUC	New Prescreen AUC
Violent Felony	0.71	0.73	0.75	0.77
Property Felony	0.71	0.73	0.71	0.73
Drug Felony	0.65	0.73	0.69	0.75
General Felony	0.72	0.74	0.73	0.74

- General felony recidivism changes are also significant. For males the AUC for the new prescreen is .72, compared to .67 AUC under the current prescreen. For females, the new prescreen AUC is .70, compared to .67 AUC for the current prescreen tool.
- It is important to note that several items (questions) were found to not score in either the prescreen or the new full PACT models that were a part of the original tools. These items represent a potential reduction in the instrument size, and may create a small decrease in workload if new models are adopted.

Full PACT-based Risk Calculation:

An additional level of analysis included building specific felony models (as compared to general recidivism of felonies and misdemeanors) using items from the full PACT, broken down by gender. After creation of the models and completion of statistical analyses, we find that:

- The offense-specific models (e.g. felony drug, felony property) outperform the general recidivism models.
- By separating model development by gender and by crime type, we are able to increase the predictive performance of the PACT-based risk calculation, in some cases substantially. For example:

	Male		Female	
Model	**Current Model AUC**	**New Full PACT AUC**	**Current Model AUC**	**New Full PACT AUC**
Violent Felony	0.72	0.76	0.75	0.78
Property Felony	0.69	0.73	0.68	0.70
Drug Felony	0.66	0.74	0.63	0.77
General Felony	0.69	0.72	0.69	0.73

- The new full PACT models provide improved prediction strength, resulting in an average 4% improvement for males and an average 3% improvement for females.
- The AUC improvement was anticipated but not to the degree that was found in the results.
- Prediction of the specified felony models outperforms the general recidivism models by an average of 5.3 percent for males and 7.0 percent for females.
- It is recommended that youth outcomes be examined/ranked in terms of level of importance. Policies and uses of the PACT might then be revised and improved, to focus on those offenses of greatest concern to public safety and address the prevalence of needs seen among Juvenile Court clients.

Race and Ethnicity:

We specifically explored outcomes based on race/ethnicity for the PACT. The collective findings do not suggest that the PACT is perpetuating bias or creating disproportionate minority contact as a result of its scoring or categorization of risk. Furthermore, an examination of predictive strength indicates that the PACT possesses moderate strength of prediction for all youth across the racial and ethnic groups analyzed.

Recommendations:

We find that the current PACT provides a validated assessment of recidivism with a moderate strength (.67) of prediction. As was shown above, this prediction can be improved and contextual details added through the use of any one or combination of new modeling options created, including breaking out the tool by gender and/or offense type. By utilizing such models, juvenile courts can create a system in which high-risk violent offenders are given top priority, followed by high-risk property, high-risk drug, and finally moderate and low risk offenders. This hierarchical classification system (illustrated in Figure 1) is currently employed by the WADOC, and guides contact standards, as well as application of services and interventions. In addition, by utilizing gender specific modeling, assessment and case management efforts can improve gender responsivity for juvenile populations.

Figure 1. Hierarchical Risk Categories
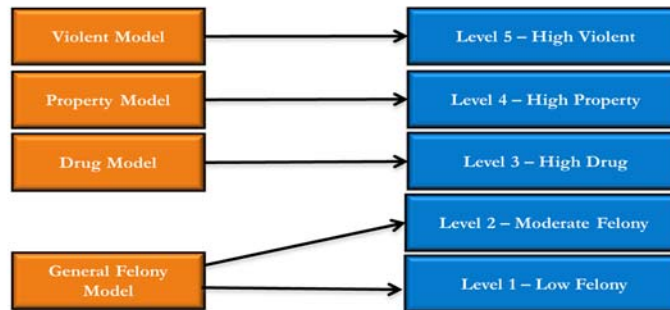
In summary, it is clear that the new models produce an increase in predictive accuracy over the original PACT scoring, but the amount of the increase varies by model type. It is important to note that several items were not found to score in the new full PACT models that were a part of the original full PACT. Should these items be removed, it may result in a reduction in the instrument size and shortened interview times for probation counselors. This is further discussed in the final recommendations.

PACT Validation and New Tool Creation

INTRODUCTION

Since the creation of the Washington State Juvenile Court Administrators' Juvenile Court Assessment, now offered as the Positive Achievement Change Tool (PACT), almost two decades ago by Dr. Robert Barnoski, the instrument has not undergone major or substantial re-weighting or on-going validation. Responding to a request from the Juvenile Court Administrators, and with support from the Washington State Center for Court Research, this research aims to analyze the current PACT database in order to incorporate and weight risk and need information to improve risk prediction, increase overall predictive validity of the PACT tool, and more accurately determine whether juveniles are suitable candidates for interventions. WSU researchers crafted the design for this study after careful review of the most recently available literature and findings on standardized juvenile risk/needs/responsivity tools, as well as recent success in updating and improving to predictive validity of the Iowa delinquency assessment (IDA) tool. In addition to the examination of the current predictive validity of the instrument, recommendations to improve the tool and next steps are put forward in the concluding section.

THE FUNCTION OF JUVENILE RISK/NEEDS ASSESSMENT

Historical Overview:

Andrews and Bonta's (2010) articulation of the risk, needs, responsivity model (RNR) is widely cited as the foundation for the emergence and evolution of actuarial-driven social risk classification in both adult and juvenile corrections. Andrews, Bonta and other scholars have guided the advancement of the RNR model, and accompanying risk/needs tools through rigorous scientific research (Andrews, Bonta, & Wormith, 2006). The field of juvenile justice continues to grow in the use of functional RNR tools and the application of evidence-based practices and programs. Under this new paradigm, the use of actuarial risk/needs assessments provides juvenile court practitioners with a means to individualize management strategies for offenders.

In response to passage of the 1997 Community Juvenile Accountability Act (CJAA), the Washington State Juvenile Court Administrators contracted with the Washington State Institute for Public Policy (WSIPP) to create a risk assessment tool in order to address the major requirements of the CJAA. According to the WA Juvenile Court Assessment Manual 2.1, the development and application of a statewide risk tool was intended to guide probation staff to:

- Determine the level of risk for re-offending posed by juvenile offenders so the courts may target more intensive efforts for higher-risk youth and not use scarce resources for lower-risk youth.
- Identify the targets of intervention to guide the rehabilitative effort. This includes a thorough assessment of risk factors that have been consistently linked to criminal behavior as well as protective and competency factors related to pro-social development.
- Develop a case management plan focused on intervention strategies that are linked to reductions in future criminal behavior by reducing risk factors and strengthening protective and competency factors.
- Monitor the youth's progress in reducing risk factors and increasing protective factors to learn whether the case management strategy is effective.
- Reduce paperwork through the use of computerized assessment and monitoring software.
- Provide juvenile court management with information on the progress made to reduce risk factors and increase protective factors by court programs and contracted service providers.

Juvenile Court Assessment Manual 2.1, pg 2

The development of the statewide Washington tool mirrored a larger movement that had been evolving over the previous two decades. Numerous relevant publications and existing actuarial tools guided the development of the Washington State Juvenile Court Assessment (WSJCA), including the Youth Level of Service Inventory and the Wisconsin Risk Scale. Working closely with the Washington State Institute for Public Policy and Assessments.com (software and implementation support), the WSJCA was launched in 1998. Due to association with the software package and provider, the WSJCA was also referred to as the Back on Track (BOT) juvenile assessment instrument.

As other states adopted the WSJCA/BOT tool, Assessments.com worked to improve the tool based on various validation studies by automating the criminal history function and building an integrated case management system (e.g. Baglivio, 2007). Based on these changes, the WSJCA/BOT is now known as the Positive Achievement Change Tool (PACT).

PACT Properties and Process:

There are two primary features that must be present in order for a risk/needs assessment tool to provide accurate results. First, the tool must exhibit *reliability*, and should produce the same outcomes or results for the same subject no matter who is administering the tool. Given that much of the motivation to create standardized risk/need tools was to move away from subjective assessment of youth offenders, it is important that proper training and quality assurance exist in order to ensure that the tools are properly scored and consistency exists across staff. Second, risk/need tools must provide levels of *validity*. In other words, is the tool accurately measuring juvenile offenders' risk of re-offense?

The information collected in standard risk/need tools varies slightly, but there is a core of common domains across all tools. The PACT is comprised of 12 domains, which were selected by WSIPP after a careful review of the juvenile assessment, delinquency and recidivism/desistence literature. Other existing actuarial tools were also assessed for guidance. The 12 domains, which incorporate measures of both risk and protective factors are:

1. Criminal History
2. Demographics
3. School
4. Use of Free Time
5. Employment
6. Relationships
7. Family
8. Alcohol and Drugs
9. Mental Health
10. Attitudes
11. Aggression
12. Social Skills

The number of questions in each domain varies, depending on the sensitivity or broadness of the concept being measured. Generally, multiple items exist in each domain to measure a concept, which has resulted in the PACT being a lengthier tool. The juvenile courts throughout Washington have been using essentially the same set of questions/domains in the PACT since the inception of the tool, and the weighting (scores assigned) of the questions has not varied.

The use of the PACT is an integral and standard practice across all of the juvenile courts in Washington State. In use since 1999, probation counselors receive 40 hours of initial training on the tool, motivational

interviewing techniques, scoring and case management at the Juvenile Corrections Personnel Academy. In addition, pervasive quality assurance measures also support adherence to the practice. Each court has a designated quality assurance specialist, who must demonstrate competence in conducting the assessment be videotaped and evaluated by the statewide coordinator or a state trainer. In addition, the Washington State Juvenile Court Administrators maintain a quality assurance committee assigned the responsibility of statewide quality assurance for the assessment and case management model.

As the creation and use of the PACT passes the 18-year mark, it is important to utilize the large dataset resulting from years of PACT administration to re-validate the tool and to understand the factors/variables most relevant and predictive. Such measures will allow for the juvenile courts in Washington to utilize a tool that has the greatest predictive validity, while also ensuring that only relevant and useful information is collected.

PROJECT METHODS

This project was focused on three main objectives. First, WSU researchers sought to examine and re-validate the PACT prescreen for Washington youth. Next, in an effort to improve the predictive performance of the tool, we created new PACT models by selecting and weighting predictive items for a variety of outcomes and populations, for both the prescreen and full PACT tool. The benefit of creating these different models is exploring model variations and specialized populations. Our final objective examined the potential utility of additional items provided via the full PACT assessment. The procedures, models and findings are explored in detail below.

The Current PACT

The current PACT is designed to consist of two tools that communicate with one another. The prescreen tool is designed to provide an assessment of risk. It is comprised of 27 multi-question items. The items are broken into criminal history and social history scores. The scores one can receive for criminal history range from 0-31 and from 0-18 for social history. These point values are summed to form a youth's continuous risk score, with larger values indicating greater risk of recidivism. Additional, non-scoring items are used to assist providers with case management concerns. Cut points are then provided separating youth into three risk areas – Low, Moderate, and High Risk. Guided by the principals of risk, needs and responsivity, efforts are made to divert youth that are low risk away from further system involvement, instead focusing on supervision, interventions and treatment of moderate and high-risk individuals. Those that score out as Moderate or High Risk receive the full PACT, which contains additional items to further examine a youth's needs and assist in case planning and intervention prioritization[1].

The scoring of each item that forms the continuous risk score in the prescreen has not been validated in over ten years, and a much larger data set now exists compared to the original database used for the validation study. In 2004, WSIPP completed an initial validation of the prescreen and full PACT assessment, and found that the accuracy of the tool was within the "moderate" range of predictive validity with an AUC of .64 (see discussion of AUC on page 14) for misdemeanor and felony recidivism. The objective of the 2004 validation was to provide an initial indication of the acceptability of the PACT's use, with the intention of providing a more thorough weighting and validation of the tool at a later date, or once a larger pool of data could be collected.

For this project, we utilize youths' scores to predict recidivism and assess the predictive validity of the PACT tool across a variety of dimensions. We further break out this prediction by males and females to assess gender responsivity and also assess race/ethnicity differences (see Appendix III). Items that are not currently

---

[1] It should be noted that while this screening process is common, regional and policy exceptions are made and some low risk youth are also provided the full PACT assessment.

scored as part of the prescreen or full PACT instruments will be tested to assess whether they can improve predictive accuracy.

New Tool Model Variations:

While updating the validation of the current prescreen PACT scoring is important for confirmation of the tool's predictive performance, the creation of different models is a vital step in the validation process, as it is important to know if a person has a higher propensity to commit a certain type of offense (e.g. property vs. violent offending). By "digging deeper" to create specific new models, scarce resources can be more strategically applied. Supervision levels, techniques and treatment/interventions can also become more targeted. The creation of these new models entailed the following steps:

1) *Outcomes*

The targeted outcome for this project was **reconvictions** for either felony or misdemeanor charges, which was defined as "any recidivism". More specified model variations were created and each outcome was modeled independently, selecting and weighing items separately to increase prediction strength for the outcome in question. A total of five outcomes were examined for multiple populations:

- o Felonies:
    - ▪ Violent
    - ▪ Property
    - ▪ Drug
    - ▪ General (i.e., any felony)
- o Any Recidivism

2) *Gender*

Gender is worthy of special attention based on prior research that indicates differences between females and males in the impact on recidivism of specific criminogenic needs. To create gender-specific predictions, we built two sets of models. Models for each of the five outcomes described were computed for both samples independently, selecting and weighting items separately.

3) *Tool variations*

As indicated, the PACT consists of a prescreen and the full assessment. Currently, only the prescreen tool is scored to assess a youth's risk level and these prescreen scores are relatively unstructured in the selection and weighting of items. That is, most items are provided a weight that represents the response value. For example, a youth with no prior felonies are scored "zero", those with one are scored "one", and those with two or more are scored "two". Some items make use of weights that are not single unit increases (i.e. 0, 2, & 4), but this weighting structure was created based on an "educated guess" of the instrument developers and is not scored based on an underling statistical model. We sought to explore potential adjustments to PACT scoring to improve predictive accuracy.

To make potential adjustments, "prescreen only" youth were separated from those who received the "full PACT". Models were then created for each sample of the nine outcomes and for all each gender's subsample and for both the prescreen and full PACT samples independently. Along with the validation of the current PACT scoring formulations, we present select models using prescreen and full PACT data, demonstrating improved predictive validity through alternative scoring schematics. Based on discussions with Subject Mater Experts (SMEs), we present risk assessment modeling variations for (any) Recidivism, as well as General (any) Felony, Violent Felony, Property Felony, and Drug Felony. Each of these five models is developed and validated separately for males and females in an effort to improve gender responsivity.

Analytic Plan

Our analysis began by establishing the prescreen score for all sampled youth. Again, these models use the original scoring outlined in the Washington State Juvenile Court Assessment Manual (Version 2.1, 2004). These computed continuous risk scores will form the bases of our examination and validation of the original PACT risk tool and its ability to predict recidivism events. Validation statistics (see description below) were completed for the sample on a variety of outcomes, grouped by gender and then again by race/ethnicity.

New Tool Creation Methods

We followed both the item selection and weighing procedures for the new PACT model variations that we used for similar models created and tested for the Washington State Department of Corrections (WADOC) (Hamilton et al., 2014). Other steps in this process included: 1) Analysis of the PACT items (variables/questions) to be included in the models were examined for current use and functionality; 2) Univariate descriptive statistics were completed and examined to remove or modify items likely to be non-responsive in a multivariate assessment; 3) We then conducted bivariate examinations of the items in order to determine reorganization and recoding, to improve item specificity. These procedures were completed in order to remove issues related to dysfunctional distribution properties of a given item. Hypothetically speaking, if the recidivism rate increased with one and then two weapons convictions, followed by a decrease for three, before increasing again for convictions five and six, this would be an example of a dysfunctional distribution and would require combining response categories or removing the item entirely.

Item Selection Criteria

A series of multiple binary logistic regression models were used to select and weight predictors. However, item selection procedures that are purely data driven can be problematic. That is, items may predict in an unanticipated direction, causing an illogical scoring schematic (Wainer, 1976). To adjust for this potential result, modified item selection procedures were constructed to identify highly predictive items, while eliminating those predicting in an illogical direction. First, each predictor item was initially examined for theoretical/logical directionality. Items in which a consensus of prior findings indicated a likely reduction in predicted recidivism were reverse coded to enable all measures to weight in a theoretically consistent (and positive) direction. All model predictors are described in Table 1.

We prevented the inclusion of illogically weighted items with a software solution. Using programming language available in the software package R, a selection procedure was created to prevent items possessing a negative logit value from being included. We think this is a novel solution for a common instrument development need – the prevention of illogical weighting. In addition, based on Steyerberg and colleagues (1999) discussion of "underfitting", items were selected based on model improvement identified via the Akaike Information Criterion (AIC), as removing predictors based on a more arbitrary threshold (p<.05) can lead to a loss of predictive performance and create multicollinearity issues. Using these two criteria – positive logit and AIC value improvement – item selection procedures were completed using a forward stepwise method and items which failed to reach the predefined criteria were removed.

Item Selection Procedures

Bootstrapping procedures were used first to select items and assess internal validation. For item selection, all items were included in a forward stepwise logistic regression model. Again, items were selected in each stepwise computation if they possessed a positive logit and improved the model AIC. The procedure was subsequently repeated on each of the 100 bootstrap samples. Items that met the two selection criteria in more than half (51%) of the bootstrap samples were retained. Readers should note that we selected PACT measures

from a large pool of potential items. For a full list of PACT items and responses refer to Washington State Juvenile Court Assessment Manual (Version 2.1, 2004).

As stepwise procedures are effective for identifying items that are predictive, some excluded items may provide additional face validity and, by their inclusion, would not diminish the prediction strength of the model overall. Therefore, excluded items identified to possess face validity, were manually added to the models. Models were then rerun with these additional items without the AIC improvement criterion. These additional items were included in the final models if they retained a positive logit, despite having a potentially low item weight.

Validation Procedures

The bootstrapping validation procedures for each model were completed using a staged process similar to those identified in prior studies (see Duwe, 2014, p.20; Harrell, Lee, & Mark, 1996; Steyerberg et al., 2001). First, 100 bootstrap samples were drawn, where eligible cases were selected, with replacement, until the bootstrap sample reaches the original sample size. Subjects selected were considered the "in boot" sample, while those not selected in each iteration became the "out of boot" sample. For our sampling procedure, the "in boot" subjects represent the construction sample while the "out of boot" subjects represent the validation sample for each bootstrap sample. The items selected for all "in boot" subjects were used to construct prediction models. These models were then assessed for predictive performance using "out of boot" samples. Model performance criteria were then computed on all five outcomes and across each gender (for a total of eight models). It should be noted that "out of boot" subjects were not sampled with replacement and only used once in a given validation sample iteration.

Model Comparisons

Through this PACT revalidation and weighting exercise, we aimed to achieve greater predictive performance of the tool by the selection of optimal instrument development methods. To examine the predictive performance improvement we compared the new models created to the original prescreen PACT scoring for the sampled youth. New models consisted of those comprised of PACT items available following the administration of the prescreen, which includes both items that currently score and those not currently included in risk prediction calculations. Another set of models was completed for the subsample of subjects that were administered a full PACT assessment, allowing for the inclusion of another set of additional items.

The AUC

To assess comparative model performance we provide one of the most accepted and common internal validation metric's – the Area Under the Curve (AUC) statistic. The AUC is preferred as it is not base rate sensitive, meaning that its assessment of performance is stable no matter what the rate of recidivism for the given population. This makes the statistic stable, comparable, and universally applicable. The AUC is a measure of discrimination, which is a model's ability to separate recidivists from non-recidivists, where larger risk scores are indicative of a greater likelihood of recidivism.

AUCs are calculated by using the youth's continuous risk score, calculated from a given model, to predict their observed recidivism events. Values range from 0.5, which is tantamount to flipping a coin or "betting the base rate" in an effort to predict recidivism, to a value of 1 (perfect prediction). Rice and Harris (2005) outlined the magnitude of AUC values, where values below 0.55 are considered "negligible or weak", those between 0.56 and 0.63 are considered "small", values between 0.64 and 0.71 are considered "moderate", and "strong" values are indicated at 0.72 or above. The stability of a model's predictive validity is considered to be contained within the "validation" sample AUC, which was described as the "out of boot" sample of our

study. For the sake of brevity, the validation AUC will be the only metric presented and compared for each model.

RESULTS

Descriptive Statistics

We first began by identifying items used in each model using the methods describe above. Items used in the current PACT prescreen were utilized and any additional items selected from to be included in the new prescreen models were identified and described. Additional items selected from the full PACT were also identified. Univariate statistics for prediction and outcome items of all models are presented in Appendix I, broken down by gender. Readers should note remaining items were selected from the full PACT utilized a smaller subsample (N=32,699), as the full PACT is most commonly administered only to youths screened as moderate or high risk for recidivism.

Prescreen Prediction Models

We next created prediction models using prescreen data. These models were cross-validated and then compared to the models that use the current PACT scoring. Stepwise multiple regression analyses results for the new models are displayed in Table 1. Standardized coefficient values are presented to allow readers to compare variables' relative prediction strength; where measures with stronger prediction strength are indicated with greater values.

Table 1. Standardized Regression Coefficients for Prescreen PACT Male Models Predicting Recidivism										
	Male					Female				
Domain/_Item_	Violent	Property	Drug	Felony	Any Recid	Violent	Property	Drug	Felony	Any Recid
Criminal History										
1. Age at first offense	3.24	3.48				2.92	1.89		3.13	
2. Misdemeanors	3.61	5.96	4.14	11.74	28.97	0.89	2.21	2.22	6.93	13.31
3. Felonies	5.47	18.86	7.14	30.30	12.26	3.89	7.71	5.76	13.45	6.31
4. Weapons (any)			1.54	5.29	0.99	0.93				0.65
5. Against-person misd.	3.41					1.63				2.25
6. Against-person felonies	5.72									
7. Sexual misconduct misd.†	0.19									
8. Felony sex offense referrals†										
9. Detention confinements	0.97	2.85		5.29	7.44	1.17	1.60			6.03
10. JRA confinements										
11. Escapes				1.97						
12. Failure-to-appear warrants	3.45	0.93	5.21	5.58	5.08	1.04	0.80	3.27		3.29
Social History										
1. Demographics										
a. Gender	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
b. Age at assessment†					11.43			3.80		0.86
2. School										
a. Current school enrollment			3.31		1.70			3.13	3.35		1.38
b. Current school conduct		3.59			0.57					2.28
c. Current school attendance								0.91		1.33
d. Current academic performance	3.67	1.87		7.67	7.66		2.26		5.22	1.10
3. Current friends										
a. History of anti-social friends†	5.36	2.06	1.84	6.40	8.45	1.23				1.66
b. Current friends spends time with	4.44	4.99	1.31	6.96	8.59		1.80		3.22	2.97

13

Table 1. Standardized Regression Coefficients for Prescreen PACT Male Models Predicting Recidivism (continued)

Domain/*Item*	Male					Female				
	Violent	Property	Drug	Felony	Any Recid	Violent	Property	Drug	Felony	Any Recid
4. Out home placements										
5. History of runaway/kicked out	4.09	10.61	3.19	6.86	7.50	2.86	4.70	0.56	5.40	3.58
6. Jail/Imprisonment history										
a. Family ever incarcerated (0-3+)†	3.53	4.81		5.54	8.56		1.47	0.96	2.53	6.07
7. Current parent control	1.80	4.78	0.31	4.62	6.64		1.93	0.65	6.89	3.83
8. Alcohol /Drug use										
b. History of drug use (yes/no)†			4.46					2.63		
d. Current drug use (yes/no)†	0.35	1.42	2.09	3.91	4.32	1.08	0.65	2.29	4.81	4.26
9. History of Abuse										
a. History of physical abuse										
b. History of sexual abuse										
10. Violence/Neglect History										
a. Witnessed violence†	1.31				0.87				0.01	1.50
b. History of neglect†	1.13					1.20				
11. History of mental health										
a. Mental health problem†									0.62	0.75
b. Intensive anger†	2.51			1.09	2.16	1.87				2.24
c. Thoughts†										
d. Trauma†										1.35
e. Complaints of intensive†										
12. Attitude/Behavior										
a. Law abiding attitude†	1.29	2.84		4.29	1.53		0.58		0.33	0.11
b. Accepts responsibility†						1.39				
c. Verbal aggression solves conflict†										1.26
d. Physical aggression solves conflict†	6.81	1.16		6.67	4.12	5.84	2.31		4.27	2.94
e. Report/Evidence of violence†	1.35	0.17			0.66	0.13	0.69		2.22	0.14
f. Reports of sexual aggression†										

† Denote items recorded in the prescreen but are not scored as part of the risk calculation (i.e. provide zero weight).

Item weighting to account for effect size

With regard to the created "Recidivism" models, we find that many (but not all) of the items currently used to score the PACT prescreen are identified to be predictive for males and females. Each item has varying strength of prediction. Based on this finding we anticipate that these new models should provide a more accurate prediction of recidivism, as compared to the current prescreen scoring, which does not factor in item strength based on statistical models and instead uses a combination of measurement equality and manual adjustments to scored items.

Additional "specified" outcomes

A more recent trend in risk assessment is to provide an understanding of offense specialization. That is, although some youth may be opportunistic in the types of offenses they commit, some are quite specialized. That is to say, those who have substance abuse issues are more likely to commit drug offenses than violent offenses, and those with aggressive tendencies are more likely to commit violent offenses that experience a reconviction for a property offense. To examine these effects we created separate models for three specific

and one general type of felony offending. Our results indicate that few items are common predictors for all models. Specifically, only prior felonies, prior misdemeanors, kicked out/run away, and current drug use were consistent predictors for all models. A far more common pattern was that selected items predict for one (or maybe a few) model(s) but not all. For example, many of the crimes against persons or aggression indicators predict well for violent felonies and many of the substance abuse related items predict well for drug felonies, but not vice versa. Furthermore, the strength of prediction of each item also varies from model-to-model. Again, we anticipated that these more specified models would provide a more accurate predication than the general and non-weighted "Recidivism" model currently used by the PACT. For case managers interested in specifying the type of outcome a youth possesses the most risk of committing, these models provide the additional contextual information that will likely be helpful in case planning.

Validation

To examine the predictive validity of the current prescreen and the new models, we provide the validation sample AUC values for each model. Large values indicate a stronger prediction for the given outcome. All model AUC values provide a moderate prediction strength (AUC>0.64) and many of the models provide a strong prediction strength (AUC>0.71). Validation findings are presented in Table 2.

The differences between recidivism models indicates that the new models provide improved prediction strength, resulting in a five percent improvement for males and a three percent improvement for females. This pattern holds for the specified outcome models as well, where new models provide better prediction strength as compared to the current PACT scoring. Another interesting finding to note is the lower prediction strength of the current prescreen as it pertains to drug felonies. Although there is a similar pattern for females, for males it appears that the current prescreen is more predictive for general recidivism than for drug felonies. This would suggest that a more specified outcome prediction model would be beneficial for the prediction of this type of youth offending.

Table 2. Internal Validity Model Findings				
	Male		Female	
Model	Current Prescreen AUC	New Prescreen AUC	Current Prescreen AUC	New Prescreen AUC
Violent Felony	0.71	0.73	0.75	0.77
Property Felony	0.71	0.73	0.71	0.73
Drug Felony	0.65	0.73	0.69	0.75
General Felony	0.72	0.74	0.73	0.74
Any Recidivism	0.67	0.72	0.67	0.70

Generally, we find that while the current prescreen provides substantial strength in prediction of recidivism, the new models created will improve prediction significantly and new models created for these specific outcomes all show improvement over the current prescreen scoring. Furthermore, the identification of more specified outcomes will expand a case manager's knowledge of the types of recidivism most likely to be committed by a particular youth.

Full PACT Prediction Models

Taking advantage of the wealth of data provided by the full PACT assessment, we repeated our modeling process. These additional models were completed to identify which items might further help the prediction of recidivism outcomes beyond what is currently collected and scored for the prescreen. The intended use of the full PACT in probation is to assist in cases management and treatment prioritization; therefore, readers should be aware that the sample is restricted to only those youth that received the full PACT, which common policy and process would suggest that the population used to create these models would be higher risk.

These models were cross-validated and then compared to the models that use the current prescreen PACT scoring. Stepwise multiple regression analyses results for the new models are displayed in Table 3. Again, standardized coefficient values are presented to allow readers to compare variables' relative prediction strength; where measures with stronger prediction strength are indicated with greater values.

Table 3. Standardized Regression Coefficients for Full PACT Male Models										
	Male					Female				
Domain/*Sub-Domain*/Item	Violent	Property	Drug	Felony	Any Recid	Violent	Property	Drug	Felony	Any Recid
1. Criminal History										
1. Age at first offense			1.54	1.48		1.62	1.89	0.64	2.19	0.75
2. Misdemeanors	3.02	4.93	0.95	4.63	14.73	2.46	2.46	0.61	3.14	7.14
3. Felonies	3.73	8.19	3.47	9.60	5.73	4.14	4.37	1.25	5.58	3.89
4. Weapons (any)		1.46	1.52	2.81	2.05				1.49	1.89
5. Against-person misdemeanors	2.20									2.30
6. Against-person felonies	0.80					1.15	1.29		2.01	4.00
9. Detention confinements	3.84	5.72	0.56	6.55	7.77	1.70	1.17	3.16	2.71	3.36
12. Failure-to-appear warrants	3.44	2.64	5.80	4.76	5.01					
2. Demographics						NA	NA	NA	NA	NA
1. Gender	NA	NA	NA	NA	NA			3.27		
2. Age at assessment†			2.86		2.64					
3. School										
3a. School History						1.30				
1. Special education	1.92			0.46		0.77	1.13	0.23	3.68	4.44
2. History of expulsions	4.73	5.13	1.78	6.22	8.68	2.01	1.40			
3. Age of first expulsion	1.33	2.88		1.31				0.38		
3b. Current School Status										
5. Comfortable teachers, staff, or coaches†		0.90	0.82	1.08				0.41		
6. Involved in school activities†					0.61	0.05				
7. Current school conduct		1.01	0.17	1.35				0.19		
8. Number of expulsions/suspensions†				0.34				0.39	1.81	
11. Likely graduate HS or equivalent†				4.24			2.97			0.98
4. Use of Free Time									1.09	
4a. Historic use of free time†										2.90
4b. Current use of free time										
2. Current interest in unstructured recreation†	1.20	0.46	1.36	1.32	1.14					
5. Employment						0.18		0.93		1.68
5a. Employment History										
1. History of employment†			1.94		1.95					
5b. Current Employment								0.96		
3. Positive relationship with current employer†		1.10	2.49	0.66						
6. Relationships										
6a. History of Relationships							0.15			
2. History of anti-social friends†	4.15	2.24		4.35	3.79				1.50	
6b. Current Relationships										
3. Current friends spends time with	4.06	2.51	0.24	4.39	5.58			1.23		
4. Current romantic relationship†		0.42			2.89	1.32	1.20			1.50
5. Currently admire/emulate anti-social peers†	1.94			2.40	0.57	1.31	0.54	1.19	1.74	2.52

Domain/*Sub-Domain*/Item	Male					Female				
	Violent	Property	Drug	Felony	Any Recid	Violent	Property	Drug	Felony	Any Recid
6. Current resistance to anti-social influence†		5.12	0.42	2.64	3.22					
7. Family										
7a.. Family History							0.98		0.23	
1. Out home placements†			0.69	0.63	4.68		2.34		2.68	
2. History of runaway/kicked out		2.91	2.20	2.29	1.49					1.90
3. History of petitions filed†		1.54			1.04	0.66	0.16	0.33	0.91	0.60
4. History of incarceration in house (3 mon) †		0.94		0.70	1.35					
7b. Current Living Arrangements									0.79	2.67
1. Persons youth living with†	2.47	4.05			1.00			1.39		1.04
2. Annual combined income of youth/family†		0.86	2.43	1.98	1.59			1.12		
3. Family incarcerated (0-3+)	0.95			2.43	1.51					0.91
9. Youth has run way or kicked out	1.30	2.97		3.56	1.32		0.28		0.43	
10. Youth has good relationship with family†		0.87		0.89			1.97		0.69	
11. Level of conflict with family†				3.85		1.24	0.35		1.26	1.89
13. Current parent control†	1.03	3.99	0.45	2.92	4.03					
14. Consistent punishment bad behavior†					0.35					
15. Consistent rewards good behavior†					0.27			1.11		
8.Alcohol and Drugs								1.20		
8a. Alcohol and Drug History										1.67
1. History of alcohol use (*yes/no*) †				0.13						
2. History of drug use (*yes/no*) †			0.99				0.55	0.83	0.69	1.03
3. History of referral to assessment†			0.64	1.52		2.13				
5. History of treatment participation†			0.79					1.33		
6. Youth using alcohol/drugs	1.61	3.11		2.49	4.49	0.46				0.55
8b. Current Alcohol and Drugs							1.81	1.92	2.56	
2. Current drug use (yes/no)		2.03	1.08	2.80		0.97		0.82	1.79	1.05
3a. Marijuana†	1.14	1.05	2.05	1.05	2.21					
3b. Amphetamines†			1.81							
3d. Heroin†		0.40	0.71				1.00		1.91	
4. Treatment program participation†			1.12				0.09			
9. Mental Health										
9a. Mental Health History										
2. History of physical abuse		0.17					1.60			
9b. Current Mental Health							0.86	0.81	1.89	2.99
Other items not in Red Book Full PACT									0.57	
a. Witnessed violence†				1.10						
b. Intensive anger†	0.87	0.96		0.46	1.16		2.51		2.26	1.93
c. Thoughts†							0.61	3.41	1.18	
d. Trauma†	1.36			0.01	0.10			0.91		
e. Complaints of intensive†			0.98			0.53	1.88		2.20	
10. Attitude/Behavior							0.69			

Table 3. Standardized Regression Coefficients for Full PACT Male Models (continued)

Domain/*Sub-Domain*/Item	Male					Female				
	Violent	Property	Drug	Felony	Any Recid	Violent	Property	Drug	Felony	Any Recid
2c. Crime purpose: Impulse†		3.44		2.94	3.48	1.10	0.78		1.79	
2e. Crime purpose: Material gain†		4.45	4.56	5.38						
3. Optimism†		0.76						0.41		
7. Respect for others property†				0.45		2.84			0.53	
10. Accepts responsibility†	0.35					1.62				
11. Aggression										
4. Physical aggression solves conflict†	2.26				0.99	0.99				
12. Skills								0.62		
1. Consequential thinking†		1.51		1.60				0.32		
2. Goal setting†		0.69								2.24
3. Problem solving†			0.60			0.13				
4. Situational perception†		0.49							0.22	1.41
8. Monitoring internal triggers†	0.63	0.54								
10. Controlling impulsive behavior†		0.60								
11. Control of aggression†	4.74			1.17	1.56					

Table 3. Standardized Regression Coefficients for Full PACT Male Models (continued)

† Denote items recorded in the full PACT but are not scored as part of the risk calculation (i.e. provide zero weight).

Item weighting and "Specified" Outcomes

As was the case in the previous prescreen analyses, we find that many (but not all) of the items currently used to score the prescreen are identified to be predictive for males and females in the full PACT. However, the list of items used to predict recidivism is expanded substantially and each item has varying strength of prediction. Based on this finding, we again anticipate that the new models (presented in Table 4) should provide a more accurate prediction of recidivism, as compared to the current prescreen. When examining the models generated for three specific and one general type of felony offending, our results indicate that few items are common predictors for all models. Specifically, only prior felonies, prior misdemeanors, failure-to-appear warrants, and history of expulsions were consistent predictors for all models. Again, a more common pattern was that selected items predict for one (or may be a few) and the strength of prediction of each item also varies from model to model.

Validation

To examine the predictive validity of the current prescreen and the new full PACT models, we provide the validation sample AUC values for each model. Validation findings are presented in Table 4. The differences between recidivism models indicates that the new full PACT models provide improved prediction strength, resulting in a 4% improvement for males and a 3% improvement for females. This pattern holds for the specified outcome models as well, where new full PACT models provide better prediction strength as compared to the current prescreen scoring. The prescreen models predicting drug felonies are again noteworthy, as the current scoring is indicated to decrease as compared to more general measures of felony recidivism. For both females and males it appears that the current prescreen is more predictive for general recidivism than for drug felonies.

Table 4. Internal Validity Model Findings (partial sample based on full PACT administrations)				
	Male		Female	
Model	Current Model AUC	New Full PACT AUC	Current Model AUC	New Full PACT AUC
Violent Felony	0.72	0.76	0.75	0.78

Table 4. Internal Validity Model Findings (partial sample based on full PACT administrations) (continued)				
	Male		Female	
Model	Current Model AUC	New Full PACT AUC	Current Model AUC	New Full PACT AUC
Property Felony	0.69	0.73	0.68	0.70
Drug Felony	0.66	0.74	0.63	0.77
General Felony	0.69	0.72	0.69	0.73
Recidivism	0.64	0.68	0.63	0.66

As anticipated, the new models, utilizing a larger pool of potential prediction items improve the prediction strength. As mentioned, these models were created with a subset of the larger population[2], those youth that completed a full PACT. Although the process and utility of these models and the specific items selected will be discussed below, the findings reveal that much can be gained by adding carefully selected, specified items and models in the prediction of risk using measures gathered during the full PACT assessment.

FINDINGS AND RECOMMENDATIONS

The current study sought to address three main objectives. First, we examined the current prescreen PACT instrument, examining the prediction validity and its current strength predicting youth recidivism. Findings based on the total sample of PACT prescreens reveal that for both males and females, the current PACT prescreen scoring is a valid prediction instrument for Washington State youth and possesses a moderate prediction strength (AUC=0.67).

Although the current prescreen instrument scoring is found to be valid and of reasonable strength, there is room for improvement. In particular, the scoring method created by Dr. Barnoski in 1998 was anticipated to be "temporary" and due to be updated after sufficient data could be collected for adequate testing. The tens of thousands of youth assessments collected during the intervening period and now available for use represented a more than adequate sample to examine an updated scoring schematic. Additionally, many advancements in risk assessment development have been explored since the initial implementation of the Washington State Juvenile Risk Assessment. Specifically, statistical methods have improved development, specified outcome modeling has improved prediction strength, and gender specific modeling has added context and accuracy of item selection.

Our second objective was to create new prescreen prediction models, in order to update and improve the current prescreen scoring. Using the entire pool of items collected during the prescreen assessment (those that currently score and those that do not), we selected and weighted items for Recidivism (misdemeanors and felonies), any Felony, Violent Felonies, Property Felonies, and Drug Felonies. These prediction models were computed for male and female samples separately for a total of 10 prediction models. Our findings revealed improved prediction strength across all newly created prescreen models. As compared to the current prescreen, these new models perform better when predicting any recidivism, recidivism for all felony types, and recidivism across genders. We recommend the Juvenile Courts explore the use of these models, perhaps supplanting the current prescreen scoring. The new models would require additional training but the benefits provided to case managers and youth recidivism prevention efforts will likely outweigh the initial update costs.

---

[2] Readers should note that the new full PACT models provide similar but somewhat reduced AUC values for "any recidivism", which is attributed to the restricted sample that is higher risk and possesses a greater propensity for felony offenses. These full PACT models are anticipated to preform equally, if not better, than the prescreen models, which is due to the increased number of items utilized in the full assessment, providing additional prediction points/scores and greater context of youth characteristics and attributes.

Our final objective examined the potential utility of additional items provided by the full PACT assessment. Currently utilized for case management and treatment prioritization, there exists a large pool of untapped items that can help improve prediction of youth risk. We added these items to our existing model creation framework and again attempted to create new, more predictive models of youth recidivism. To complete this objective, we again selected and weighted items for the 10 prediction models previously indicated. Compared to the current prescreen assessment we found the use of the additional full PACT items again improved prediction strength.

However, due to the common policy and use of the full PACT, i.e., evaluating intervention eligibility and needs of moderate and high risk youth, the sample is somewhat restricted as compared to the prescreen models created. As indicated in Table 5, there is a stark contrast between the risk levels of the prescreen and full PACT samples. Roughly half of the sample is not provided the full PACT and the proportion in the prescreen low risk youth is similar to the proportion of full PACT high risk youth for both males and females with a substantial increase in the proportion of moderate full PACT youth as well.

Table 5. Prescreen and Full Pact Risk Level Comparison				
	Male		Female	
Risk Level	Prescreen	Full PACT	Prescreen	Full PACT
High	29%	46%	27%	46%
Moderate	30%	37%	28%	37%
Low	41%	17%	45%	17%
Sample Size	50,818	24,481	19,380	8,218

Due to these sample variations, one cannot assume that all items and weights created with the full PACT assessment would possess the same prediction strength with future prescreen samples. Therefore, we provide two potential options for our full PACT model. First, it is reasonable to assume that newly created full PACT models would be equally and potentially more predictive with a full prescreen sample, which includes a greater proportion of lower risk youth. Therefore, the Juvenile Courts could replace the current prescreen scoring of risk with the potentially more accurate assessment using the models derived from the full PACT assessment.

An alternative option would be to keep the current prescreen operation, utilizing the newly created prescreen models to assess risk, followed by the administration of the full PACT to moderate and high risk youth. Using the new full PACT scoring, the assessment of risk may then be adjusted (updating the findings of the previously administered prescreen assessment). The result of this process may potentially alter the youth's level of risk based on this newly gathered information and provide a more accurate depiction of their level and primary type of recidivism.

Future Efforts

The present study identified that the current PACT scoring provides a validated assessment of recidivism with a moderate strength of prediction. This prediction can be improved and contextual details added through the use of any one or combination of new modeling options created. Derived, in part, from the successful categorization of the WADOC adult risk assessment, a hierarchical risk categorization will likely be an effective strategy for youth populations, as well. Specifically, the WADOC models are used to create a system in which high risk violent offenders are given top priority, followed by high risk property, high risk drug, and finally moderate and low risk offenders. This hierarchical classification system (illustrated in Figure 1) guides WADOC contact standards in the community. This system is thought to improve public safety by outlining the quality of risk. Furthermore, by providing gender specific modeling the assessment and case

management efforts that follow will improve gender responsivity, a concept not yet extended to juvenile justice populations.

Figure 1. Hierarchical Risk Categories
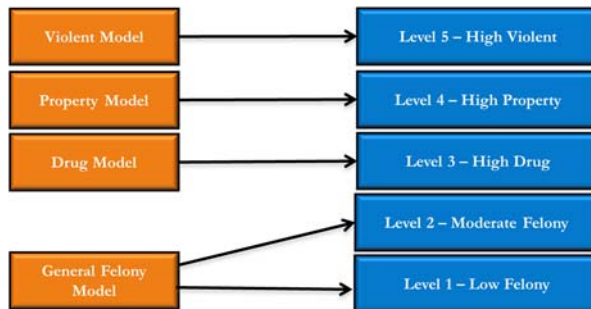
A second future effort is found within the still untapped resource contained within the PACT interventions data. Although guidelines direct probation staff to provide intervention resources, a more thorough examination of responsivity will increase the efficiency of rehabilitation programming. More specifically, an examination of the characteristics of youth for which particular programs were found to be most effective will improve match between youths and interventions. Further, this identification of effective specific populations for particular interventions may also provide a system-wide understating of programming needs; outlining the prevalence of needs for the population of juvenile offenders under probation supervision to be serviced, which may further be broken down by jurisdiction. This would mean that the menu of options available to jurisdictions could be brought into alignment with the local population of probation supervised juvenile offenders.

Finally, it is recommended that the Juvenile Courts explore the creation of a dynamic needs assessment. As described, the full PACT assessment is designed to assess programming needs. However, it is *not* a true "needs assessment". As indicated by the RNR principles, *needs* are assessment items that are dynamic, temporary, and amenable to interventions (Andrews & Bonta, 2010). Needs also must be defined as criminogenic, indicated by an empirical (i.e. statistical) relationship with recidivism. A needs assessment combines the effects of these items and provides scales that serve to identify treatment prioritization and act as intermediate outcomes for which youth may improve upon over the course of their supervision. The current use of the full PACT assessment does not currently follow these principles and may be improved through and examination of domains and scales that better address youth needs. Specifically, the PACT creates scores within each section, or domain, of the instrument (i.e. school, employment, relationships). These domain items and scores are then used independently to identify a youth's priority for interventions and services. While the independent domain scores have not yet been assessed for their ability to predict recidivism, additionally the domains consist of a mix of both static and dynamic items. These are problematic issues as the domain score should be composed of items that collectively predict recidivism and the domains that include static items remove the ability of the youth to reduce their score to zero (or low need) following the receipt of an intervention.

A dynamic needs assessment would be created to "organize" the full PACT into sub-scales or "domains". These domains would consist of only items that are dynamic, or changeable via interventions. These domains would be scored independently, identifying youth as high, moderate, or low need for a given domain. These domain rankings would outline prioritization of interventions and further screening. If, for example, a youth was identified as "high need" in the substance abuse domain, they would be prioritized for further screening and treatment. Domain scores may then be reassessed over time or following the provision of interventions. It would be assumed that domain scores would decrease over time and thus, act as

"intermediate outcomes" that serve to gage youths' progress during supervision. The WADOC is currently in the process of implementing a similar stand-alone needs tool as part of the STRONG assessment system. The Washington State PACT could also provide such a tool with simple software modifications and additional training. This additional tool will provide greater utility, stakeholder buy-in, and improved functionality.

REFERENCES

Andrews, D. A. and Bonta, J. (2010). The Psychology of Criminal Conduct. 5th edition. New Providence, NJ: Anderson Publishing Company.

Andrews, D.A., Bonta, J., and Wormith, J.S. (2006). The Recent Past and Near Future of Risk/Need Assessment. *Crime and Delinquency*, 52(1), 7-27.

Barnoski, R. (2004). Assessing risk for re-offense: Validating the Washington state juvenile court assessment. Olympia, WA: Washington State Institute for Public Policy.

Duwe, G. (2013). The development, validity, and reliability of the Minnesota screening tool assessing recidivism risk (MnSTARR). Criminal Justice Policy Review, 1-35. DOI: 10.1177/0887403413478821

Hamilton, Z., Kigerl, A., Campagna, M., Barnoski, R., Block, L., & Lee, S. (2014). The STRONG-R Recidivism Assessment - Final Report. Washington State Department of Corrections. Olympia, WA.

Harrell, F., Lee, K., & Mark, D. (1996). Multivariate Prognostic Models: Issues in Developing Models, Evaluating Assumptions and Adequacy, and Measuring and Reducing Errors. *Statistics in Medicine*, 15, 361-387.

Rice, M. & Harris, G. (2005). Comparing effect sizes in follow-up studies: ROC area, Cohen's d, and r. *Law and Human Behavior*, 29, 615-620

Schwalbe, C. S. (2007). Risk assessment for juvenile justice: A meta-analysis. *Law and Human Behavior*, 31, 449–462.

Steyerberg, E. W., Harrell, F. E., Borsboom, M. J. C., Vergouwe, J., & Habbema, D. F. (2001). Internal validation of predictive models: Efficiency of some procedures for logistic regression analysis. *Journal of Clinical Epidemiology*, 54, 774-781.

Washington State Institute for Public Policy. (2004). Assessing risk for re-offense: Validating the Washington State Juvenile Court assessment. Olympia,WA: Washington State Institute for Public Policy.

Appendix I. Descriptive Statistics (Means) of Prescreen and Full PACT by Gender

Domain/*Sub-Domain*/Item	Minimum – Maximum	Male Prescreen/Full Mean	Female Prescreen/Full Mean
1. Criminal History			
1. Age at first offense – CP	0 – 4	2.3/2.5	2.3/2.5
2. Misdemeanors – CP	0 – 3	0.7/0.1	0.7/1.0
3. Felonies – CP	0 – 6	1.3/1.6	0.7/1.0
4. Weapons (any) – CP	0 – 1	0.1/0.1	<0.1/<0.1
5. Against-person misdemeanors – CP	0 – 2	0.4/0.5	0.5/0.6
6. Against-person felonies – CP	0 – 4	0.3/0.4	0.2/0.2
9. Detention confinements – CP	0 – 3	0.8/1.3	0.7/1.2
10. JRA confinements – CP	0 – 4	0.1/0.2	0.1/0.1
11. Escapes – CP	0 – 2	<0.1/<0.1	<0.1/<0.1
12. Warrants – CP	0 – 2	0.3/0.4	0.3/0.5
2. Demographics			
1. Gender – CP	0 – 1	0.7/0.8	0.3/0.2
2. Age at assessment – NP	0 – 6	3.7/3.8	3.6/3.7
3. School			
3a. School History			
1. Special education	0 – 1	NA/0.4	NA /0.3
2. History of expulsions	0 – 5	NA /2.7	NA /2.1
3. Age of first expulsion	0 – 4	NA /2.7	NA /2.2
4. Enrolled in a community school	-1 – 2	NA /-0.2	NA /-0.2
3b. Current School Status			
1. Current school enrollment – CP	-1 – 2	-0.4/-0.2	-0.5/-0.2
4. School encouraging environment	0 – 3	NA /1.3	NA /1.2
5. Comfortable teachers, staff, or coaches	-2 – 0	NA /-0.6	NA /-0.6
6. Involved in school activities	-1 – 3	NA /1.5	NA /1.5
7. Current school conduct – CP	-2 - 4	0.9/1.3	0.7/1.1
8. Number of expulsions/suspensions	0 – 4	NA /2.0	NA /1.1
9. Current school attendance – CP	0 – 4	1.8/2.0	1.8/2.1
10. Current academic performance – CP	-2 – 3	0.9/1.2	0.8/1.2
11. Likely graduate HS or equivalent	0 – 3	NA /1.2	NA /1.2
4. Use of Free Time			
4a. Historic use of free time			
1. History of structured recreation	-2 – 0	NA /-1.0	NA /-0.9
4b. Current use of free time			
1. Current interest in structured recreation	-1 – 0	NA /-0.3	NA /-0.2
2. Current interest in unstructured recreation	-1 – 0	NA /-0.6	NA /-0.5
5. Employment			
5a. Employment History			
1. History of employment	-1 – 0	NA /-0.4	NA /-0.4
2. History of successful employment	-2 – 0	NA /-1.7	NA /-1.6
3. History of problems while employed	0 – 1	NA /<0.1	NA /0.1
4. Positive relationship with past employer	-2 – 0	NA /-0.3	NA /-0.3
5b. Current Employment			
2. Current interest in employment	-4 – 0	NA /-2.4	NA /-2.5
3. Positive relationship with current employer	-2 – 0	NA /-0.2	NA /-0.2
6. Relationships			
6a. History of Relationships			
1. History of non-family adult relationship	-2 – 0	NA /-0.8	NA /0.8
2. History of anti-social friends – NP	-1 – 2	0.2/0.3	0.1/0.3
6b. Current Relationships			
2. Current pro-social ties	-3 – 0	NA /-0.7	NA /-0.8
3. Current friends spends time with – CP	-1 – 2	0.1/0.4	0.1/0.3

Domain/*Sub-Domain*/Item	Minimum – Maximum	Male Prescreen/Full Mean	Female Prescreen/Full Mean
4. Current romantic relationship	0 – 2	NA /0.3	NA /0.3
5. Currently admire/emulate anti-social peers	0 – 2	NA /0.9	NA /0.9
6. Current resistance to anti-social influence	0 – 3	NA /1.4	NA /1.4
7. Family			
7a.. Family History			
1. Out home placements – CP	0 – 1	0.4/0.2	0.4/0.3
2. History of runaway/kicked out	0 – 2	NA /0.7	NA /1.2
3. History of petitions filed	0 – 2	NA /0.2	NA /0.3
4. History of incarceration in house (3 mon) – CP	0 – 1	0.3/0.4	0.3/0.4
5. Youth living under adult supervision	0 – 3	NA /0.8	NA /0.1
7b. Current Living Arrangements			
1. Persons youth living with	-3 – 3	NA /-0.5	NA /-0.3
2. Annual combined income of youth/family	-1 – 3	NA /0.9	NA /1.0
3. Family currently incarcerated (0-3+)	0 – 2	NA /0.5	NA /0.6
5. Problem history with siblings	0 – 2	NA /0.1	NA /0.2
6. Support network for family	-2 – 0	NA /-1.0	NA /-0.9
9. Youth has run way or kicked out – CP	0 – 2	0.5/0.7	0.9/1.2
10. Youth has good relationship with family	-3 – 0	NA /-1.0	NA /-0.8
11. Level of conflict with family	0 – 3	NA /0.9	NA /1.2
13. Current parent control – CP	0 – 3	0.7/1.0	0.9/1.1
14. Consistent punishment bad behavior	0 – 3	NA /1.3	NA /1.5
15. Consistent rewards good behavior	0 – 3	NA /0.8	NA /0.9
8.Alcohol and Drugs			
8a. Alcohol and Drug History			
1. History of alcohol use *(yes/no)*	-1 – 6	NA /0.8	NA /1.1
2. History of drug use (yes/no) – NP	0 – 1	0.7/0.8	0.7/0.8
3. History of referral to assessment	0 – 3	NA /0.9	NA /0.9
4. History of education classes for problem	0 – 3	NA /0.6	NA /0.7
5. History of treatment participation	0 – 2	NA /0.3	NA /0.3
6. Youth using alcohol/drugs	0 – 1	NA /0.7	NA /0.7
8b. Current Alcohol and Drugs			
1. Current alcohol use (yes/no) – CP	0 – 1	0.3/0.4	0.3/0.4
2. Current drug use (yes/no) – CP	0 – 1	0.4/0.5	0.4/0.5
3a. Marijuana	0 – 1	NA /0.5	NA /2.9
3b. Amphetamines	0 – 1	NA /0.1	NA /0.5
3c. Cocaine/crack	0 – 1	NA /0.1	NA /0.1
3d. Heroin	0 – 1	NA /<0.1	NA /0.1
3e. Other drugs (all others not listed above)	0 – 1	NA /0.1	NA /0.1
4. Treatment program participation	-2 – 1	NA /-0.9	NA /-0.9
9. Mental Health			
9a. Mental Health History			
2. History of physical abuse – CP	0 – 2	0.2/0.2	0.2/0.3
3. History of sexual abuse – CP	0 – 1	0.1/0.1	0.2/0.3
4. History of neglect – CP	0 – 1	0.2/0.2	0.2/0.3
5. History of ADD/ADHD	0 – 2	NA /0.4	NA /0.2
6. Mental health problem history – CP	0 – 1	0.2/0.2	0.3/0.3
8. Current mental health status	0 – 1	NA /0.2	NA /0.3
9b. Current Mental Health			
5. Mental health problem interferes work			

Appendix I. Descriptive Statistics (Means) of Prescreen and Full PACT by Gender (continued)			
Domain/*Sub-Domain*/Item	Minimum – Maximum	**Male** Prescreen/Full Mean	**Female** Prescreen/Full Mean
Other items not in Red Book Full PACT			
a. Witnessed violence – NP	0 – 1	0.2/0.1	0.2/0.1
b. Intensive anger – NP	0 – 1	<0.1/<0.1	<0.1/<0.1
c. Thoughts – NP	0 – 1	<0.1/<0.1	<0.1/<0.1
d. Trauma – NP	0 – 1	0.1/<0.1	0.1/0.1
e. Complaints of intensive – NP	0 – 1	0.1/<0.1	0.1/0.1
10. Attitude/Behavior			
2c. Crime purpose: Impulse	0 – 1	NA /0.2	NA /0.2
2d. Crime purpose: Sexual desire	0 – 1	NA /0.1	NA /<0.1
2e. Crime purpose: Material gain	0 – 1	NA /0.2	NA /0.2
3. Optimism	-2 – 2	NA /-0.4	NA /-0.5
4. Impulsive	-1 – 2	NA /0.6	NA /0.5
6. Empathy/Remorse for criminal behavior	-1 – 1	NA /0.1	NA /0.1
7. Respect for others property	0 – 2	NA /0.8	NA /0.7
9. Law abiding attitude – NP	0 – 3	0.9/1.0	0.9/1.1
10. Accepts responsibility – NP	0 – 3	0.7/0.8	0.7/0.8
11. Youth's belief in supervision success	-1 – 1	NA /-0.5	NA /-0.5
11. Aggression			
1. Tolerance for frustration			
3. Verbal aggression solves conflict – NP	0 – 2	0.2/0.9	0.9/1.1
4. Physical aggression solves conflict – NP	0 – 3	1.2/1.4	1.1/1.4
5. Report/Evidence of violence – NP	0 – 2	0.5/0.7	0.5/0.7
12. Skills			
1. Consequential thinking	-1 – 2	NA /0.8	NA /0.8
2. Goal setting	-1 – 2	NA /0.5	NA /0.4
3. Problem solving	-2 – 1	NA /0.0	NA /-0.1
4. Situational perception	-2 – 1	NA /-0.1	NA /-0.1
5. Dealing with others	-2 – 1	NA /-0.1	NA /-0.2
6. Dealing with difficult situations	-1 – 2	NA /0.8	NA /0.8
7. Dealing with feelings/emotions	-1 – 2	NA /0.9	NA /0.9
8. Monitoring internal triggers	-1 – 1	NA /0.4	NA /0.4
10. Controlling impulsive behavior	-2 – 1	NA /0.4	NA /0.4
11. Control of aggression	-2 – 2	NA /0.1	NA /0.2
Prescreen/Full PACT Outcomes			
Violent Felony	0 – 1	0.04/0.08	0.01/0.02
Property Felony	0 – 1	0.08/0.14	0.03/0.06
Drug Felony	0 – 1	0.02/0.04	0.01/0.02
Felony	0 – 1	0.14/0.22	0.06/0.09
Recidivism	0 – 1	0.41/0.48	0.27/0.33

Note - Items that are only used to score the current version of the Prescreen are indicted with a "CP". Additional items selected for the new Prescreen models are indicated with a "NP".

Appendix II. Additional Model Comparisons

Full PACT Model Comparison Findings

Again, it is clear that the new models produce an increase in predictive accuracy over the original PACT scoring. However, the amount of the increase varies by model type. It is important to note that several items were not found to score in the new full PACT models that were a part of the original full PACT. These items represent a potential reduction in the instrument size and are outlined in the table below.

Items listed in the Full PACT that do not score in the new models

Domain/Item Number	**Domain**/Item Description
1.	***Criminal History***
11.	Escapes
3b.	***Current School Status***
2.	Type of school
3.	Youth believes there is a value in education
4a.	***Historic use of free time***
2.	History of unstructured pro-social recreational activities
4b.	***Current use of free time***
3.	Current interest and involvement in unstructured recreational activities
5b.	***Current Employment***
1.	Understanding of what is required to maintain a job
4.	Current positive personal relationship with employer
6b.	***Current Relationships***
1.	Current positive assault non-family relationship not connected to school or employment
7b.	***Current Living Arrangements***
4.	Problem history of parents who are involved with the household
7.	Family willingness to help
8.	Family provides opportunities for youth to participate in family activities and decisions
12.	Parental supervision
16.	Parental characterization of youth's anti-social behavior
8b.	***Current Alcohol and Drugs***
1.	Alcohol use
9a.	***Mental Health History***
1.	History of suicide ideation
7.	Health insurance
4.	History of neglect
9b.	***Current Mental Health***
1.	Current suicide ideation
2.	Currently diagnosed with ADD/ADHD
3.	Mental health treatment currently prescribed, excluding ADD/ADHD treatment
4.	Mental health medication currently prescribed, excluding ADD/ADHD medication
10.	***Attitude/Behavior***
1.	Primary emotion when committing last crime(s) within the last 6 months
2a.	Primary crime purpose: Anger
2b.	Primary crime purpose: Revenge
2c.	Primary crime purpose: Excitement
2d.	Primary crime purpose: Status/Acceptance
5.	Belief in control over anti-social behavior
8	Respect for authority
11.	***Aggression***
2.	Hostile interpretation of actions and intentions of others in a common non-confrontational setting
6.	Reports of sexual aggression
12.	***Skills***
9.	Monitoring of external triggers (events or situations) that can lead to trouble

In addition, it is important to note that several items are collected via the prescreen but are found to be predictive in the new prescreen models and could potentially be used to score youth risk in the future. These measures are presented in the table below.

Table18. Items listed in the Prescreen (but not scored) that now score in the new models

Domain/Item Number	Item Description
0.	Age at assessment
Friends/Companions	
3a.	History of anti-social friends
Jail/Imprisonment history of household	
6a.	Family ever incarcerated (0-3+)
Alcohol and Drugs	
8b.	History of drug use (yes/no)
8c.	Current alcohol use
Mental Health History	
1	Mental health problem
2.	Intensive anger
3.	Thoughts
4.	Trauma
5.	Complaints of intensive
Attitude/Behavior	
1.	Law abiding attitude
2	Accepts responsibility
3.	Verbal aggression solves conflict
4.	Physical aggression solves conflict
5.	Report/Evidence of violence
6.	Reports of sexual aggression

Felony versus General Recidivism Types

Having four additional felony models to predict various types of youth risk provides specificity not currently offered in the PACT models. Identifying the amount of improvement required additional testing of model outcomes. We examined the incremental predictive performance of the more specific felony prediction models with those of the general recidivism (felonies and misdemeanors). This examination was completed by forcing the newly created Recidivism model to predict a specified felony outcome type.

Differences in discriminate performance of Felony versus General Outcome Models

Differences in Felony over General Predicted Performance Full PACT Male AUC			
Model	**Felony**	**General**	**Difference**
Violent	0.76	0.71	-5
Property	0.73	0.67	-6
Drug	0.74	0.68	-6
Any	0.72	0.68	-4
Mean	**0.74**	**0.69**	**-5.3**
Model	**Felony**	**General**	**Difference**
Violent	0.78	0.73	-5

Differences in Felony over General Predicted Performance Full PACT Male AUC (continued)			
Property	0.70	0.64	-6
Drug	0.77	0.67	-10
Any	0.73	0.66	-7
Mean	**0.75**	**0.68**	**-7.0**

We find the specified outcomes (listed in the Felony) column, to outperform the General Recidivism models. The AUC improvement was anticipated but not the degree indicated. Specifically, the prediction performance of the specified felony models outperform the general models by an average of 5.3 percent for males and 7.0 percent for females. This is substantial and significant, demonstrating the incremental improvement in prediction and contextual knowledge gained. As is currently the case for adults supervised by the WADOC, it is recommended that youth outcomes be examined/ranked in terms of level of importance. Policies and uses of the PACT might then be improved, focusing on those offenses of greatest concern to public safety and addressing the prevalence of needs demonstrated by JCA clients.

Appendix III. Race/Ethnicity Analyses

Although the PACT does not utilize race/ethnicity as a predictor of recidivism, due to notable disproportionate minority contact with the system, there is concern that risk assessments that score dynamic (social) items will further perpetuate disproportionalities within the system. That is, some worry that a greater proportion of minority youth will be identified as high risk based on cultural differences, creating an undue burden that is unrelated to recidivism. Because concerns of race/ethnicity are focused on the appropriate use of select items, we relegate our examination to on the current Prescreen tool and its scores with regard to the overall Prescreen Total Score, Criminal History Score, and Social Score. Race and gender break-downs are provided for each analysis. Statistical tests were also performed to examine the magnitude of race/ethnicity differences. Readers should note that due to our large sample sizes, statistical magnitude (or effect size) was the preferred metric. Specifically, the correlation coefficient "r" was used as an effect size metric for all comparisons; where values less than 0.1 are considered negligible; effects greater than 0.1 are "small"; effects greater than 0.3 are moderate; and effects greater than 0.5 are considered large.

We first examined univariate descriptive statistics of race/ethnicity categories by gender. As anticipated, roughly two-thirds of the sample were White, 11 percent Black, 12-15 percent Hispanic, 4-7 percent Native American/Pacific Islander, and roughly three percent were collapsed into the category "other" (which included youth of Asian descent).

Univariate Race/Ethnicity Descriptives by Gender

Model	Male %	Female %
White	66.8	67.0
Black	10.9	11.2
Hispanic	14.9	12.2
Native American/Pacific Islander	4.4	6.8
Other	3.1	2.8

When examining differences among racial categories we first compared continuous risk scores. The Total Score is computed by summing the Criminal History and Social scores. We examine each of these scores separately. The overall sample average for the Total Score was 12.4; where Black and Native American/Pacific Islander youth possessed slightly elevated[3] means and youth categorized as "Other" possessed indicate lower scores on average. The difference among races/ethnicities demonstrated only a small effect (r=0.13). With regard to the Criminal History Score, only Black youth were observed to have a slightly elevated score (7.4) as compared to the overall sample mean (6.1), which again was observed to provide only a small effect size (r=0.13) when examining differences across racial/ethnic categories. For Social Scale scores only youth identified as Native American/Pacific Islander were found to have a slightly elevated mean scores (7.1) as compared to the overall mean Social Score (6.1), and the comparison of means was identified as a negligible (or less than small) effect size (r=0.09).

We also examined risk categories, identifying the percentage of subjects from each racial/ethnic category that scored above/below a given risk cut point. Similar to the findings of the continuous scores, as "Other" youth were more often classified as "Low" risk while Black and Native American/Pacific Islander youth were more frequently classified as "High" risk. However, a multinomial examination of category differences revealed only a small effect size difference among risk categories (r=0.11).

---

[3] Given that our focus is on the magnitude of the effect, rather than statistical significance, elevated/reduced is considered to be a mean difference of greater than [1] and a percentage difference greater than [4%] in the Low or High risk categories. Although a somewhat rough/arbitrary criteria of difference, statistical significance is more commonly observed at these levels when sample sizes are within more common ranges for observation studies (i.e. N~500-1,000).

When examining female youth, similar patterns were identified. With regard to the Total Score, youth classified as "Other" indicated a reduced mean (4.3) as compared to the overall mean (5.4) and the racial comparison was found to be a negligible effect size (r=0.09). Similar to the findings of male youth, Black females were found to possess an elevated Criminal History score mean (6.4), while Native American/Pacific Islander youth possessed an elevated Social Score mean (7.0). The race/ethnicity differences for the criminal score were again found to only provide a small effect (r=0.13) and the differences among Social Scale score means were found to be negligible (r=0.09). With regard to risk categories, youth categorized as "Other" were found to score out as low risk more frequently, while female Black and Native American/Pacific Islander youth scored as high risk with greater frequency. The magnitude for these differences met the criteria for a small effect size (r=0.1).

Bivariate Descriptives of Risk by Race/Ethnicity and Gender

Male							
Model	White	Black	Hispanic	Native American/ Pacific Islander	Other	**Overall**	**r**
Mean Total Score	12.0	*14.2*	12.8	*13.4*	11.8	**12.4**	**0.13**
Mean Criminal History Score	5.8	*7.4*	6.4	6.5	6.1	**6.1**	**0.13**
Mean Social Score	6.0	6.7	6.2	*7.1*	5.4	**6.1**	**0.09**
Risk Category							**0.11**
Low	44.8	31.1	40.6	34.4	*47.1*	**42.3**	
Moderate	29.3	32.2	29.3	29.0	31.4	**29.7**	
High	25.9	*36.7*	30.1	*36.6*	21.5	**28.0**	
Female							
Mean Total Score	5.2	5.7	5.2	5.6	*4.3*	**5.4**	**0.09**
Mean Criminal History Score	5.1	*6.4*	5.6	5.9	5.4	**5.4**	**0.13**
Mean Social Score	5.9	6.1	5.6	*7.0*	5.0	**5.9**	**0.09**
Risk Category							**0.10**
Low	48.1	38.7	48.1	36.4	*50.8*	**46.3**	
Moderate	27.1	30.6	28.0	27.6	29.9	**27.7**	
High	24.8	*30.7*	23.9	*36.0*	19.3	**26.0**	

Next we examined the observed rates of recidivism (misdemeanor or felony) by race/ethnicity, broken down by gender. This examination was completed to identify if variations in racial/ethnic proportions classified in to low, moderate, and high risk categories was reflective in the observed recidivism patterns of sampled youth. For male youth, recidivism findings are reflective of risk category scoring for Black and Native American/Pacific Islander youth, were an elevated proportion in the high risk category were identified to recidivate (49.0 & 53.2%, respectively); however, male youth classified as "Other" did not possess a reduced level of recidivism in the low risk youth. Overall the difference in male recidivism were expectedly small (r=0.13).

For females, inconsistency was observed. As expected high-risk youth classified as Native American/Pacific Islander indicated an elevated proportion recidivating (50.8%). However, high risk Black females *were not* observed to recidivate at elevated levels and low risk female Hispanic and "Other" youth *were* observed to recidivate at elevated levels. Despite some unanticipated findings for females, overall, proportionate variations in risk did not reach the criteria for a small effect (r=0.09).

Observed Recidivism by Race/Ethnicity and Gender

Male							
Model	White	Black	Hispanic	Native American/ Pacific Islander	Other	**Overall**	**r**
Risk Category							**0.13**
Low	29.0	18.3	28.6	19.6	27.5	**25.8**	

Observed Recidivism by Race/Ethnicity and Gender (continued)							
Male							
Model	White	Black	Hispanic	Native American/ Pacific Islander	Other	**Overall**	**r**
Moderate	31.5	32.6	29.9	27.3	38.4	**30.9**	
High	39.5	*49.0*	41.5	*53.2*	34.1	**43.3**	
Female							
Risk Category							0.09
Low	27.9	21.5	*31.6*	22.0	*34.3*	**26.3**	
Moderate	31.5	32.3	31.5	27.2	36.1	**31.1**	
High	40.6	46.1	36.9	*50.8*	29.6	**42.6**	

Finally, we examined the prescreen continuous Total Score's ability to predict recidivism. These tests were completed to describe the strength of PACT scoring in predicting recidivism. We examined each racial/ethnic category separately and values presented were again broken-down by gender. Overall, a moderate prediction strength was observed for the PACT (AUC=0.67) for both males and females. With regard to racial categories, only slight variations were observed. For males, AUC values ranged a total of three percent, with prediction strength being lowest for White and Hispanic youth (ACU = 0.66) and greatest for youth classified as "Other" (AUC=0.69). For females, AUCs ranged a total of five percent, with prediction strength being lowest for "Other" youth (ACU = 0.64) and greatest for Black youth (AUC=0.69). Generally, with all scores identified as possessing "moderate" prediction strength (AUC>0.63), observed racial/ethnic variations are negligible as models appear to provide a relatively consistent strength of prediction across race and gender categories.

Current Prescreen Score Predicted Performance by Race and Gender

Model	White	Black	Hispanic	Native American/ Pacific Islander	Other	**Overall**
Male AUC	0.66	0.67	0.66	0.68	0.69	**0.67**
Female AUC	0.68	0.69	0.66	0.66	0.64	**0.67**

Summary of Race/Ethnicity Analyses

Disproportionate minority contact is a key concern for the juvenile justice system and risk assessment developers. While prior criminal history is an objective and relatively non-contentious method of assessing risk, the use of the PACT's dynamic Social Scale scoring has the potential to inflate disproportionate minority contact. That is, if items contained within the Social Scale represent proxies for cultural differences among races/ethnicities, and are unrelated to recidivism, there is a potential for bias.

Our results show that differences among racial/ethnic categories are small-to-negligible. With that said, some patterns were identified. Among the Criminal History Scale scores Black youth tend to score higher on average and on Social Scales averages tend to be higher for Native American/Pacific Islander youth. As anticipated, these two race/ethnic categories were also found to have greater proportions of youth classified as High Risk. On average, these two categories also possessed greater rates of recidivism. A comprehensive understanding of these comparisons reveals that while the PACT does not identify risk categories equally among races/ethnicities, those races/ethnicities categories with a greater proportion of youth categorized as high risk are also found to have a greater proportion of recidivism committed by those high-risk youth.

While these findings do not, in any way, suggest that our culture or juvenile justice system is devoid of bias, the collective findings presented here also do not suggest that the PACT is perpetuating bias or disproportionate minority contact as a result of its scoring or categorization of risk. Furthermore, an

examination of predictive strength suggests a lackluster pattern with regard to racial/ethnic distinctions and indicate that the PACT possesses moderate strength of prediction for all youth. With this being said, these results pertain only to our Washington State sample and may not be applicable to other jurisdictions.