Validity and Reliability of the Florida PACT Risk and Needs Assessment Instrument: A Three-Phase Evaluation (2012)

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FLORIDA DEPARTMENT OF JUVENILE JUSTICE

POSITIVE ACHIEVEMENT CHANGE TOOL (PACT)

Validity and Reliability of the Florida PACT Risk and Needs Assessment Instrument: A Three-Phase Evaluation

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Validity and Reliability of the Florida PACT Risk and Needs Assessment Instrument: A Three-Phase Evaluation

Contract P2085

February 2012

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TABLE OF CONTENTS

TABLES AND FIGURES

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EXECUTIVE SUMMARY

The Florida Department of Juvenile Justice (Department) began efforts in 2005 to develop a comprehensive, evidence-based system of assessing the risks and needs of youth referred to the juvenile justice system. A system change of this magnitude was not easily accomplished and required strong collaboration within the Department, as well as with juvenile justice stakeholders and community partners. The Department followed a long-range plan for developing and implementing its new risk and needs assessment instrument referred to as the Positive Achievement Change Tool (PACT). This process included pilot testing of the assessment and a Pre-Validation Study to norm the instrument to Florida's delinquency population and examine its initial validity in predicting offender risk to re-offend.

The current evaluation examined the validity and reliability of the PACT in three phases: Phase I assessed the validity of the PACT risk and needs assessment in accurately predicting recidivism; Phase II involved confirmatory and exploratory factor analyses of all PACT assessment data to assess the utility and parsimony of PACT scoring; and Phase III examined consistency in PACT scoring through assessment of inter-rater reliability. The Justice Research Center (JRC) performed the analyses reported here under contract (Contract P2085) with the Department following a competitive procurement process.

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Florida's PACT risk and needs assessment is a valid predictor of recidivism for system-involved youth.

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Phase I – PACT Validation

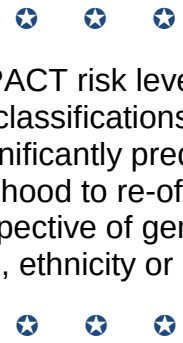
The purpose of the Phase I study was to evaluate whether the PACT effectively identifies risk-level subgroups within the Florida juvenile offender population that are predictive of subsequent rates of re-offending. Using bivariate and multivariate analyses, the study assessed the validity of the PACT instrument for the overall juvenile offender population, as well as subsamples based on gender, race, ethnicity, age, and supervision placement. The study sample was comprised of 80,192 PACT assessments for youth released between FY 2007-08 and FY 2008-09. The findings revealed:

- The PACT overall risk to re-offend level, criminal history score, and social history score were all significant predictors of recidivism for the general delinquency population in Florida, as well as subsamples based on gender, race and ethnicity.

- Youth classified in the higher PACT risk levels were significantly more likely to be re-arrested than those classified in the lower risk levels on the assessment. This trend was consistent for males and females, whites and non-whites, Hispanics and non-Hispanics, and across all four age categories. The findings support the conclusion that the PACT is a gender-neutral and race-neutral risk and needs assessment instrument.

- The predictive validity of the PACT was further assessed using Area Under the Curve (AUC) statistics. AUC scores for the models examining re-arrest ranged from .614 for females to .632 for the non-white sample. The full sample and male-only sample produced AUC scores of .632 and .630, respectively. The AUC results established further support for the gender and race neutrality of the PACT assessment.

- Analyses revealed that the PACT overall risk to re-offend level was significantly, positively related to recidivism for youth released from each supervision placement type, spanning the continuum of care from diversion services through to residential commitment.



- For each supervision placement type – diversion, probation, residential commitment, and post-commitment services – the PACT criminal history and social history scores remained significant predictors of re-arrest and re-conviction, after controlling for race, gender and age at release. Social history scores were more predictive than criminal history scores for diversion and probation releases, while criminal history scores were more predictive for youth released from residential and post-commitment services. The PACT social history score was not a significant predictor of recidivism for youth released from the specific placement type of day treatment and minimum risk services.

- Examination of the relative influence of individual PACT indicators found that the strongest predictor for the full sample of releases was gender, followed by race, prior adjudicated misdemeanors, jail imprisonment history of current household members, and school enrollment, conduct, performance and attendance.

Phase II – PACT Factor Analysis

The purpose of the Phase II study was to examine the criminal history and social history scales using factor analysis to assess whether the individual questions currently used in the construction of the PACT domains represent distinct constructs or measures. Confirmatory factor analysis was used initially to assess the PACT domains, followed by exploratory factor analysis to evaluate whether other factors or domains included in the PACT assessment might be considered for inclusion in the scoring of the criminal history and social history scores, as well as the overall level of risk to re-offend. The findings revealed:

- The questions on the PACT assessment used to compute the criminal history score were found to have strong internal consistency (alpha = 0.706), signaling that the score is in fact measuring a distinct risk construct or concept representing prior delinquency involvement.

- Confirmatory factor analysis of the criminal history score questions suggested four factors or groups of offenders with differing clusters of risk: a) low-level misdemeanants, b) more serious delinquents involved in felony offending, c) "deep-end" youth with histories of escape, detention and commitment, and d) youth referred for weapons offenses. The four factors accounted for 64% of the variance among the measures in the criminal history scale.

- The underlying questions that comprise the PACT social history score were found to have less internal consistency than those used to compute the criminal history score (alpha = 0.541), reflecting greater diversity in the concepts being measured by the scale.

- Confirmatory factor analysis of the social history scale produced three factors, suggesting the following distinct groups of youth involved in the juvenile justice system: a) defiant youth with multiple problems in multiple settings—school, home, peer relationships, and/or drug or alcohol abuse; b) girls with mental health issues who have experienced abuse and/or have run away from home; and c) youth with histories of neglect or abuse, and out-of-home child welfare placements. The three factors accounted for 45% of the variance among the measures encompassing the social history score scale.

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The items combined to produce the PACT criminal history score exhibited greater internal consistency than those comprising the social history score.

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- Analysis examined whether the inclusion of other factors or domains could be included in the calculation of the PACT social history score to increase the predictive power of the scale. Notably, the factors that "best" fit the model were those considered *pro-social,* rather than indicators of risk. The following pro-social constructs were identified through factor analysis:

Factor 1	Demonstrates pro-social thinking
Factor 2	No problems with drugs
Factor 3	No history of school suspensions or expulsions
Factor 4	Involvement in structured/unstructured activities
Factor 5	No household members with incarceration history
Factor 6	Strong support network
Factor 7	Strong family environment
Factor 8	Close relationship to father
Factor 9	Higher socioeconomic bracket
Factor 10	Not easily influenced by peers

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An alternative social history score method produced a stronger relationship to recidivism than current scoring, suggesting that the inclusion of PACT pro-social items may achieve greater predictive power than scoring based predominately on anti-social risk.

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- Exploratory factor analysis was used to develop an alternative social history score incorporating pro-social protective factors with score weights proportional to their correlation with recidivism. The alternative social history score resulted in a stronger relationship to re-arrest than the current score, more than doubling the overall correlation to recidivism (from r = 0.106 to r = 0.227).

- The alternative social history score was combined with the current criminal history score to produce an alternative overall risk to re-offend score and classification method. The alternative method produced greater variation between the risk level extremes (low to high risk).

- The alternative PACT score classification resulted in slight improvement in predictive accuracy over current scoring, suggesting greater predictive power in examining pro-social aspects of the PACT, as opposed to focusing predominately on anti-social risk.

Phase III – PACT Inter-Rater Reliability

The purpose of the Phase III study was to examine the extent of inter-rater agreement in administering the PACT assessment. A random sample of staff raters viewed two videotaped PACT interviews involving a female youth (Grace) and a male youth (Andrew), and subsequently completed a community PACT full-assessment for each youth. The PACT maintains consistency in scoring of the criminal history items and social history indicator of a youth's gender by interfacing with JJIS to auto-populate these fields. The reliability study assessed rater agreement on the remaining ten social history items currently used in scoring the PACT. Staff ratings were additionally compared to assessments of both case study youth completed by a Department-designated master rater. The findings revealed:

Staff raters agreed with the scoring of a master rater on nine of the ten PACT indicators examined in the study.

- Examination of the social history indicators used in scoring the PACT revealed strong agreement among raters (greater than 90% agreement) in assessing the youths' history of physical or sexual abuse, history of neglect, and history of mental health problems.

- The majority of staff raters agreed with the scoring of the master rater on nine out of the ten social history indicators for both Andrew and Grace.

- The percentage of agreement among staff raters on Andrew's PACT assessment was strong (90% and higher) for the following five social history indicators: history of child welfare out-of-home placements, history of running away or being kicked out of the home, history of physical or sexual abuse, history of neglect, and history of mental health problems.

- For the following three social history indicators, staff rater scoring of Andrew was somewhat more divergent than it was for the other seven indicators examined: school performance (52% highest agreement), current friends (63% highest agreement), and parental authority (62% highest agreement). In part, this may be reflective of the fact that these PACT social history items contain three or more categories, increasing the likelihood that subtle differences in question responses will result in different scores.

- Staff raters exhibited less consistency in scoring Grace than in scoring Andrew. Raters were somewhat split on their score in assessing Grace on four of the social history indicators: history of out-of-home placements, history of running away, parental authority and control, and current alcohol/drug use.

- Review of the videotaped PACT interview with Grace, as well as examination of individual rater responses, revealed areas that warrant future examination. In particular, it appears that there may have been confusion over the definition of 'running away.' Current PACT instructions indicate that a youth is considered to have a history of running away if, over the previous six month period, they left their home and failed to voluntarily return within 24 hours. The results suggested that raters may have considered additional factors in scoring this item, including whether the parent or guardian consented to the youth leaving the home and/or whether the youth's whereabouts were known to the parent or guardian.

- Inter-rater agreement was lower in scoring the parental authority/control indicator than it was with other PACT items for both Grace and Andrew. It is not clear in the current instructions how raters should handle instances in which a parent fails to set or enforce rules in the first place. Consistency in scoring may be enhanced through PACT instructions that address this ambiguity and more specifically define the response elements of 'obeying rules' and 'being hostile.'

RECOMMENDATIONS

A number of recommendations regarding PACT implementation, enhancement, and future evaluation are discussed in detail in the reports from each of the three study phases. A summary of these recommendations includes the following:

- The Phase I study findings indicating a reduction in the predictive accuracy of the PACT with youth disposed to day treatment and minimum risk services warrants further examination. Future research may explore characteristics of this offender population, as well as consider potential system-based factors and programming elements. For example, analysis may determine whether supervision effects exist whereby youth in day treatment programs have an increased likelihood of receiving non-law violations of probation than similar youth who receive other dispositions.

- The PACT criminal history and social history scores were not significant predictors of re-arrest for youth disposed to maximum risk residential commitment. Future evaluation could explore and/or confirm possible explanations for this finding. It was hypothesized that this may have been an artifact of a low sample size and instrument implementation, as many of the youth committed to maximum risk programs during the study time period had been incarcerated prior to statewide administration of the PACT. Successive samples of youth receiving a community PACT assessment and disposed to maximum risk

commitment could be examined to see whether criminal history and social history scores are predictive of future offending for these youth, and if not, explore possible explanations for the lowered predictive validity of the PACT in these cases.

- Monitoring the quality of data entry, including automated processes which populate the PACT assessment, as well as the programming used to generate scoring, should be ongoing, as it is a critical component to an effective, maintenance system.

- Future research on the inter-rater reliability of the PACT could examine the effects of staff interviewing styles, characteristics, and attitudes on the consistency in scoring.

- Training for staff responsible for administering PACT assessments should be ongoing and include clear instructions from the Department and the PACT developer for defining the elements of the items being answered and scored on the instrument. Training should underscore the importance of the time periods referenced in certain PACT questions, particularly given that a single response can result in a higher calculated risk level.

- Consistency in PACT administration should be routinely monitored, as a system that is accurate yet applied unreliably, is one that introduces disparity in decision making. Given that the PACT relies upon motivational interviewing techniques, future research on the inter-rater reliability of the instrument could examine the influence of rater interview styles on assessment scoring, to determine whether differences during the interview process result in scoring variations for the same youth.

- Finally, as the population changes, it is appropriate to periodically revalidate the assessment model, including the measures within it, to maintain and improve predictive accuracy. One of the more cost-effective ways to do this would be to evaluate the static risk indicators in the PACT. Further studies could explore existing criminal history and recidivism data to build a more current model of risk to recidivate in order to maximize the predictive power, especially the Receiver Operator Characteristic, of the trait or static risk aspect of the instrument. Further analysis could also examine if indeed the pro-social indicators measured by the PACT are better predictors than those related to anti-social risk at estimating the state or dynamic factors associated with recidivism.

PACT

VALIDATION-GENERAL REPORT

PHASE I STUDY

INTRODUCTION

The current evaluation represents Phase I of the Positive Achievement Change Tool (PACT) Validation Study. The primary focus of this initial phase was to assess the validity of the PACT risk and needs assessment instrument as an effective measure of juvenile risk to reoffend and as an accurate predictor of recidivism. The Justice Research Center (JRC) performed the analyses reported here under a competitively awarded subcontract (Contract P2085) with the Florida Department of Juvenile Justice (FDJJ). Phase II of the evaluation presents results from the factor analysis component of the study, while Phase III examines findings from the assessment of inter-rater reliability in the administration of the PACT in Florida's juvenile justice system.

Florida Statutes set forth that FDJJ shall develop an intake and case management system that assigns "… a relative risk to the child and the community….to classify the child's risk as it relates to placement and supervision alternatives" (Fla. Stat. § 985.14 (3)(b), 2010). To this end, as part of the Department's What Works Initiative in 2005, the FDJJ Office of Probation and Community Corrections (PCC) developed the PACT risk and needs assessment instrument in collaboration with Allvest Information Services, Inc. (Assessments.com). The PACT was based in large part upon the Washington State Juvenile Court Assessment (WSJCA), *Back on Track!* (Washington State Institute for Public Policy, 2004). The WSJCA was similarly designed to meet legislative requirements and to address the following needs of the state:

1) To determine youth risk to reoffend to effectively target resources for higher-risk youth;
2) To identify individual risk and protective factors to inform rehabilitative efforts to address youth's assessment profiles;
3) To develop a case management system aimed at reducing risk factors and increasing protective factors; and
4) To allow managers to determine if targeted factors change as a result of interventions (Washington State Institute for Public Policy, 2004).

The Positive Achievement Change Tool (PACT)

Findings from hundreds of studies and meta-analyses of criminal justice services have documented that high-quality interventions that effectively reduce offender recidivism have common features (Andrews & Bonta, 2006; Gendreau, Goggin, &. Paparozzi, 1996; Gendreau, Little, & Goggin, 1996; Simourd & Andrews, 1994). The Crime and Justice Institute (2009) consolidated these factors into eight evidence-based principles for effective interventions which include:

1. Assess actuarial risk and needs
2. Enhance intrinsic motivation for change
3. Target interventions
   - Risk Principle: Prioritize supervision and treatment resources for higher risk offenders
   - Need Principle: Target interventions toward criminogenic needs
   - Responsivity Principle: Be responsive to temperament, learning style, motivation, culture, and gender in assigning programs
   - Dosage: Structure 40-70% of high-risk offenders' time for 3-9 months
   - Treatment Principle: Integrate treatment into the full sentence/sanction requirements
4. Skill train with directed practice (use cognitive behavioral treatment methods)
5. Increase positive reinforcement
6. Engage ongoing support in natural communities
7. Measure relevant processes/practices
8. Provide measurement feedback (Crime and Justice Institute, 2009).

In 2005, seeking to address these principles and be responsive to legislative directives, FDJJ began developing a system of ongoing offender risk screening, triage, risk and needs assessment, and case management planning. A major component of this system was the creation of the PACT

risk and needs assessment which was designed to assess juvenile offenders' risks, needs, and protective factors as outlined in the "What Works" literature (Andrews & Bonta, 2006). The PACT consists of a pre-screen assessment and a full assessment. These instruments were created collaboratively by Assessments.com and FDJJ through federal funding from the U.S. Department of Justice, Office of Juvenile Justice and Delinquency Prevention (OJJDP). The grant was awarded by the Florida State Advisory Group (SAG), the committee responsible for managing Juvenile Justice and Delinquency Prevention funding at the state level. In compliance with the Juvenile Justice and Delinquency Prevention Act of 2002, the SAG provides guidance to the Department in the development and review of the FDJJ Juvenile Justice and Delinquency Prevention Plan. Members are representative of a myriad of systems involved in the care of at-risk and delinquent youth. Adapting the PACT from the WSJCA instrument, Florida customized its risk and needs assessment to reflect terminology used in Florida and added items related to mental health, depression, and suicide.

As the PACT was systematically rolled out across the state from 2005 to 2006, staff was trained to administer the pre-screen and full instruments. To date over 2,700 juvenile probation officers and juvenile assessment center (JAC) screeners have received the two-day PACT training. The training includes risk assessment theory, case planning, and instruction in the techniques of motivational interviewing (Miller & Rollnick, 2002).

The pre-screen PACT is a 46-item, multiple choice initial assessment instrument. The PACT full assessment is a 126-item, in-depth multiple choice assessment. Both instruments produce a criminal history score and social history risk score upon which risk level classifications are based. These scores are the same regardless of the instrument used, as the same questions on the pre-screen and full assessment are used in scoring. The criminal history score is based solely on measures of prior criminal offending, juvenile justice supervision and placement, escapes and warrants for failure to appear before the court. Scores range from a low of zero to a high of 31 points. The social history score examines individual and situational factors including the youth's

sex, current school involvement, peers, dependency placements, familial criminal justice system involvement, parental supervision, alcohol and drug use, abuse and neglect, and mental health problems. A social history score of zero is indicative of low risk in terms of environmental factors that may influence the likelihood for future criminal offending. The maximum social history score a youth can receive is eighteen. The total criminal history score and social history score are factored together following the matrix depicted in Table 1 to calculate a youth's overall risk to re-offend and corresponding risk level classification.

Table 1. PACT Scoring Matrix

Criminal History Score	Social History Score		
	0 to 5	6 to 9	10 to 18
0 to 5	Low	Low	Moderate
6 to 8	Low	Moderate	Moderate-high
9 to 11	Moderate	Moderate-high	High
12 to 31	Moderate-high	High	High

The PACT pre-screen and full assessments are designed as semi-structured interview protocols that use Motivational Interviewing techniques and measure both static and dynamic risk factors. The pre-screen takes approximately 25 minutes to complete, while the full assessment requires approximately 45 minutes. Both instruments are auto-populated with client information from FDJJ's Juvenile Justice Information System (JJIS), including demographic and prior criminal history data. The automation of the youth's prior criminal history not only increases the accuracy of PACT calculations, but affords the interviewer more time to gather information on the youth's attitudes and behaviors.

The PACT pre-screen and full assessment identify not only the areas or *domains* in which the juvenile is most at risk, but also capture information on youths' strengths or protective factors. On the pre-screen, risk and protective factors in the following four domains are assessed: criminal history, social history, mental health and attitudes/behaviors. The full assessment instrument measures a youth's risk and protective factors in the following 12 domains: criminal history, school,

use of free time, employment, relationships, family, living arrangements, alcohol and drugs, mental health, attitudes/behaviors, aggression, and skills. Not all information contained in the domains is used in the scoring of offender risk to re-offend. The PACT was designed to not only collect risk factor information, but also to assess offender needs for use in appropriately targeting treatment interventions. While a given item on the PACT assessment may not be used in risk level scoring, it nonetheless may be integral to identifying factors related to the youth's responsivity and protective factors, which in turn drive comprehensive case planning.

The PACT pre-screen is administered to all youth referred for delinquency at one of the state's Juvenile Assessment Centers, detention centers, or police booking units. With automated scoring, the pre-screen identifies a risk level for each youth assessed. Low-risk youth are generally recommended for diversion or other community-based programs. Moderate-risk youth are typically directed to intervention services. Youth who score moderate-high and high-risk on the pre-screen are administered the full assessment. This assessment is administered by successfully trained Department juvenile probation officers, or Department-contracted provider staff, and completed in consultation with the youth. This fosters a collaborative relationship between staff and youth. The PACT pre-screen and full assessment may be administered by non-clinical staff in juvenile intake, diversion, probation, detention, residential commitment, and aftercare settings provided they have received the requisite instructional training on risk assessment theory, case planning and techniques of motivational interviewing.

The full assessment provides information for designing the Youth Empowered Success (YES) Plan which is specific to the adolescent's identified needs and includes a supervision placement recommendation, e.g., probation supervision, day treatment, residential commitment. The YES Plan was developed by FDJ and Assessments.com, in collaboration with Justice System Assessment and Training (J-SAT). The plan ranks criminogenic needs, as well as suggests various treatment methods for addressing the most pressing risk factors. The goal of the YES Plan is to increase offenders' intrinsic motivation to replace anti-social behaviors, attitudes, and/or

associates with pro-social actions, cognitions, and peers. The PACT assessment provides information on both the individual youth and comparative aggregate levels. Routine reassessments inform the JPO and other juvenile justice professionals of the youth's progress toward addressing his or her criminogenic risk factors.

In 2006, following the pilot implementation of the PACT assessment in Florida's Hillsborough and Pinellas counties, FDJJ contracted with the JRC to conduct a pre-validation study of the instrument (Justice Research Center, 2006). The initial review was limited in scope. Implementation had not fully progressed, nor were data available to allow for a comprehensive assessment of both the PACT criminal history score and social history score. The evaluation relied on data extracted from FDJJ's Screening Risk and Classification Instrument (SRCI) to test the validity of derived PACT criminal history scores and corresponding risk levels in predicting recidivism. Varying risk level classifications were evaluated at the time to norm PACT categorizations to the specific population of Florida juvenile offenders. Key findings from the study included:

- Using an initial classification scheme in which scores of zero to seven were categorized as low risk, and scores of eight to 31 were rated moderate risk, the PACT criminal history score effectively predicted subsequent adjudications/convictions.[1] More than half of the youth classified as moderate risk to re-offend ultimately recidivated, while only 17% of the low risk youth re-offended.

[1] Recidivism was defined as a subsequent juvenile adjudication within 18 months and/or a subsequent adult conviction within six months.

[2] AUC scores are a function of the receiver operator characteristics curve (ROC) which graphically depicts the trade-off between the false positive rate and the false negative rate. The larger the AUC score the better the assessment classification of offenders relative to predicted recidivism. An AUC of 1.0 represents the ideal test with 100% sensitivity and 100% specificity; whereas a score of 0.5 signifies that the assessment is no better than the random flip of a coin (Simon, 2008). Reported AUC scores for various risk assessment instruments have generally ranged between 0.41 and 0.79 (Baglivio, 2009).

[3] The post-hoc Bonferonni test adjusts for the increased likelihood that one or more test will be significant due to chance (Type I error) as more tests are conducted.

[4] The PACT is additionally comprised of other measures that are not calculated into the criminal history and

- Risk level was significantly correlated with various types of re-offending including subsequent violent, felony, misdemeanor, and felony/misdemeanor re-conviction. Correlation coefficients ranged from a low of .25 for misdemeanor offending to a high of .46 for re-adjudication or conviction for a felony.

- Area under the curve (AUC) scores[2] ranged from 0.65 for misdemeanor re-offending to 0.85 for subsequent violent offenses, reflecting fairly good predictive accuracy of the PACT criminal history score.

Various cut-off scores for risk level designations were examined (two, three, and four risk levels), and in each instance risk to re-offend, as measured by the available PACT indicator data, was significantly positively associated with recidivism. Given the lack of social history data, the pre-validation study highlighted the need for further evaluation after full implementation of the instrument.

Five years later, the fourth-generation PACT assessment has been fully operational for four years and sufficient data are available to revisit the question of whether the PACT accurately predicts risk of failure among juvenile offenders in Florida. In that time, Dr. Michael Baglivio, with the Florida Department of Juvenile Justice, completed the first comprehensive validation study of the PACT in 2007 for his doctoral dissertation (Baglivio, 2009). The study sample consisted of 8,132 PACT assessments administered between November 2005 and February 2007, and examined whether the instrument accurately predicted subsequent juvenile referrals within 12 months post-assessment for those youth who remained in the community following the initial assessment. Baglivio found that the PACT effectively predicted both male and female delinquency

[2] AUC scores are a function of the receiver operator characteristics curve (ROC) which graphically depicts the trade-off between the false positive rate and the false negative rate. The larger the AUC score the better the assessment classification of offenders relative to predicted recidivism. An AUC of 1.0 represents the ideal test with 100% sensitivity and 100% specificity; whereas a score of 0.5 signifies that the assessment is no better than the random flip of a coin (Simon, 2008). Reported AUC scores for various risk assessment instruments have generally ranged between 0.41 and 0.79 (Baglivio, 2009).

(AUC scores of 0.59 for the full sample, male only sample and female only sample). While calculated criminal history scores, social history scores, and risk levels on the PACT were significantly correlated with re-referral for all youth, additional factors relevant to the prediction of female offending were not identical to those of male youth. Race, a history of running away, and fewer relationships with pro-social adults other than teachers or employers were predictive of female delinquency. Being non-white, drug use problems, anti-social peers, inadequate or inconsistent parental supervision, and a history of school suspensions and expulsions were significant predictors of male delinquency.

The current validation study examined PACT assessments of all youth released from FDJJ services in fiscal years 2007-08 and 2008-09 for whom a pre-screen or full PACT was available. The analysis included univariate, bivariate and multivariate analyses to assess the validity of the instrument for the general population of juvenile offenders, as well as to test the applicability of the PACT relative to sex, race, ethnicity, and age, while controlling for service placement (e.g., diversion, probation, commitment). A sound risk and needs assessment instrument should accurately classify youth regardless of demographic differences. Furthermore, when attempting to assess the predictive validity of an instrument, Flores, Travis & Latessa (2003) point out that analyses should "incorporate controls for agency efforts to provide service between the initial classification assessment and ultimate case disposition" (p.10).

METHODS

A thorough examination of the efficacy of any risk and needs assessment instrument should include a review of not only its predictive accuracy, but also its utility, parsimony, and reliability or consistency in measuring offenders' likelihood to recidivate. While an instrument may effectively classify cases relative to risk, results may not be fully utilized in case planning or treatment, limiting the utility of the instrument. Likewise, assessment administration may be overly cumbersome, inefficient or fail to adequately account for the unique characteristics of the population of youth with

whom the instrument is being used. Juvenile justice professionals must also be consistent in administration of the instrument. Deviation from administration protocols can produce unreliable risk assessments, ultimately jeopardizing the validity of the instrument. The empirical findings reported here focus only on the validity or predictive accuracy of the PACT as it is implemented and scored in Florida's juvenile justice system. Subsequent phases of the study incorporate additional analysis of the reliability, utility, and parsimony of the PACT.

The primary research question for the first phase of the validation study was:

Does the PACT effectively identify risk-level subgroups within the Florida juvenile justice offender population that are predictive of subsequent rates of re-offending?

A number of operational decisions had to be made in examining the research question. Given the focus on the predictive accuracy of the PACT, analysis centered on the specific items used to generate a youth's criminal history score, social history score, and risk level classification. As noted previously, a number of domains and questions on the PACT are not used in the scoring of the instrument. These items may be useful in refining the PACT to more effectively and parsimoniously assess offender risks and needs. However, given that they are not currently used in scoring, they are not considered here in this initial phase of validation and instead are examined in subsequent phases of the study. Individual criminal history and social history indicators were coded to match scoring protocols in effect at the time of administration.

At the outset of the validation process, the JRC was provided PACT scoring manuals and documentation from the Department. Initial application of the scoring methodology resulted in discrepancies between social history scores generated by the PACT and those manually calculated during the data verification process. The JRC contacted the instrument developers and was provided with the most recent scoring manual. The updated manual alleviated some of the discrepancies. Yet, a few remain and as such operational definitions were made to uniformly measure PACT constructs. Additional investigation is warranted to determine the cause of any

scoring discrepancies. The JRC will collaborate with the Department to expand or revise any such definitions and corresponding analyses as FDJJ deems appropriate.

Operational Definitions

The JRC has adhered to FDJJ's operational definitions and calculations of recidivism as set forth in FDJJ's annual *Common Definitions Report*. Specifically, the Department defines official recidivism as any subsequent offense that results in an adjudication, including adjudication withheld, or adult conviction within one year of completion and release from a program. Similar to other validation studies of risk and needs assessments, subsequent re-arrest or re-referral for a juvenile or adult crime occurring within 12 months of release was also included as an outcome measure. Table 2 sets forth the operationalized definitions of the independent variables used in the study.

Table 2. PACT Analysis Variables

Variable	Values	Attributes
Criminal history indicator		
Age at first offense	1 to 5	Over 16 years (1), 16 years (2), 15 years (3), 13 to 14 years (4), Under 13 years (5)
Adjudicated misdemeanors	1 to 4	None or one (1), two (2), three or four (3), five or more misdemeanors (4)
Adjudicated felonies	1 to 4	None (1), one (2), two (3), three or more felonies (4)
Adjudicated weapons offenses	1 to 2	None (1), one or more weapons offenses (2)
Adjudicated against-person misdemeanors	1 to 3	None (1), one (2), two or more against-person misdemeanors (3)
Adjudicated against-person felonies	1 to 3	None (1), one or two (2) three ore more against-person felonies (3)
Secure detention placements	1 to 4	None (1), one (2), two (3), three or more secure detention placements (4)
Commitment placements	1 to 3	None (1), one (2) two more commitment placements (3)
Adjudicated escapes	1 to 3	None (1), one (2) two or more escapes (3)
Failure to appear warrants	1 to 3	None (1), one (2), two or more warrants (3)
Social history indicator		
Sex	1 to 2	Female (1), male (2)
School enrollment/conduct/attendance/ performance	1 to 3	Graduated or enrolled without major problems in conduct, attendance or performance (1); problems reported by teachers, calls to parents, some full-day unexcused absences, or mostly Cs and Ds, with some Fs (2); calls to police, habitual truant, some Ds and mostly Fs, dropped out, expelled or suspended (3)
Current peers	1 to 4	Has pro-social friends and no anti-social friends (1), has no friends or both pro-social and anti-social friends (2), has all anti-social friends (3), is a gang member/associate (4)
History of out-of-home placements	1 to 2	No history of out-of-home or emergency foster shelter care placements exceeding 30 days (1), one or more out-of-home placements (2)

Table 2. PACT Analysis Variables (continued)

Variable	Values	Attributes
History of running away	1 to 3	No history of running away or being kicked out of home (1), one instance of running away or being kicked out of home (2), two or more instances of running away or being kicked out of home (3)
Jail/imprisonment history of current household	1 to 2	No jail/imprisonment history for siblings, mother or father currently living in the household (1); mother, father, and/or siblings currently living in the household has jail/imprisonment history (2)
Parental authority and control	1 to 3	Youth usually obeys and follows rules (1); youth sometimes obeys, obeys some rules (2); youth consistently disobeys and/or is hostile (3)
Current alcohol and drug use	1 to 2	No current alcohol or drug use that is causing family conflict, disrupting education, causing health problems, interfering with keeping prosocial friends, or contributing to criminal behavior (1), current alcohol or drug use that is causing family conflict, disrupting education, causing health problems, interfering with keeping prosocial friends, or contributing to criminal behavior (2)
History of physical/sexual	1 to 2	No history of physical or sexual abuse (1), victim of physical or sexual abuse (2)
History of neglect	1 to 2	No history of neglect (1), victim of neglect (2)
History of mental health problems	1 to 2	No history of mental health problems (1); diagnosed with mental health problems, mental health medication prescribed, mental health treatment prescribed, or mental health medication and treatment prescribed (2)
Covariates		
PACT risk level (risk to re-offend)	1 to 4	Low risk (1), moderate risk (2), moderate-high risk (3), high risk (4)
Race	1 to 2	White (1), non-white (2)
Ethnicity	1 to 2	Non-Hispanic (1), Hispanic (2)
Age at release	1 to 4	Under 13 years of age at release (1), 15-16 years (2), 17 years (3), 18 years or older (4)
Re-arrest	1 to 2	No juvenile re-arrest within 12 months/no adult re-arrest within 12 months (1), at least one juvenile re-arrest within 12 months or adult re-arrest within 12 months of release (2)
Re-conviction	1 to 2	No juvenile re-adjudication within 12 months/no adult conviction within 12 months (1), at least one juvenile re-adjudication within 12 months or adult conviction within 12 months of release (2)

Data Sources and Sample Description

The Department conducts an annual outcome evaluation of FDJJ programming across the continuum of the Florida juvenile justice system, from prevention services through residential commitment. The Department provided the JRC with the data sets used in completing the two most recent outcome evaluations (as reported in the FDJJ *Comprehensive Accountability Report* (CAR) for 2010 and 2011). All youth released from FDJJ services in fiscal years 2007-08 and

2008-09, formed the basis of the release pool sample used in the current study. All releases with a PACT assessment during this time period were included in the study sample. Risk assessment data were obtained from the monthly Juvenile Justice Information Systems (JJIS) PACT extract for September 2010 and matched to the release sample. The PACT assessment closest to the admission date (for each corresponding release) was used for the study sample. Referral history and juvenile and adult recidivism previously calculated by FDJJ for annual outcome evaluations were likewise obtained for the sample of all releases. The recidivism follow-up period was 12 months following conclusion of the placement services associated with the release.

The validation study included all youth released between FY 2007-08 and FY 2008-09, with a completed PACT assessment. Table 3 summarizes the total number of releases and total number of cases with PACT data during the study time period by placement type. In fiscal year 2007-08, there were 47,229 releases from diversion, probation and commitment programs in Florida. Of the 47,229 releases, 85% had risk factor data from either a pre-screening or full PACT assessment. In fiscal year 2008-09, the proportion of releases with PACT information increased to 92 percent. During that time period, there were 43,589 releases from FDJJ diversion, probation and residential services. Just over forty thousand of those releases had PACT data. Altogether, there were 90,818 releases for both fiscal years; eighty-eight percent (80,192) had a PACT assessment. The validation analyses were performed on the sample of 80,192 releases with a PACT assessment.

Table 3. Total Releases and PACT Assessments by Placement Type, FY 2007-08 and FY 2008-09

Placement Type	FY 2007-08		FY 2008-09		Both Years	
	Total Releases	Had a PACT (Pre/Full)	Total Releases	Had a PACT (Pre/Full)	Total Releases	Had a PACT (Pre/Full)
Intensive Delinquency Diversion Services	2,041	1,850 (91%)	2,172	2,127 (98%)	4,213	3,977 (94%)
Diversion Services	5,062	3,823 (76%)	5,779	4,252 (74%)	10,841	8,075 (74%)
General and Intensive Probation	21,665	17,736 (82%)	19,187	17,816 (93%)	40,852	35,552 (87%)
Probation Enhancement Services	1,256	1,174 (93%)	1,321	1,281 (97%)	2,577	2,455 (95%)
Day Treatment/Minimum-Risk Non-Residential	1,997	1,962 (98%)	1,718	1,716 (100%)	3,715	3,678 (99%)
Redirection Services	1,371	1,355 (99%)	1,304	1,289 (99%)	2,675	2,644 (99%)
Post-Commitment Services - State Operated	1,800	1,215 (68%)	1,478	1,260 (85%)	3,278	2,475 (76%)
Post-Commitment Services - Provider Operated	4,349	3,614 (83%)	3,446	3,299 (96%)	7,795	6,913 (89%)
Residential - Low Risk	806	794 (99%)	600	600 (100%)	1,406	1,394 (99%)
Residential - Moderate Risk	5,050	4,914 (97%)	5,205	5,196 (100%)	10,255	10,110 (99%)
Residential - High Risk	1,755	1,547 (88%)	1,297	1,256 (97%)	3,052	2,803 (92%)
Residential - Maximum Risk	77	41 (53%)	82	75 (91%)	159	116 (73%)
Total	47,229	40,025 (85%)	43,589	40,167 (92%)	90,818	80,192 (88%)

As illustrated in Table 3, the percentage of releases with a PACT assessment was generally high for all placement types with the exception of diversion services and maximum risk residential commitment. This was not surprising, as some diversion programs were designed to reduce system involvement, including assessment. The lower PACT rates for youth disposed to maximum risk residential programs were likely due to both reduced sample sizes and the length of commitment to such programs. Commitment to a maximum risk facility carries a statutorily set mandatory minimum sentence of 18 months. Youth released from these facilities in FY 2007-08, generally would have entered the program during the initial introduction and implementation phases of the PACT. The PACT administration rate for maximum risk releases increased over time, as was demonstrated in FY 2008-09 when 91% of youth released from maximum risk residential placement had a completed PACT assessment. A statistical comparison of releases with and without PACT data revealed some differences between the groups. The sample of youth without a PACT assessment was comprised of younger adolescents ($\bar{x}$ =15.7 years) compared to those with a PACT ($\bar{x}$ =16.2 years). This corresponds with the finding that 29% of the 9,623 releases missing assessments had been disposed to diversion. While the samples did not differ significantly relative to race, the group without PACT assessments had a lower percentage of males ($\bar{x}$ =73.8%) than those with a PACT (76.9%). This finding is not surprising given that males comprised a larger percentage of the residential releases, e.g., ninety-eight percent of the releases from maximum risk residential programs. These differences introduce a slight bias to the validation study sample.

Characteristics of the study sample in terms of demographics, placement supervision and assessment type are presented in Table 4. Most of the 80,192 youth released between FY 2007-08 and FY 2008-09 were male (76.9 percent). More than half of the releases were non-white (53%), and 13% were Hispanic. Slightly more than one-third of the validation study sample was 17 years old or older at admission; twenty-four percent was 16 years old; thirty percent was between 14 and 15 years old, and just under 9% was 13 years or younger. Releases from probation programs (i.e.,

general/intensive probation, probation enhancement services, Redirection services, and post-commitment services) comprised the majority (62%) of the study sample. Fifteen percent of the releases were from diversion programs, and the remaining cases were released from residential or day treatment facilities. Among the sample of releases, forty-eight percent had a completed pre-screen PACT and 51% had a full PACT assessment.

Table 4. Sample Descriptive Statistics

	N	Percent
Sex		
Female	18,557	23.1%
Male	61,635	76.9%
Race		
Non-white	42,828	53.4%
White	37,364	46.6%
Ethnicity		
Hispanic	10,837	13.5%
Non-Hispanic	69,355	86.5%
Age at admission		
13 years or younger	6,912	8.6%
14 to 15 years	24,147	30.1%
16 years	19,835	24.7%
17 years or older	29,298	36.5%
Placement type		
Intensive Delinquency Diversion Services (IDDS)	3,977	5.0%
Diversion Services	8,075	10.1%
General/Intensive Probation	35,552	44.3%
Probation Enhancement Services	2,455	3.1%
Redirection Services	2,644	3.3%
Post-Commitment Services - State Operated	2,475	3.1%
Post-Commitment Services - Provider Operated	6,913	8.6%
Day Treatment & Minimum Risk Non-Residential	3,678	4.6%
Residential - Low Risk	1,394	1.7%
Residential - Moderate Risk	10,110	12.6%
Residential - High Risk	2,803	3.5%
Residential - Maximum Risk	116	0.1%
PACT type		
Pre-screen	39,110	48.8%
Full	41,082	51.2%

Data Analysis

A number of analyses were necessary to fully address the Phase I research question. First and perhaps most importantly, it was necessary to determine whether the primary assessment classification of offender risk to re-offend accurately predicted re-arrest and re-conviction among the referral sample in general, as well as sub-samples according to sex, race, ethnicity, age, and supervision placement type. To assess the relationship between PACT risk level and recidivism outcomes, chi-square tests of significance and correlation coefficients were calculated, followed by multivariate logistic regression analyses controlling for race and ethnicity. Logistic regression is the preferred statistical procedure to use when attempting to predict a discrete outcome, such as recidivism versus non-recidivism, from a set of predictor variables that may be continuous, discrete, dichotomous, or a mixture of these levels of measurement. Logistic regression answers the same questions as discriminant analysis. Unlike discriminant analysis, however, logistic regression is more flexible because it makes no assumptions about the distribution of the predictor variables, i.e., the predictor variables do not have to be normally distributed, linearly related to the dependent variable, or of equal variance in each group. Unlike the statistical procedure called Logit, the predictor variables do not have to be discrete in a logistic regression analysis (Hosmer & Lemeshow, 2000).

Additional measures of association, and measures of the PACT assessment's specificity and sensitivity, were also computed using ROC analysis. False negative and false positive categorizations were compared through examination of the AUC statistic. Sensitivity and specificity measures were calculated for the full sample of all youths and sub-samples relative to offender sex and race.

The study examined whether alternative risk level cut-offs may be more effective in predicting risk to re-offend through correlation analyses and analysis of variance (ANOVA). The appropriateness of the risk categories and the extent of differences in recidivism rates between risk levels were assessed using Silver, Smith & Banks' (2000) dispersion index for risk (DIFR). The

summary statistic assesses how a sample is subdivided into different risk levels and the extent to which the recidivism rates of youth in a level vary from the base rate of the entire sample of all youth. As such, it was possible to evaluate the utility of the current instrument relative to other specified cut-offs in terms of proportionality and differences in outcome rates by risk level.

The relative significance of the two core components that dictate PACT risk levels, the criminal history score and social history score, were examined through bivariate correlations and logistic regression analyses. The study also examined the influence of these composite scores on recidivism for both male and female juvenile offenders.

Finally, analysis turned to the influence of the individual factors used in computing risk levels to determine whether they were significantly related to re-arrest and re-conviction. As Baird (2009) notes, if a given item is not statistically significantly related to recidivism, it cannot be expected that positive changes in the factor will reduce risk. Indeed, Baird questions the extent to which such items introduce substantial 'noise' and "actually reduce, rather than improve, a model's ability to accurately classify cases" (Baird, 2009, p. 3). Bivariate correlations between subsequent offending and the individual items used in calculating PACT criminal history and social history scores were calculated. Logistic regression analyses were also used to assess the relative contribution of each item in predicting recidivism.

RESULTS

Descriptive statistics for each of the indicators used in calculating the PACT criminal history scores and social history scores, as well as covariates used in the analyses, are presented in Table 5. The overall mean for each indicator and the percent of releases within each attribute of an indicator are provided in the table.

In terms of the criminal histories of the youth in the release sample, nearly two-thirds were 14 years or younger when they committed their first offense that resulted in a juvenile referral. Most

had either zero or one prior misdemeanor adjudications (56%). Exactly two-thirds of the release sample had been previously adjudicated for one or more felonies. The majority of releases had no adjudicated weapons offenses (88%), no adjudicated against-person misdemeanors (67%), and no adjudicated against-person felonies (74%). Forty-five percent of the youth released had one or more placements in secure detention and 19% had been previously committed at least once in the past. Most youths had no record of escape (99%), yet 26% had previously had warrants issued for their arrest for a failure to appear in court. The average criminal history score for all releases was 8.36 (the range was 0 to 30).

Table 5. Percent of Releases for Criminal History Indicators, Social History Indicators, and Covariates (N=80,192)

Criminal History Indicator	Percent	Criminal History Indicator	Percent
Age at first offense (mean=3.65)		Adjudicated against-person felonies (mean=1.27)	
1. Over 16 years	7.4%	1. None	74.4%
2. 16 years	12.1%	2. One or two	23.9%
3. 15 years	16.2%	3. Three or more	1.7%
4. 13 to 14 years	36.3%	Secure detention placements (mean=1.87)	
5. Under 13 years	28.0%	1. None	55.5%
Adjudicated misdemeanors (mean=1.71)		2. One	18.2%
1. None or one	56.4%	3. Two	9.9%
2. Two	21.6%	4. Three or more	16.4%
3. Three or four	16.7%	Commitment placements (mean=1.23)	
4. Five or more	5.3%	1. None	80.8%
Adjudicated felonies (mean=2.08)		2. One	15.2%
1. None	32.9%	3. Two or more	4.0%
2. One	38.9%	Adjudicated escapes (mean=1.01)	
3. Two	15.2%	1. None	99.2%
4. Three or more	13.0%	2. One	0.8%
Adjudicated weapons offenses (mean=1.12)		3. Two or more	0.1%
1. None	87.6%	Failure to appear warrants (mean=1.39)	
2. One or more	12.4%	1. None	73.6%
Adjudicated against-person misdemeanors (mean=1.42)		2. One	13.8%
1. None	67.2%	3. Two or more	12.6%
2. One	23.3%		
3. Two or more	9.5%		

Table 5. Percent of Releases for Criminal History Indicators, Social History Indicators, and Covariates (N=80,192) (continued)

Social History Indicator	Percent
Sex (mean=1.77)	
1. Female	23.1%
2. Male	76.9%
Current school status (mean=1.92)	
1. No major problems with enrollment, conduct, attendance or performance	38.2%
2. Problems reported by teachers, calls to parents, some full-day unexecused absences, mostly Cs and Ds, with some Fs	31.3%
3. Calls to police, habitual truant, some Ds and mostly Fs, dropped out, expelled or suspended	30.5%
Current peers (mean=1.91)	
1. Has pro-social friends and no anti-social friends	27.1%
2. Has no friends or has both pro-social friends and anti-social friends	59.4%
3. Has all anti-social friends	9.2%
4. Is a gang member or associate	4.3%
History of out-of-home placements (mean=1.12)	
1. No out-of-home placements exceeding 30 days	87.6%
2. One or more out-of-home placements	12.4%
History of running away/being kicked out (mean=1.48)	
1. No history of running away or being kicked out	70.9%
2. One instance of running away or being kicked out	10.6%
3. Two or more instances of running away or being kicked out	18.5%

Social History Indicator	Percent
Jail/imprisonment history of current household (mean=1.27)	
1. No mother, father or sibling with history of incarceration in jail or prison	72.8%
2. Mother, father or sibling with history of incarceration in jail or prison	27.2%
Parental authority and control (mean=1.69)	
1. Minor usually obeys and follows rules	42.2%
2. Sometimes obeys or obeys some rules	46.3%
3. Consistently disobeys, and/or is hostile	11.5%
History/current alcohol and drug use (1.24)	
1. No history or current problems with alcohol or drugs	86.3%
2. History or current alcohol and/or drug problems causing family conflict, disrupting education, causing health problems, interfering with keeping pro-social friends, or contributing to criminal behavior	13.7%
History of physical or sexual abuse (mean=1.16)	
1. No history of physical or sexual abuse	84.2%
2. Has been the victim of physical and/or sexual abuse	15.8%
History of neglect (mean=1.06)	
1. No history of neglect	93.8%
2. Has been the victim of neglect	6.2%
History of mental health problems (mean=1.14)	
1. No history of mental health problems	86.0%
2. Diagnosed with mental health problem, prescribed mental health medication(s), prescribed mental health treatment, or mental health treatment and medication prescribed	14.0%

Covariates	
Sex (mean=1.77)	
1. Female	23.1%
2. Male	76.9%
Race (mean=1.47)	
1. White	53.4%
2. Non-white	46.6%
Ethnicity (mean=1.14)	
1. Non-Hispanic	86.5%
2. Hispanic	13.5%
Age at release (mean=2.64)	
1. Under 15 years	13.1%
2. 15-16 years	35.7%
3. 17 years	25.6%
4. 18 years or older	25.5%

Covariates	
Risk to re-offend (mean=1.98)	100.0%
1. Low risk	50.7%
2. Moderate risk	15.4%
3. Moderate-high risk	18.5%
4. High risk	15.3%
Criminal history mean score	8.36
Social history mean score	5.06
Re-arrest (mean=1.46)	
1. No juvenile referral or adult arrest	53.7%
2. Re-referred or re-arrested	46.3%
Re-conviction (mean=1.30*)	
1. No juvenile adjudication or adult conviction	69.5%
2. Re-adjudicated or re-convicted	30.5%
*mean is equal to 1.3049	

Turning to the social histories of the sample, most youth were assessed as having problems in school, associating with anti-social peers, and sometimes or consistently disobeying their parents. Those with histories of out-of-home placements (12%), running away (29%), residing with a parent or sibling who had previously been in jail or prison (27%), physical or sexual abuse (16%), neglect (6%), or mental health problems (14%) were in the minority. Social history scores ranged from a low of zero to a high of 18, with an average score of 5.06 for all releases.

A number of covariates were used in the study analyses and review of the percent of releases within the attributes of these indicators reveals that the majority were male, white, non-Hispanic,

and between the ages of 17 and 18 years at the time of release. Overall, of the 80,192 youth released between FY 2007-08 and FY 2008-09 and for whom a PACT assessment had been completed, the majority were assessed as low risk (51%). Equal percentages of releases were classified as moderate risk (15%) and high risk (15%), while 19% were assessed as moderate-high risk to re-offend. Just under half of the release pool went on to be re-arrested (46%) and nearly 31% were re-adjudicated or re-convicted for a crime.

The distribution of PACT risk levels relative to sex, race, ethnicity and age is presented in Table 6. Female releases tended to have lower risk scores than their male counterparts. Sixty-one percent of female releases were assessed as low risk to re-offend, while 48% of males were classified within this risk level. One-quarter of the females released were considered moderate-high or high risk. In comparison, 36% of the males in the study sample were designated as moderate-high to high risk to re-offend.

Table 6. Distribution of PACT Risk Levels by Sex, Race, Ethnicity, and Age at Admission

	PACT Risk Level				
	Low	Moderate	Moderate-High	High	Total
Full sample	51%	15%	19%	15%	100%
Sex					
Female	61%	14%	13%	12%	100%
Male	48%	16%	20%	16%	100%
Race					
Non-white	45%	15%	22%	18%	100%
White	56%	16%	15%	13%	100%
Ethnicity					
Hispanic	56%	15%	16%	13%	99%
Non-Hispanic	50%	15%	19%	16%	99%
Age at admission					
13 years or younger	63%	17%	11%	9%	100%
14 to 15 years	51%	17%	17%	15%	100%
16 years	49%	15%	19%	17%	100%
17 years or older	49%	14%	21%	16%	100%
Number of PACT assessments	40,690	12,377	14,859	12,266	80,192

A similar pattern emerged when examining differences between whites and non-whites, with a greater proportion of white youth receiving lower overall scores. Fifty-six percent of white releases fell into the low-risk category, and 13% were assessed as high risk. In comparison, forty-five

percent of non-white youth were categorized as low risk, and 18% were classified as high risk. Ethnic disparities between Hispanics and non-Hispanics were less significant. For instance, fifty-seven percent of Hispanic and 50% of non-Hispanic releases were assessed as low risk on the PACT assessment. The percentage of youth classified as high risk was also similar for Hispanics and non-Hispanics (13% and 16%, respectively).

Sixty-three percent of younger releases (13 or under) scored low risk on the PACT assessment. The percentage of offenders deemed low risk, as shown in Table 6, declined as age increased. Correspondingly, the distribution of youth categorized as moderate-high or high risk generally increased with the age of the offender. Only nine percent of the 13 year old or younger group fell into the high risk group; whereas, 17 percent of the 16 year olds and 16% of those 17 years and older were assessed as high risk.

Bivariate Analyses: Predictive Accuracy of PACT Risk Level Classifications

The overarching research question for the current study asks whether the PACT effectively identifies risk-level subgroups within the Florida juvenile justice offender population that are predictive of subsequent rates of re-offending. The simplest way to answer the question is to examine re-arrest and re-conviction rates by PACT risk level to see whether increasing risk levels correspond with increasing rates of recidivism.

Table 7 presents re-arrest rates by PACT risk level for the full sample, and then examines sub-samples based on sex, race, ethnicity and age to determine whether risk levels are not only predictive in general, but are also predictive for different groups of offenders. The table reveals that for the full sample and each of the subsamples, the PACT was significantly related to re-arrest. Youth classified in the higher risk levels experienced greater rates of recidivism than did those classified in the lower risk levels. Of the releases classified as low risk, 35% were re-arrested. As the risk level increased the re-arrest rate increased. Fifty percent, for instance, of those in the moderate risk group had another juvenile referral or adult arrest within the follow-up period. High

risk clients, as determined by the PACT assessment, had a 64% re-arrest rate. The relationship between PACT risk level and re-arrest was significant at p<.001 level. This trend was consistent for males and females, whites and non-whites, Hispanics and non-Hispanics, and across all four age categories. These findings lend support for the validity of the PACT assessment in accurately predicting subsequent offending.

Table 7. Re-Arrest Rates by PACT Risk Level for Full Sample and by Sex, Race, Ethnicity and Age

	PACT Risk Level				
	Low	Moderate	Moderate-High	High	Total
Full sample - Re-arrest[a]	35%	50%	60%	64%	46%
Sex					
Female[b]	25%	40%	45%	50%	33%
Male[c]	39%	53%	62%	68%	50%
Race					
Non-white[d]	41%	55%	65%	70%	54%
White[e]	31%	46%	53%	58%	40%
Ethnicity					
Hispanic[f]	34%	52%	54%	63%	44%
Non-Hispanic[g]	35%	50%	60%	65%	47%
Age at admission					
13 years or younger[h]	32%	50%	63%	69%	42%
14 to 15 years[i]	37%	54%	63%	67%	49%
16 years[j]	36%	49%	58%	63%	47%
17 years or older[k]	33%	48%	58%	63%	45%

a. χ^2 (3) = 4928.64, $p \leq .001$
b. χ^2 (3) = 828.84, $p \leq .001$
c. χ^2 (3) = 3591.85, $p \leq .001$
d. χ^2 (3) = 2198.34, $p \leq .001$
e. χ^2 (3) = 2234.20, $p \leq .001$
f. χ^2 (3) = 571.67, $p \leq .001$
g. χ^2 (3) = 4350.41, $p \leq .001$
h. χ^2 (3) = 562.98, $p \leq .001$
i. χ^2 (3) = 1476.31, $p \leq .001$
j. χ^2 (3) = 1045.25, $p \leq .001$
k. χ^2 (3) = 1866.28, $p \leq .001$

Table 8 presents results from chi square tests of significance of PACT risk levels relative to the outcome measure of subsequent juvenile adjudication or adult conviction following program release. As in the previous analysis, the relationship between PACT risk level and outcomes was examined for the full sample, as well as subsamples based on sex, race, ethnicity and age at admission. The results are similar to the re-arrest findings. Overall, thirty percent of the study sample had a juvenile adjudication or adult conviction during the follow-up period. Of the releases classified as low risk, twenty-two percent were re-convicted. In comparison, forty-five percent of the high risk youth had a subsequent adjudication/conviction. There was a significant (p<.001) positive association between risk level and the recidivism outcome. The positive relationship

between PACT risk level and re-conviction rates was consistent and statistically significant across sex, race, ethnicity and age at admission.

Table 8. Re-Conviction Rates by PACT Risk Level for Full Sample and by Sex, Race, Ethnicity and Age

	PACT Risk Level				
	Low	Moderate	Moderate-High	High	Total
Full sample - Re-conviction[a]	22%	33%	40%	45%	30%
Sex					
Female[b]	15%	25%	29%	32%	20%
Male[c]	24%	35%	43%	48%	34%
Race					
Non-white[d]	26%	37%	45%	49%	36%
White[e]	19%	30%	35%	40%	26%
Ethnicity					
Hispanic[f]	19%	31%	34%	39%	26%
Non-Hispanic[g]	22%	34%	41%	46%	31%
Age at Admission					
13 years or younger[h]	21%	36%	49%	56%	30%
14 to 15 years[i]	26%	40%	47%	50%	35%
16 years[j]	23%	32%	40%	44%	31%
17 years or older[k]	18%	27%	35%	40%	26%

a. χ^2 (3) = 3363.73, $p \leq .001$
b. χ^2 (3) = 527.69, $p \leq .001$
c. χ^2 (3) = 2468.52, $p \leq .001$
d. χ^2 (3) = 1513.18, $p \leq .001$
e. χ^2 (3) = 1503.51, $p \leq .001$
f. χ^2 (3) = 342.76, $p \leq .001$
g. χ^2 (3) = 2975.71, $p \leq .001$
h. χ^2 (3) = 503.54, $p \leq .001$
i. χ^2 (3) = 1127.03, $p \leq .001$
j. χ^2 (3) = 659.40, $p \leq .001$
k. χ^2 (3) = 1260.35, $p \leq .001$

In addition to exploring the predictive validity of the PACT for varying offender populations, the current study also examined whether recidivism outcomes were positively related to PACT risk level for varying dispositions or supervision, placement types (e.g., diversion, probation, commitment). Tables 9 and 10 present the results of those analyses. For each placement type, ranging from diversion services through to maximum risk residential commitment, the relationship between PACT risk level and re-arrest was statistically significant at the p≤.05 level (see Table 9). As expected, re-arrest base rates increased as the restrictiveness of the placement type increased, with the highest rates among those disposed to high risk and maximum risk residential commitment. Re-arrest rates generally increased as assessed risk levels increased for the varying dispositions.

A few exceptions were noted. Among youth released from Intensive Delinquency Diversion Services (IDDS) assessed as moderate risk on the PACT, fifty-six percent were re-arrest for a

Table 9. Re-Arrest Rates by PACT Risk Level and Supervision Placement Type

Placement Type	PACT Risk Level				Total
	Low	Moderate	Moderate-High	High	
Intensive Delinquency Diversion Services[a]	31%	46%	56%	42%	33%
Diversion Services[b]	28%	51%	61%	80%	30%
General/Intensive Probation[c]	35%	48%	54%	56%	40%
Probation Enhancement Services[d]	43%	52%	60%	66%	50%
Redirection Services[e]	50%	62%	65%	63%	58%
Post-Commitment Services - State[f]	38%	42%	60%	60%	55%
Post-Commitment Services - Provider[g]	45%	50%	61%	61%	58%
Day Treatment and Minimum Risk[h]	51%	54%	55%	58%	54%
Residential - Low Risk[i]	48%	63%	65%	73%	63%
Residential - Moderate Risk[j]	44%	53%	63%	67%	61%
Residential - High Risk[k]	31%	44%	63%	73%	65%
Residential - Maximum Risk[l]	17%	50%	74%	66%	65%

a. χ^2 (3) = 62.91, $p \leq .001$
b. χ^2 (3) = 170.67, $p \leq .001$
c. χ^2 (3) = 989.67, $p \leq .001$
d. χ^2 (3) = 67.92, $p \leq .001$
e. χ^2 (3) = 44.15, $p \leq .001$
f. χ^2 (3) = 73.94, $p \leq .001$
g. χ^2 (3) = 76.06, $p \leq .001$
h. χ^2 (3) = 7.78, $p = .05$
i. χ^2 (3) = 45.31, $p \leq .001$
j. χ^2 (3) = 243.66, $p \leq .001$
k. χ^2 (3) = 185.70, $p \leq .001$
l. χ^2 (3) = 8.04, $p = .05$

Table 10. Re-Conviction Rates by PACT Risk Level and Supervision Placement Type

Placement Type	PACT Risk Level				Total
	Low	Moderate	Moderate-High	High	
Intensive Delinquency Diversion Services[a]	19%	32%	35%	25%	21%
Diversion Services[b]	17%	34%	43%	60%	18%
General/Intensive Probation[c]	21%	30%	35%	37%	25%
Probation Enhancement Services[d]	32%	33%	42%	50%	36%
Redirection Services[e]	38%	43%	49%	46%	42%
Post-Community Control - State[f]	24%	27%	38%	42%	36%
Post-Community Control - Provider[g]	31%	34%	40%	41%	39%
Day Treatment and Minimum Risk[h]	35%	38%	41%	40%	38%
Residential - Low Risk[i]	33%	49%	52%	57%	49%
Residential - Moderate Risk[j]	29%	37%	43%	48%	43%
Residential - High Risk[k]	19%	32%	45%	51%	45%
Residential - Maximum Risk[l]	0%	13%	56%	38%	40%

a. χ^2 (3) = 48.29, $p \leq .001$
b. χ^2 (3) = 155.63, $p \leq .001$
c. χ^2 (3) = 626.03, $p \leq .001$
d. χ^2 (3) = 36.15, $p \leq .001$
e. χ^2 (3) = 21.03, $p \leq .001$
f. χ^2 (3) = 38.22, $p \leq .001$
g. χ^2 (3) = 27.69, $p \leq .001$
h. χ^2 (3) = 7.34, $p = .062$
i. χ^2 (3) = 43.92, $p \leq .001$
j. χ^2 (3) = 136.18, $p \leq .001$
k. χ^2 (3) = 87.22, $p \leq .001$
l. χ^2 (3) = 10.21, $p = .017$

juvenile or adult offense during the follow-up period. In contrast, a smaller percentage (42%) of the high risk, IDDS releases were re-arrested. Closer examination of placement types and risk levels revealed a very small sample size of youth classified as high risk on the PACT and disposed to

IDDS (n=12). Five of the twelve youth recidivated and on average, they were slightly older (15 years) than their counterparts (i.e., released from IDDS and re-arrested) who were assessed as moderate-high risk on the PACT (14 years). While this may reflect the consistent finding in the delinquency research that age is negatively associated with recidivism, definitive conclusions cannot be drawn given the small sample sizes.

Among youth released from Redirection and Post-Commitment Services probation services, re-arrest rates for moderate-high and high risk levels were nearly identical. For those disposed to day treatment or minimum risk non-residential programs, there was little variation in re-arrest rates across the four PACT risk categories. The overall range in re-arrest rates from low risk to high risk level was the smallest for these releases, with 51% of the low risk group re-arrested during the follow-up period and 58% of the high risk group.

Less than one percent of the 80,192 total releases were placed in maximum risk residential facilities (n=116). The overwhelming majority (88%) of youth released from these programs were categorized as moderate-high or high risk on the PACT. Notably, a smaller percentage (66%) of the high risk releases were re-arrested in comparison to the youth classified as moderate-high risk to re-offend (74%).

Similar patterns were found when examining the association between the outcome of re-conviction and PACT risk levels for each placement type (see Table 10). The PACT remained a significant predictor of re-conviction rates for youth released from the varying levels of correctional supervision, with the exception of day treatment and minimum risk, non-residential programs. Re-conviction outcomes ranged from 35% for youth assessed as low risk to 40% for those classified as high risk. Forty-one percent of youth released from these non-residential, community interventions, were assessed as moderate-high risk on the PACT, were ultimately re-convicted for an offense during the study follow-up period. As Table 10 depicts, there was little variation in outcomes

across increasing PACT risk levels for the day treatment and minimum risk interventions (p=.062). Alternative risk classifications are presented later in the study.

Bivariate Analyses: Predictive Accuracy of Composite and Individual Indicators

Following assessment of the accuracy of PACT risk levels in predicting subsequent offending, attention turned to examinations of risk levels, criminal history scores, social history scores and individual PACT indicators relative to recidivism outcomes using bivariate and multivariate analyses. The predictive validity of the PACT with varying offender populations was likewise explored.

Table 11 provides the correlations of gender, race, ethnicity, age at admission, and placement type with overall PACT risk to re-offend. For each of the sub-populations, with the exception of maximum risk residential releases, PACT scores were significantly correlated with re-arrest and re-conviction outcomes. Higher correlation coefficients reflected a stronger relationship between the PACT assessment and recidivism outcome. The strength of this relationship varied by offender sub-populations and correctional supervision placements. The correlation between the PACT and recidivism was greater for males than for female juvenile offenders. Similarly, correlations were higher for non-white youth in comparison to white youth, non-Hispanics compared to Hispanics, and youth who were 13 years or younger at the time of admission relative to older youth. Among the various correctional placement types, correlations between the PACT assessment and recidivism were strongest for youth disposed to high risk residential commitment. These results mirror the findings from the chi square analyses presented previously in Tables 7 through 10. As expected, the correlation between PACT risk levels and recidivism outcomes was relatively weak for youth disposed to day treatment/minimum risk non-residential programs and disposed to maximum risk residential facilities.

Table 11. Correlations Between PACT Risk and Recidivism Outcomes by Sex, Race, Ethnicity, Age, and Placement Type

Variable	Re-Arrest	Re-Conviction
Sex		
Female	.205***	.163***
Male	.238***	.198***
Race		
Non-white	.238***	.198***
White	.224***	.185***
Ethnicity		
Hispanic	.221***	.173***
Non-Hispanic	.246***	.204***
Age		
13 years or younger	.280***	.268***
14 to 15 years	.241***	.209***
16 years	.227***	.181***
17 years or older	.248***	.206***
Placement Type		
Intensive Delinquency Diversion Services	.120***	.103***
Diversion Services	.144***	.138***
General/Intensive Probation	.160***	.129***
Probation Enhancement Services	.166***	.115***
Redirection Services	.109***	.079***
Post-Commitment Services - State	.153***	.120***
Post-Commitment Services - Provider	.091***	.060***
Day Treatment and Minimum Risk	.044**	.042*
Residential - Low Risk	.174***	.166***
Residential - Moderate Risk	.152***	.115***
Residential - High Risk	.254***	.171***
Residential - Maximum Risk	.173	.126

*$p \leq .05$
**$p \leq .01$
***$p \leq .001$

In an effort to identify individual factors significantly correlated with recidivism, correlation coefficients were estimated for each indicator used in calculating a youth's criminal history score and each indicator used in calculating a youth's social history score. The results of these analyses are presented in Table 12. With the exception of having a history of physical or sexual abuse, each of the criminal history and social history indicators were significantly correlated with re-arrest rates. The same was true for correlations with re-conviction, however a history of physical or sexual abuse was significant at the 0.01 level for this outcome. Both the criminal history score and social history score were significantly related to the recidivism measures, with criminal history more strongly correlated with re-arrest than with re-conviction. Some of the stronger correlations with re-arrest included age at first offense (.159), adjudicated misdemeanors (.176), adjudicated felonies

(.183), secure detention placements (.223), commitment placements (.144), failure to appear warrants (.164), sex (.150), parental authority and control (.116), and race (.137).

Table 12. Correlations Between Individual PACT Indicators and Recidivism Outcomes

Variable	Re-Arrest	Re-Conviction
Criminal history score	.250***	.205***
Age at first offense	.159***	.153***
Adjudicated misdemeanors	.176***	.144***
Adjudicated felonies	.183***	.144***
Adjudicated weapons offenses	.054***	.041***
Adjudicated against-person misdemeanors	.088***	.075***
Adjudicated against-person felonies	.078***	.059***
Secure detention placements	.223***	.179***
Commitment placements	.144***	.117***
Adjudicated escapes	.028***	.025***
Failure to appear warrants	.164***	.121***
Social history score	.170***	.145***
Sex	.150***	.122***
School enrollment, conduct, attendance and performa	.106***	.089***
Current peers	.080***	.067***
History of out-of-home placements	.042***	.036***
History of running away	.086***	.074***
Jail/imprisonment history of current household	.081***	.073***
Parental authority and control	.116***	.099***
Current alcohol and drug use	.062***	.052***
History of physical or sexual abuse	.005	.011**
History of neglect	.033***	.026***
History of mental health problems	.037***	.033***
Risk Level	.243***	.202***
Race	.137***	.109***

*$p \leq .05$
**$p \leq .01$
***$p \leq .001$

Multivariate Analyses: Predictive Accuracy of PACT for Sub-Samples

The next phase in the study sought to assess the accuracy of the PACT in predicting subsequent arrests using multivariate logistic regression analyses. Logistic regression allows for the simultaneous control of potentially influential factors in assessing the predictive accuracy of the PACT assessment. The multivariate analyses began with an examination of the predictive power of the PACT overall risk level for the full sample and sub-samples based on sex, race and ethnicity. Composite criminal history and social history scores were then examined to assess their relative influence in predicting re-arrest outcomes. Control variables including race, age at release, and

correctional placement type (diversion, probation, commitment, post-commitment services) were added to subsequent models to examine the effect on the predictive power of PACT measures for the full sample and sub-samples. It should be noted that sex was not also included as a control variable, given that it is an item that comprises the social history score.

Table 13 presents the first of these logistic regression analyses. As can be seen from the results, overall risk, as assessed by the PACT, was a significant predictor of re-arrest for the full sample of releases, and remained significant after controlling for race. As the overall risk to re-offend increased the likelihood of re-arrest increased by a little more than one and a half times (odds ratio of 1.55). Race was a slightly stronger predictor of recidivism indicating that the odds of being re-arrested increased by a factor of 1.59 for non-white youth.

Table 13. Logistic Regression Models Predicting Re-Arrest for Full Sample and Sub-Samples

Variable	Full Sample	Full Sample	Male Only	Female Only	Non-White Only	White Only	Hispanic Only
PACT overall risk	.439***	.419***	.403***	.384***	.426***	.413***	.408***
	1.550	*1.521*	*1.497*	*1.469*	*1.532*	*1.511*	*1.503*
	(.006)	(.007)	(.007)	(.014)	(.009)	(.009)	(.018)
Race		.466***	.508***	.341***			0.120
		1.593	*1.662*	*1.407*			*1.128*
		(.015)	(.017)	(.032)			(.074)
Constant	-1.021***	-1.202***	-1.044***	-1.585***	-.751***	-1.190***	-1.032***
	.360	*.301*	*.352*	*.205*	*.472*	*.304*	*.356*
	(.015)	(.016)	(.018)	(.035)	(.022)	(.020)	(.039)

Note: Beta values reported with Exp(B) in italics and standard errors in parentheses.
*$p \leq .05$
**$p \leq .01$
***$p \leq .001$

The remaining models presented in Table 13 examined whether the PACT was a significant predictor of re-arrest for male and female youth, non-white and white youth, and Hispanic youth. The results revealed that the PACT assessment predicts recidivism equally well for not only males and females, but also for non-white and white youth, and for Hispanic adolescents. The influence of overall risk remained relatively stable with odds ratios ranging from 1.47 to 1.55. Race was a significant predictor of subsequent offending for both males and females, but did not significantly increase the odds of re-arrest for Hispanic youth. The relationship to recidivism was somewhat

stronger for race than overall risk for males. For females, however, PACT risk level was a stronger predictor of re-arrest than was race.

The predictive validity of the PACT was further explored by examining whether increases in overall risk significantly correlated with an increased likelihood for re-arrest for non-white males and females, white males and females, and Hispanic males and females. The results of these analyses are presented in Table 14. Once again, the overall PACT risk to re-offend significantly predicted re-arrest for each of the sub-samples of youth. Risk level exhibited the strongest relationship with recidivism for Hispanic females (1.653 odds ratio) followed by white males, non-white females, and non-white males. For the sub-groups examined, for each increase in overall risk to re-offend, the likelihood of re-arrest increased between 1.44 and 1.65 times. These findings indicated that the PACT significantly predicted recidivism equally well for minority males and females, as well as non-minority males and females.

Table 14. Logistic Regression Models Predicting Re-Arrest for Sub-Samples Based on Sex, Race and Ethnicity

Variable	Non-White Males	White Males	Non-White Females	White Females	Hispanic Males	Hispanic Females
PACT overall risk	.395***	.411***	.406***	.363***	.377***	.503***
	1.484	*1.508*	*1.501*	*1.438*	*1.459*	*1.653*
	(.011)	(.010)	(.021)	(.020)	(.020)	(.047)
Constant	-.518***	-1.059***	-1.286***	-1.546***	-.845***	-1.815***
	.596	*.347*	*.276*	*.213*	*.430*	*.163*
	(.026)	(.023)	(.046)	(.043)	(.043)	(.101)

Note: Beta values reported with Exp(B) in italics and standard errors in parentheses.
*$p \leq .05$
**$p \leq .01$
***$p \leq .001$

A youth's assessed risk to re-offend on the PACT is computed using the criminal history score and social history score. To examine the relative influence of each score, re-arrest was regressed on the criminal history and social history composite scores. Table 15 depicts the results from this analysis. Both composite scores significantly predicted re-arrest for the full sample of releases, with the criminal history score only slightly more predictive of recidivism than the social history

score. A one unit increase in the criminal history score increased the odds of re-arrest by a factor of 1.09, while a similar increase in a youth's social history score resulted in 1.08 times increase in the likelihood of that the youth would recidivate.

The next logistic regression model included race (nonwhite=1) as a control variable to examine the impact on the predictive power of the two composite PACT scores. As can be seen from the results in Table 15, the criminal history and social history scores remain significant predictors of re-arrest after controlling for race. Higher risk youth and minority youth had greater odds of being subsequently re-arrested than did lower risk and non-minority offenders.

The final full-sample model presented in Table 15 illustrates the results from re-arrest regressed on criminal history scores and social history scores, controlling for race, age of the youth at release, and the supervision placement type from which the youth was released. Given the findings from the earlier bivariate analyses in which placement type impacted the correlation between the PACT risk to re-offend and recidivism outcomes, it was important to control for the correctional interventions received following assessment. Placement type was recoded into four attributes: diversion, probation, residential commitment, and post-commitment services. The results revealed that the PACT criminal and social history scores remained significant predictors of re-arrest after controlling for race, age at release, and placement type. Being higher risk, non-white, younger, and disposed to a commitment program significantly increased the odds of recidivism.

Table 15. Re-Arrest Regressed on Criminal History and Social History Scores for Full Sample and Sub-Samples Based on Sex, Race and Ethnicity

Variable	Full Sample	Full Sample	Full Sample	Male Only	Female Only	Non-White Only	White Only	Hispanic Only
Criminal History Score	.085***	.077***	.066***	.062***	.063***	.060***	.072***	.059***
	1.088	*1.080*	*1.068*	*1.064*	*1.065*	*1.062*	*1.075*	*1.061*
	(.001)	(.001)	(.002)	(.002)	(.004)	(.003)	(.003)	(.005)
Social History Score	.078***	.087***	.079***	.079***	.093***	0.077***	.082***	.105***
	1.081	*1.091*	*1.083*	*1.082*	*1.098*	*1.08*	*1.085*	*1.111*
	(.003)	(.003)	(.003)	(.003)	(.005)	(.004)	(.004)	(.008)
Race		.446***	.439***	.481***	.342***			0.119
		1.562	*1.551*	*1.617*	*1.407*			*1.126*
		(.015)	(.015)	(.017)	(.033)			(.074)
Age at release			-.031***	-0.009	-.127***	-0.047***	-.017*	-.014
			.969	*.991*	*.880*	*.954*	*.983*	*.986*
			(.005)	(.006)	(.011)	(.007)	(.007)	(.014)
Placement type								
Diversion to Residential			-.437***	-.398***	-.161*	-.642***	-.254***	-.387***
			.646	*.672*	*.851*	*.526*	*.776*	*.679*
			(.033)	(.037)	(.073)	(.049)	(.045)	(.090)
Probation to Residential			-.175***	-.217***	.221***	-.292***	-.058	-.083
			.839	*.805*	*1.247*	*.747*	*.943*	*.921*
			(.023)	(.026)	(.057)	(.033)	(.033)	(.069)
Post-Commitment Services to Residential			*-.092***	*-.124****	*0.045*	*-.160****	*-.015*	*-.030*
			.912	*.883*	*1.046*	*.852*	*.985*	*.971*
			(.029)	(.032)	(.075)	(.040)	(.042)	(.085)
Constant	-1.254***	-1.440***	-.612***	-.813***	.223***	0.254	-1.018	-.895
	.285	*.237*	*.543*	*.443*	*1.250*	*1.289*	*.361*	*.409*
	(.017)	(.019)	(.094)	(.106)	(.208)	(.133)	(.132)	(.265)

Note: Beta values reported with Exp(B) in italics and standard errors in parentheses.
*$p \leq .05$
**$p \leq .01$
***$p \leq .001$

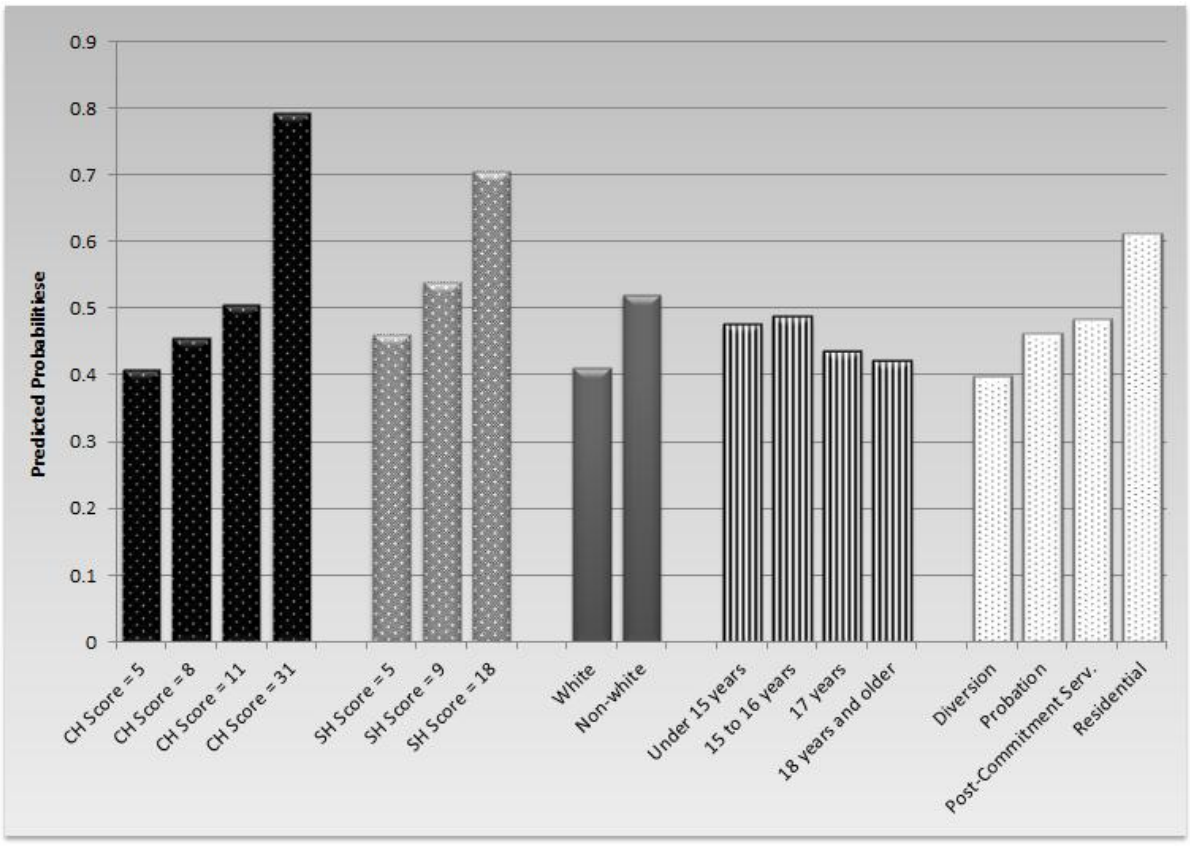
The same regressors were used in models for sub-samples based on sex, race and ethnicity, to examine whether the PACT composite scores were significantly predictive of re-arrest after controlling for differences in age at release and placement type. The findings confirmed the PACT composite scores to be equally capable of predicting subsequent offending for males and females alike, minorities and non-minorities, as well as Hispanic youth. In each of the models for the sub-samples, the social history score was slightly more correlated with re-arrest than the criminal history score. A few notable results from these analyses revealed that age at release was not a significant predictor of likelihood to re-offend for males. While males released from all three lower levels of placement supervision (diversion, probation, and post-commitment services) were less likely to recidivate than those disposed to a residential facility, the same did not hold true for female youth. Female offenders released from probation were actually more likely to recidivate than females who received residential commitment. This was a particularly noteworthy finding and one

that warrants further analytic investigation in subsequent phases of the current study. (See Supplemental Analyses reported in Appendices for additional results by specific placement type, e.g., Day Treatment, IDDS, Moderate Risk Residential, etc.).

For males and for minority youth, release from a residential facility, as compared to probation or post-commitment services, increased the likelihood of re-arrest. However, for white youth and Hispanics, being released from a residential program did not significantly increase the odds of re-offending over release from probation or post-commitment services.

Figure 1 illustrates changes in the probability of recidivism associated with varying levels of offender risk, as well as differences in race, age, and placement type for the full sample of releases. The chart clearly depicts the linear relationship between the PACT criminal history scores and social history scores with recidivism. A youth with an assessed criminal history score of five, holding all other factors constant, would have a 40% chance of recidivating. This compares to a youth with a score of 31 (the highest possible criminal history score), whose chances of being re-arrested increase to nearly 80 percent. Youth whose social histories place them at high risk, minorities, younger youth, and those released from residential commitment were more likely to recidivate than those with lower social history scores, non-minorities, older youth and those released from diversion, probation or post-commitment services.

Figure 1. Impact of Significant Predictors on Probability of Re-Arrest (full sample)



Multivariate Analyses: Predictive Influence of Individual PACT Indicators

The final multivariate analyses focused on the individual indicators that comprise the criminal history and social history scores to examine the extent to which they contribute to the overall prediction of re-offending. The first model presented in Table 16 illustrates the results of regressing re-arrest on the individual PACT indicators for the full sample of releases. Indicators highlighted in grey denote the variable was not significantly related to recidivism. Adjudicated weapons offenses, adjudicated against-person misdemeanors, adjudicated escapes, history of out-of-home placements, history of neglect, and history of mental health problems all failed to reach statistical significance in the model. The remaining criminal history and social history indicators were found to be significantly related to re-arrest. The strongest predictor in the model was sex (odds ratio of 1.94), followed by race (odd ratio of 1.56), adjudicated misdemeanors (odds ratio of 1.19),

Table 16. Re-Arrest Regressed on Individual PACT Indicators

Variable	Full Sample	Male Only	Female Only	Non-White Only	White Only
Criminal History Indicators					
Age at first offense	.089***	.072***	.160***	.098***	.081***
	1.093	*1.075*	*1.173*	*1.103*	*1.085*
	(.007)	(.008)	(.016)	(.011)	(.010)
Adjudicated misdemeanors	.174***	.183***	.137***	.149***	.201***
	1.190	*1.201*	*1.147*	*1.160*	*1.223*
	(.010)	(.012)	(.023)	(.015)	(.015)
Adjudicated felonies	.077***	.077***	.063***	.070***	.082***
	1.080	*1.080*	*1.064*	*1.073*	*1.085*
	(.005)	(.006)	(.014)	(.008)	(.007)
Adjudicated weapons offenses	-.030	-.034	-.014	-.001	-.053
	.970	*.967*	*.986*	*.999*	*.948*
	(.024)	(.025)	(.071)	(.034)	(.033)
Adjudicated against-person misdemeanors	.020	.010	.051	.000	.040*
	1.020	*1.010*	*1.052*	*1.000*	*1.041*
	(.014)	(.016)	(.028)	(.019)	(.019)
Adjudicated against-person felonies	-.069***	-.077***	-.012	-.057***	-.080***
	.934	*.926*	*.988*	*.945*	*.923*
	(.009)	(.010)	(.023)	(.012)	(.014)
Secure detention placements	.128***	.141***	.065**	.130***	.122***
	1.136	*1.151*	*1.067*	*1.139*	*1.130*
	(.010)	(.011)	(.023)	(.014)	(.014)
Commitment placements	.046***	.059***	-.029	.040**	.052***
	1.047	*1.061*	*.971*	*1.041*	*1.054*
	(.010)	(.010)	(.024)	(.013)	(.014)
Adjudicated escapes	-.093	-.015	-.170	-.081	-.119
	.911	*.986*	*.844*	*.923*	*.888*
	(.078)	(.095)	(.144)	(.118)	(.103)
Failure to appear warrants	.090***	.092***	.096***	.107***	.075***
	1.094	*1.097*	*1.101*	*1.113*	*1.078*
	(.013)	(.015)	(.028)	(.018)	(.020)
Social History Indicators					
Sex	.663***			.728***	.603***
	1.941			*2.070*	*1.828*
	(.020)			(.028)	(.027)
School enrollment/conduct/ attendance/performance	.135***	.138***	.127***	.143***	.131***
	1.145	*1.148*	*1.135*	*1.154*	*1.140*
	(.010)	(.011)	(.021)	(.015)	(.013)
Current peers	.074***	.077***	.055*	.076***	.071***
	1.077	*1.080*	*1.057*	*1.079*	*1.073*
	(.010)	(.012)	(.024)	(.015)	(.014)
History of out-of-home placements	-.026	-.035	.008	-.031	-.015
	.975	*.965*	*1.008*	*.970*	*.986*
	(.026)	(.030)	(.048)	(.037)	(.035)
History of running away	.060***	.056***	.072***	.029*	.083***
	1.062	*1.058*	*1.075*	*1.030*	*1.086*
	(.009)	(.010)	(.017)	(.013)	(.011)
Jail/imprisonment history of current household	.150***	.151***	.147***	.133***	.165***
	1.162	*1.163*	*1.158*	*1.142*	*1.179*
	(.017)	(.019)	(.035)	(.024)	(.024)
Parental authority and control	.137***	.120***	.190***	.158***	.119***
	1.147	*1.127*	*1.209*	*1.171*	*1.126*
	(.013)	(.015)	(.027)	(.019)	(.018)
Current alcohol and drug use	.078***	.078***	.071**	.056**	.087***
	1.081	*1.081*	*1.073*	*1.057*	*1.091*
	(.012)	(.013)	(.026)	(.019)	(.014)
History of physical/sexual	-.051*	-.085**	.016	-.012	-.084**
	.950	*.919*	*1.016*	*.988*	*.919*
	(.023)	(.028)	(.041)	(.037)	(.030)
History of neglect	.001	-.007	.021	-.018	.015
	1.001	*.994*	*1.021*	*.982*	*1.016*
	(.017)	(.021)	(.031)	(.026)	(.023)
History of mental health problems	.043	.030	.099*	.045	.036
	1.043	*1.030*	*1.104*	*1.046*	*1.037*
	(.023)	(.027)	(.046)	(.039)	(.029)
Race	.447***	.475***	.328***		
	1.564	*1.608*	*1.388*		
	(.016)	(.018)	(.035)		
Constant	-1.933***	-1.239***	-2.057***	-1.540***	-1.887***
	.145	*.290*	*.128*	*.214*	*.151*
	(.027)	(.026)	(.051)	(.040)	(.036)

Note: Beta values reported with Exp(B) in italics and standard errors in parentheses.

*$p \leq .05$

**$p \leq .01$

***$p \leq .001$

jail imprisonment history of current household (odds ratio of 1.16), and school enrollment, conduct, performance and attendance (odds ratio of 1.15). Males, minority youth, youth with a current alcohol or drug problem, and youth with a history of adjudicated misdemeanors or felonies, were more likely than adolescents without these characteristics to re-offend. Similar patterns were found for males, females, non-white and white youth.

A few notable differences between the sub-samples were found in the analyses. Unlike males, a history of having been adjudicated for against-person felonies did not significantly decrease the odds of re-arrest for female youth. Having one or more prior commitments likewise was not significant for females but was significantly and positively related to re-arrest for boys, minorities and non-minority youth. Surprisingly, while a history of physical or sexual abuse decreased the odds that males and white youth would recidivate, it was not a significant predictor of re-offending for females or non-white youth. Finally, the odds of being re-arrested increased for female adolescents presenting with a history of mental health problems; whereas, mental health problems were not predictive of recidivism among the male-only, non-white only and white-only release samples. (See Supplemental Analyses reported in Appendices for additional results by specific placement type).

Receiver Operator Characteristics (ROC) Analysis

The bivariate correlation coefficients and the logistic regression analyses support the conclusion that the PACT is an effective assessment tool for males and females, as well as minority and non-minority youth. A growing number of researchers have also explored whether assessments predict recidivism regardless of sex, race or ethnicity, by using the Receiver Operator Characteristic (ROC) to plot the true positive rate against the false positive rate, allowing for an assessment of the sensitivity and specificity of the instrument in predicting recidivism. The ROC's Area Under the Curve (AUC) statistic is an estimate of the probability that a risk score for a randomly selected recidivist will be higher than the score for a randomly selected non-recidivist

(Simon, 2008). Reported AUC scores have ranged from .41 to .79 in validation studies of other juvenile risk assessment instruments (Baglivio, 2009).

ROC analyses were performed for four samples: full sample of all releases, male only sample, female only sample, and non-white only sample. Table 17 presents the sensitivity and specificity for the four models in which the PACT overall risk level served as the test variable with re-arrest as the state variable. Table 18 provides the results for the models using re-conviction as the state variable. As can be seen in Table 19, AUC scores for the models examining re-arrest ranged from a low of .614 for females to a high of .632 for the non-white sample. The full sample and the male-only sample resulted in AUC scores of .632 and .630, respectively. The AUC measures of validity confirmed earlier analyses documenting the gender and race neutrality of the PACT assessment. The probability estimate that a randomly selected recidivist would have an overall risk score greater than the score for a youth who does not get re-arrested, was relatively consistent across samples.

Table 17. AUC Analysis for Overall Risk Level (Re-Arrest)

Cut-Off Score	Full Sample Sensitivity	Full Sample Specificity	Male Sample Sensitivity	Male Sample Specificity	Female Sample Sensitivity	Female Sample Specificity	Non-White Sample Sensitivity	Non-White Sample Specificity
0.0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1.5	0.619	0.384	0.636	0.409	0.535	0.322	0.659	0.432
2.5	0.451	0.241	0.469	0.260	0.359	0.193	0.500	0.284
3.5	0.213	0.101	0.219	0.106	0.181	0.089	0.229	0.116
5.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 18. AUC Analysis for Overall Risk Level (Re-Conviction)

Cut-Off Score	Full Sample Sensitivity	Full Sample Specificity	Male Sample Sensitivity	Male Sample Specificity	Female Sample Sensitivity	Female Sample Specificity	Non-White Sample Sensitivity	Non-White Sample Specificity
0.0	1.000	1.000	1.000	1.000	1.000	1.000	1.000	1.000
1.5	0.638	0.429	0.654	0.457	0.550	0.351	0.679	0.484
2.5	0.470	0.281	0.488	0.304	0.370	0.216	0.520	0.332
3.5	0.225	0.122	0.232	0.128	0.186	0.103	0.241	0.141
5.0	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

Table 19. AUC Scores for Full, Male, Female and Non-White Samples

	Area Under the Curve	
	Re-Arrest	Re-Adjudication
Full Sample	0.632	0.619
Male Sample	0.630	0.614
Female Sample	0.614	0.606
Non-White Sample	0.632	0.614

AUC predictive validity scores were calculated for each of the criminal history and social history indicators relative to re-arrest as the state variable for the full sample and sub-samples based on sex and race. The findings from these analyses are presented in Table 20. Overall, AUC scores were higher for criminal history scores than for social history scores across the samples. Secure detention placement was the strongest criminal history predictor for each of the samples with the exception of females for whom age at first offense was a stronger indicator. While sex was consistently a strong social history predictor across samples, parental authority and control was clearly influential in determining likelihood for re-offending for males, females, minorities and non-minority youth.

Table 20. AUC Scores by Criminal History and Social History Indicators for Full Sample and Sub-Samples (Re-arrest state variable)

	Full Sample	Male Sample	Female Sample	Non-White Sample	White Sample
Criminal history score	0.647	0.641	0.632	0.642	0.632
Age at first offense	0.587	0.580	0.595	0.578	0.577
Adjudicated misdemeanors	0.590	0.593	0.580	0.587	0.584
Adjudicated felonies	0.596	0.586	0.556	0.599	0.580
Adjudicated weapons offenses	0.518	0.514	0.506	0.518	0.516
Adjudicated against-person misdemeanors	0.541	0.545	0.552	0.534	0.539
Adjudicated against-person felonies	0.532	0.528	0.534	0.530	0.516
Secure detention placements	0.617	0.617	0.591	0.619	0.603
Commitment placements	0.558	0.559	0.533	0.560	0.550
Adjudicated escapes	0.503	0.503	0.502	0.502	0.503
Failure to appear warrants	0.574	0.577	0.570	0.576	0.558
Social history score	0.602	0.594	0.619	0.603	0.610
Sex	0.563	0.500	0.500	0.574	0.555
School enrollment, conduct, attendance and performance	0.558	0.555	0.567	0.557	0.556
Current peers	0.539	0.538	0.534	0.540	0.537
History of out-of-home placements	0.514	0.514	0.531	0.511	0.516
History of running away	0.540	0.545	0.581	0.531	0.555
Jail/imprisonment history of current household	0.537	0.539	0.542	0.531	0.537
Parental authority and control	0.562	0.562	0.581	0.561	0.561
Current alcohol and drug use	0.521	0.520	0.521	0.521	0.532
History of physical or sexual abuse	0.502	0.505	0.535	0.504	0.509
History of neglect	0.508	0.508	0.519	0.506	0.510
History of mental health problems	0.513	0.512	0.531	0.515	0.521

Alternative Risk Level Scoring

One of the main issues in assessing the validity and equity of risk assessments is the degree to which there is adequate proportionality and differences in the outcome rates between the risk classifications (Low, Moderate, Moderate-High, and High for the purposes of this report). One of the newer, albeit less utilized techniques, is the Dispersion Index for Risk (DIFR) (Silver and Banks, 1998). Silver and Banks' DIFR statistic measures how well a sample is divided into different risk levels and the degree to which the outcomes observed per level vary from the overall rate for the total sample. For example, a score of zero would indicate there are no differences between groups as compared to the total rate; while a score of three or more would indicate there are substantial differences between groups, while maintaining a higher proportion of the sample having the greatest rate difference from the total rate. So in essence, values on the DIFR will vary depending on the differences between the groups and the difference of the majority of the sample from the total sample's mean rate. The higher the DIFR score the more differentiated the groups are from one another and the better the overall classification. The DIFR equation is provided below where k is the number of groupings, P is the total rate, N is the total sample size, p is the group's rate, and n is the group's sample size (Silver, Smith & Banks, 2000).

$$Silver - Banks\ DIFR = \sqrt{\sum_{i=1}^{k} \left[ln\left(\frac{P}{1-P}\right) - ln\left(\frac{p_i}{1-p_i}\right)\right]^2 * \frac{n_i}{N}}$$

In examining the relationship between recidivism rates and the PACT risk categories, the DIFR equation was used to determine the base DIFR score prior to exploratory, alternative cut-off requirements for class specification. Table 21 demonstrates the base rate DIFR calculations for the actual PACT score classification table. As can be seen the final DIFR score for re-arrest was 0.50 and the final DIFR score for re-conviction was 0.45. The risk classifications were slightly better in classifying risk for re-arrest than for re-conviction, as borne out in previous analyses.

Further, it suggests that although there were clear differences in rates between the risk levels, the differences between the majority of the sample and the total rate were not necessarily discrete (DIFR <= 0.50).

Table 21. DIFR Results for Recidivism Outcomes and Current PACT Risk Levels

		Risk Level				
		Low	Moderate	Mod-High	High	Total
Percent Re-Arrest		35%	50%	60%	64%	46%
Percent Re-Conviction		22%	33%	40%	45%	30%
Sample Size (N)		40,690	12,377	14,859	12,266	80,192
Re-Arrest DIFR Table						
x1 --- LN(Total/1-Total)	-0.145	-0.145	-0.145	-0.145	-0.145	
x2 --- LN(Level/1-Level)		-0.619	0.000	0.405	0.575	
x3 --- (x1-x2)^2		0.225	0.021	0.303	0.519	
x4 --- Level N/ Total N	80,192	0.507	0.154	0.185	0.153	SUM
x5 --- x3 * x4		0.114	0.003	0.056	0.079	Σ: 0.253
Re-Arrest DIFR						**0.503**
Re-Conviction DIFR Table						
x1 --- LN(Total/1-Total)	-0.824	-0.824	-0.824	-0.824	-0.824	
x2 --- LN(Level/1-Level)		-1.279	-0.701	-0.391	-0.210	
x3 --- (x1-x2)^2		0.207	0.015	0.187	0.378	
x4 --- Level N/ Total N	80,192	0.507	0.154	0.185	0.153	SUM
x5 --- x3 * x4		0.105	0.002	0.035	0.058	Σ: 0.200
Re-Conviction DIFR						**0.447**

To determine alternative cut-off criteria, two different approaches were utilized. The first involved examining cut-offs or "bins" based on an equal range between the potential minimum and maximum probability derived from the basic logistic regression models (Criminal History Score ^ Re-conviction and Social History Score ^ Re-conviction); while the second method determined "bins" based on an equal distribution of the sample with less concern for predicted probability ranges. Table 22 shows the developed "bins" utilizing the first approach where the progression of predicted probabilities were divided into four equal ranges or quartiles (0-.25, .26-.50, etc.).

Table 22. PACT Score Ranges by Predicted Probabilities (Quartiles)

	Predicted Probabilities			
	0-.25	.26 - .50	.51-.75	.76 - 1.00
Criminal History Range	0 - 5	6 - 19	20 - 30	None
Social History Range	0 - 3	4 - 13	14 - 18	None
Percent of Sample[1]	37%	58%	5%	0%

[1]Based on the Criminal History Range

The results indicated that a disproportionate percentage (58%) of the sample fell within the predicted probability range of .26 to .50. This would do little, in practical terms, to aid in distinguishing distinctive risk level sub-groups.

Method 2, however, demonstrated a more equitable proportion per group while maintaining distinct differences in the predicted probability to re-offend. Method 2 equalized the proportion of the sample (roughly one-third) within the probability range. Table 23, Figure 2, and Figure 3 depict the "bins" used.

Table 23. PACT Score Ranges by Distribution of Cases (Thirds) and Predicted Probabilities

	Predicted Probabilities		
	0-.23	.24 - .31	.32-1.00
Criminal History Range	0 - 4	5 - 9	10 - 30
Social History Range	0 - 2	3 - 5	6 - 18
Percent of Sample[1]	28%	38%	34%

[1]Based on the Criminal History Range

Figure 2. Distribution of Sample Relative to Developed Criminal History Score Cut-Off Criteria and Predicted Probability of Re-Conviction

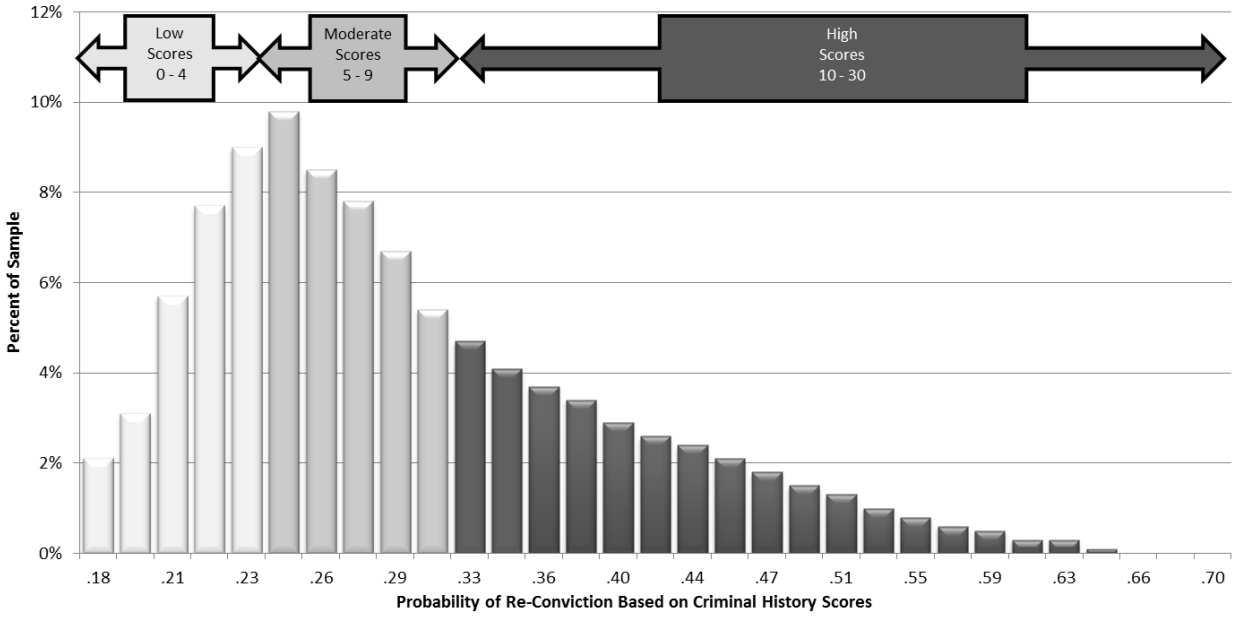
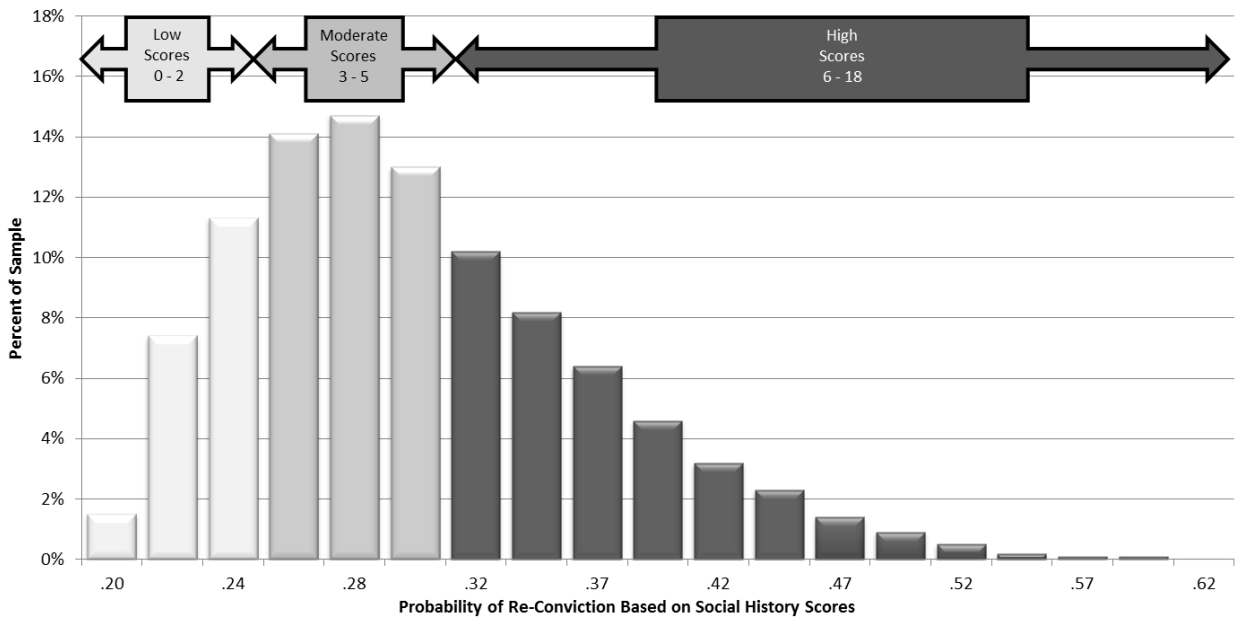


Figure 3. Distribution of Sample Relative to Developed Social History Score Cut-Off Criteria and Predicted Probability of Re-Conviction



By creating the "bins" based on the distribution of the sample, the results provided for a more uniform distribution of cases across the resulting "bins." This provided for a more robust grouping given the violation of normality in outcomes (fewer recidivists than non-recidivists).

There are a number of factors to consider in defining final risk classifications. There is, as presented previously, the actual relationship between the risk scores to outcomes as well as the distribution of scores across the population. But there are also more practical considerations as well, such as available resources, considerations of handling varying risk levels, labeling effects, and risk levels that are not equitably greater than any other. In looking at classifications, not merely as a delinquent label, but rather as a way to target limited resources, statistically informed, actuarial risk classifications, as opposed to clinical or intuitive assessments of risk, can be useful in directing limited resources to those most at risk and most in need (Flores et al., 2003).

The current PACT risk classification matrix is shown in Table 24, while the proposed alternative is depicted in Table 25. As can be seen, there were substantial differences between classification schemes. The most obvious was the reduction of four criminal history score ranges to three. As

previously explained, this provides for a more equitable distribution of youth based on the criminal history ranges.

Table 24. Current PACT Scoring Matrix

Criminal History Score	Social History Score		
	0 to 5	6 to 9	10 to 18
0 to 5	Low	Low	Moderate
6 to 8	Low	Moderate	Moderate-high
9 to 11	Moderate	Moderate-high	High
12 to 31	Moderate-high	High	High

Table 25. Developed PACT Scoring Matrix

Criminal History Score	Social History Score		
	0 to 2	3 to 5	6 to 18
0 to 4	Low	Low	Low
5 to 9	Low	Moderate	Moderate
10 to 31	Moderate-high	Moderate-high	High

The next step was to determine whether the developed model more distinctly operationalizes the groups as determined by subsequent rates of re-offending. Table 26 shows the recidivism outcomes for the current and developed risk level classification schemes.

Table 26. Re-Arrest and Re-Conviction Rates for Current and Developed PACT Risk Level Classifications

PACT Classification	Risk Level			
	Low	Moderate	Moderate-High	High
Current Matrix				
Re-Arrest	35%	50%	60%	64%
Re-Conviction	22%	33%	40%	45%
Percent of Sample	51%	15%	19%	15%
Developed Matrix				
Re-Arrest	31%	47%	59%	63%
Re-Conviction	19%	31%	39%	44%
Percent of Sample	35%	31%	16%	18%

As illustrated in the table, the differentiation in rates between groups was slightly greater for the developed model than the current classification scheme. In addition, the sample distribution was more equitable between low and moderate risk in the developed classification. To test if the proposed model improved the degree to which the group rates differed from one another and differed from the overall sample rate, three statistical techniques were used. The first technique was based upon DIFR calculations as is presented in Table 27. The second method examined ANOVA F tests (see Tables 28 through 31) and the third employed post-hoc ANOVA Bonferroni tests[3] (presented in Tables 32 through 35).

Table 27. DIFR Results for Recidivism Outcomes and Developed PACT Risk Levels

		Risk Level				
		Low	Moderate	Mod-High	High	Total
Percent Re-Arrest		31%	47%	59%	63%	46%
Percent Re-Conviction		19%	31%	39%	44%	30%
Sample Size (N)		28,002	24,742	13,028	14,420	80,192
Re-Arrest DIFR Table						
x1 --- LN(Total/1-Total)	-0.149	-0.149	-0.149	-0.149	-0.149	
x2 --- LN(Level/1-Level)		-0.788	-0.138	0.382	0.539	
x3 --- (x1-x2)^2		0.409	0.000	0.281	0.473	
x4 --- Level N/ Total N	80,192	0.349	0.309	0.162	0.180	SUM
x5 --- x3 * x4		0.143	0.000	0.046	0.085	Σ: 0.274
Re-Arrest DIFR						**0.523**
Re-Conviction DIFR Table						
x1 --- LN(Total/1-Total)	-0.824	-0.824	-0.824	-0.824	-0.824	
x2 --- LN(Level/1-Level)		-1.460	-0.793	-0.429	-0.248	
x3 --- (x1-x2)^2		0.404	0.001	0.156	0.333	
x4 --- Level N/ Total N	80,192	0.349	0.309	0.162	0.180	SUM
x5 --- x3 * x4		0.141	0.000	0.025	0.060	Σ: 0.227
Re-Conviction DIFR						**0.476**

The DIFR for the current PACT risk level classification was presented in Table 21 and depicted respective DIFR scores for both re-arrest (0.503) and re-conviction (0.447). The DIFR scores for the developed groupings as shown in Table 27 are slightly higher than those of the current PACT

[3] The post-hoc Bonferonni test adjusts for the increased likelihood that one or more test will be significant due to chance (Type I error) as more tests are conducted.

classification system. The DIFR statistic increased between the two classification models for both re-arrest outcomes, as well as re-conviction rates.

The second method to determine grouping improvements utilized ANOVA F tests. Tables 28 and 29 present the results for the current classifications, while Tables 30 and 31 present the results for the developed classifications. As presented, there were some slight improvements both between and within group structures compared to the current risk level categorizations. The between groups were more clearly defined for the developed method compared to the current risk levels (re-arrest mean squares: 423 versus 409; re-conviction 247 versus 237, respectively). This demonstrates that the developed model had rates of re-offending that were more diverse than those of the current scoring matrix. Further, within each group the rates were marginally more similar to each other in the developed risk levels than in the current classification scheme. This is evidenced by the slightly lower within group sum of squares of the developed risk levels compared to those of the current risk levels.

Table 28. One-Way ANOVA of Re-Arrest and Current Risk Levels

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1,225.39	3	408.46	1,750.38	0.00
Within Groups	18,712.39	80,188	0.23		
Total	19,937.78	80,191			

Table 29. One-Way ANOVA of Re-Conviction and Current Risk Levels

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	712.84	3	237.61	1,170.28	0.00
Within Groups	16,281.35	80,188	0.20		
Total	16,994.19	80,191			

Table 30. One-Way ANOVA of Re-Arrest and Developed Risk Levels

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	1,268.10	3	422.70	1,815.54	0.00
Within Groups	18,669.68	80,188	0.23		
Total	19,937.78	80,191			

Table 31. One-Way ANOVA of Re-Conviction and Developed Risk Levels

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	741.97	3	247.32	1,220.29	0.00
Within Groups	16,252.22	80,188	0.20		
Total	16,994.19	80,191			

Examination of post-hoc Bonferroni tests was the final method used to assess whether the proposed model improved the degree to which group rates differed from one another and from the overall sample. Tables 32 and 33 present the current risk levels and Tables 34 and 35 present the developed risk levels. In looking at the mean differences between risk levels, in the majority of instances the difference between the lower risk levels (low and moderate) and the higher risk levels (moderate-high and high) was greater for the developed classification scheme than it was for the current risk level categorization.

Table 32. Bonferroni Tests of Re-Arrest and Current Risk Levels

Risk Level	Compared To	Mean Difference	Std. Error	Sig.	95% CI Lower	95% CI Upper
Low Risk						
	Moderate Risk	-15.6%	0.00	0.00	-16.9%	-14.3%
	Moderate-High Risk	-24.8%	0.00	0.00	-26.0%	-23.6%
	High Risk	-29.6%	0.00	0.00	-30.9%	-28.3%
Moderate Risk						
	Moderate-High Risk	-9.2%	0.01	0.00	-10.8%	-7.7%
	High Risk	-14.1%	0.01	0.00	-15.7%	-12.4%
Moderate-High Risk						
	High Risk	-4.8%	0.01	0.00	-6.4%	-3.3%

Table 33. Bonferroni Tests of Re-Conviction and Current Risk Levels

Risk Level	Compared To	Mean Difference	Std. Error	Sig.	95% CI Lower	95% CI Upper
Low Risk						
	Moderate Risk	-11.4%	0.00	0.00	-12.6%	-10.2%
	Moderate-High Risk	-18.6%	0.00	0.00	-19.7%	-17.4%
	High Risk	-23.0%	0.00	0.00	-24.2%	-21.8%
Moderate Risk						
	Moderate-High Risk	-7.2%	0.01	0.00	-8.6%	-5.7%
	High Risk	-11.6%	0.01	0.00	-13.1%	-10.1%
Moderate-High Risk						
	High Risk	-4.4%	0.01	0.00	-5.9%	-3.0%

Table 34. Bonferroni Tests of Re-Arrest and Developed Risk Levels

Risk Level	Compared To	Mean Difference	Std. Error	Sig.	95% CI Lower	95% CI Upper
Low Risk						
	Moderate Risk	-15.3%	0.00	0.00	-16.4%	-14.2%
	Moderate-High Risk	-28.2%	0.01	0.00	-29.5%	-26.8%
	High Risk	-31.9%	0.00	0.00	-33.2%	-30.6%
Moderate Risk						
	Moderate-High Risk	-12.9%	0.01	0.00	-14.3%	-11.5%
	High Risk	-16.6%	0.01	0.00	-17.9%	-15.3%
Moderate-High Risk						
	High Risk	-3.7%	0.01	0.00	-5.3%	-2.2%

Table 35. Bonferroni Tests of Re-Conviction and Developed Risk Levels

Risk Level	Compared To	Mean Difference	Std. Error	Sig.	95% CI Lower	95% CI Upper
Low Risk						
	Moderate Risk	-12.3%	0.00	0.00	-13.3%	-11.3%
	Moderate-High Risk	-20.6%	0.00	0.00	-21.8%	-19.3%
	High Risk	-25.0%	0.00	0.00	-26.2%	-23.8%
Moderate Risk						
	Moderate-High Risk	-8.3%	0.00	0.00	-9.6%	-7.0%
	High Risk	-12.7%	0.00	0.00	-13.9%	-11.4%
Moderate-High Risk						
	High Risk	-4.4%	0.01	0.00	-5.8%	-3.0%

DISCUSSION AND RECOMMENDATIONS

The current study examined the validity of the Positive Achievement Change Tool (PACT) risk assessment instrument currently used by the Florida Department of Juvenile Justice to determine youths' risk to re-offend. The study examined all PACT assessments completed for youth released from FDJJ services in fiscal years 2007-08 and 2008-09. The analysis included univariate, bivariate and multivariate analyses to evaluate the validity of the instrument for the general population of juvenile offenders, as well as subsamples based on sex, race, ethnicity, and age.

The study sample was comprised of 80,192 PACT assessments for youth released between FY 2007-08 and FY 2008-09. Seventy-seven percent were assessments involving males, more than half were for non-white youth (53%), and 13% involved Hispanic youth. Slightly more than one-third of the validation study sample was 17 years old or older at admission; twenty-four percent was 16 years old; thirty percent was between 14 and 15 years old, and just under 9% was 13 years or younger.

The average criminal history score for all releases was 8.36 (with a range from a low of 0 to a high of 30). Social history scores ranged from a low of zero to a high of 18, with an average score for all releases of 5.06. Overall, of the 80,192 releases with PACT assessments, the majority were assessed as low risk (51%). Equal percentages of releases were classified as moderate risk (15%) and high risk (15%), while 19% were assessed as moderate-high risk to re-offend. Just under half of the release pool went on to be re-arrested (46%) and nearly 31% were re-adjudicated or re-convicted for a crime.

Bivariate analyses revealed that for the full sample and each of the subsamples, the PACT was significantly related to re-arrest. Youth classified in the higher risk levels experienced greater rates of recidivism than did those classified in the lower risk levels. This trend was consistent for males and females, whites and non-whites, Hispanics and non-Hispanics, and across all four age

categories. These findings lend support for the validity of the PACT assessment in accurately predicting subsequent offending.

In addition to exploring the predictive validity of the PACT for varying offender populations, the current study also examined whether recidivism outcomes were positively related to PACT risk level for varying dispositions or supervision placement types (e.g., diversion, probation, commitment). For each placement type, ranging from diversion services through to maximum risk residential commitment, the relationship between PACT risk level and re-arrest was statistically significant at the $p \leq .05$ level. It should be noted, however, that for those disposed to day treatment or minimum risk non-residential programs, there was little variation in re-arrest rates across the four PACT risk categories.

Multivariate analyses in which PACT scores were examined for predictive validity while controlling for covariates revealed that overall risk levels were significant predictors of re-arrest for the full sample of releases. As the overall risk to re-offend increased the likelihood of re-arrest increased by a little more than one and a half times (odds ratio of 1.55). The results further revealed that the PACT assessment predicts recidivism equally well for not only males and females, but also for non-white and white youth, and for Hispanic adolescents.

Examination of the relative influence of individual PACT indicators found that the strongest predictor for the full sample of releases was sex (odds ratio of 1.94), followed by race (odd ratio of 1.56), adjudicated misdemeanors (odds ratio of 1.19), jail imprisonment history of current household (odds ratio of 1.16), and school enrollment, conduct, performance and attendance (odds ratio of 1.15). Males, minority youth, youth with a current alcohol or drug problem, and youth with a history of adjudicated misdemeanors or felonies, were more likely than adolescents without these characteristics to re-offend. Similar patterns were found for males, females, non-white and white youth.

Finally, the predictive validity of the PACT was additionally assessed using Area Under the Curve (AUC) statistics. AUC scores for the models examining re-arrest ranged from a low of .614 for females to a high of .632 for the non-white sample. The full sample and the male-only sample resulted in AUC scores of .632 and .630, respectively. The AUC measures of validity confirmed earlier analyses documenting the gender and race neutrality of the PACT assessment. The findings from the study support the predictive validity of the PACT risk level categorization, criminal history scores and social history scores for the delinquency population in general in Florida, as well as subsamples based on gender, race and ethnicity. Recommendations for potential changes to the PACT designed to increase the instruments parsimony are examined in the subsequent phases outlining results of the factor analyses and reliability study.

PHASE I SUPPLEMENTAL ANALYSES

The following models were calculated following the preparation of the PACT Validity-General Report, at the request of the Department, to provide additional insight into the predictive validity of the PACT for the various placement types (i.e., diversion, probation, residential, and post-commitment services cohorts).

Overall, the supplemental analyses resulted in largely similar outcomes to those reported in the main study. For each placement category (diversion, probation, residential, and post-commitment services), the PACT criminal history and social history scores remained significant predictors of subsequent arrest, controlling for race, gender and age at release. Social history scores were more predictive than criminal history scores for diversion and probation releases, while criminal history scores were more predictive for youth released from residential and post-commitment services.

Notably, the PACT social history score failed to significantly predict reoffending for youth released from day treatment/minimum risk services. Future research should further examine the underlying factors impacting the predictive validity of the PACT assessment with this population.

The supplemental multivariate regression analyses included examination of specific placement type cohorts (e.g., IDDS, probation enhancement services, moderate risk residential, etc.) to determine the individual PACT indicators predictive of subsequent offending. The results revealed that for diversion and probation youth, the most predictive factors included prior adjudicated misdemeanors, gender, race, and whether a current family member in their household has been incarcerated. Among youth released from residential commitment, prior adjudicated misdemeanors, gender and race were likewise strong predictors of re-arrest. Additionally, parental authority and control was a strong predictor of the likelihood for re-arrest among residential releases.

Table 36. Supplemental Analysis: Re-Arrest Regressed on Criminal History Score, Social History Score, and Covariates for Full Sample and Sub-Samples Based on Placement Category

Variable	Full Sample	Diversion	Probation	Residential	Post-Commitment Services
Criminal History Score	.071***	.102***	.064***	.063***	.051***
	1.074	*1.108*	*1.066*	*1.065*	*1.052*
	(.002)	(.010)	(.003)	(.004)	(.005)
Social History Score	.088***	.171***	.091***	.054***	.022**
	1.092	*1.186*	*1.095*	*1.055*	*1.022*
	(.003)	(.009)	(.004)	(.006)	(.008)
Race	.457***	.442***	.448***	.508***	.384***
	1.580	*1.555*	*1.566*	*1.662*	*1.468*
	(.015)	(.042)	(.020)	(.037)	(.044)
Gender	.620***	.548***	.509***	.886***	.781***
	1.859	*1.730*	*1.664*	*2.426*	*2.184*
	(.018)	(.046)	(.024)	(.049)	(.062)
Age at release	-.016***	.087***	-.042***	-.114***	-.075***
	.984	*1.091*	*.959*	*.893*	*.928*
	(.005)	(.013)	(.007)	(.014)	(.017)
Constant	-1.614***	-3.799***	-1.042***	.233	-.099
	.199	*.022*	*.353*	*1.262*	*.905*
	(.082)	(.231)	(.119)	(.250)	(.309)

Note: Beta values reported with Exp(B) in italics and standard errors in parentheses.
*$p \leq .05$
**$p \leq .01$
***$p \leq .001$

Table 37. Supplemental Analysis: Re-Arrest Regressed on Criminal History Score, Social History Score, and Covariates by Specific Placement Types

Variable	Diversion Services	IDDS	General/ Intensive Probation	Probation Enhancement Services	Day Treatment/ Minimum Risk	Redirection Services	Low Risk Commitment	Moderate Risk Commitment	High Risk Commitment	Maximum Risk Commitment	Post Commitment State	Post Commitment Provider
Criminal History Score	.121***	.066***	.065***	.056***	.026**	.040***	.059***	.060***	.092***	.066	.071***	.043***
	1.129	*1.069*	*1.067*	*1.057*	*1.026*	*1.041*	*1.060*	*1.062*	*1.097*	*1.069*	*1.073*	*1.044*
	(.012)	(.018)	(.003)	(.009)	(.009)	(.010)	(.014)	(.005)	(.008)	(.037)	(.009)	(.005)
Social History Score	.193***	.143***	.092***	.114***	.010	.075***	.096***	.046***	.071***	-.122	.021	.024**
	1.213	*1.154*	*1.096*	*1.121*	*1.010*	*1.078*	*1.101*	*1.047*	*1.073*	*.885*	*1.021*	*1.024*
	(.012)	(.014)	(.004)	(.016)	(.013)	(.015)	(.021)	(.007)	(.014)	(.070)	(.014)	(.009)
Race	.511***	.312***	.451***	.557***	.393***	.398***	.532***	.527***	.394***	.884*	.327***	.402***
	1.667	*1.366*	*1.570*	*1.745*	*1.482*	*1.489*	*1.703*	*1.694*	*1.484*	*2.421*	*1.387*	*1.495*
	(.053)	(.071)	(.023)	(.087)	(.069)	(.084)	(.119)	(.044)	(.087)	(.439)	(.085)	(.051)
Gender	.570***	.491***	.533***	.497***	.505***	.418***	.885***	.897***	1.033***	.726	.740***	.791***
	1.768	*1.634*	*1.703*	*1.644*	*1.658*	*1.519*	*2.422*	*2.452*	*2.810*	*2.066*	*2.096*	*2.205*
	(.057)	(.080)	(.027)	(.102)	(.082)	(.088)	(.144)	(.056)	(.153)	(1.356)	(.118)	(.073)
Age at release	.100***	.054**	-.017*	-.024	-.097***	-.128***	-.186***	-.103***	-.055	.193	-.108**	-.060**
	1.105	*1.056*	*.983*	*.977*	*.907*	*.880*	*.830*	*.902*	*.946*	*1.213*	*.898*	*.941*
	(.017)	(.021)	(.007)	(.028)	(.029)	(.030)	(.045)	(.017)	(.034)	(.199)	(.033)	(.020)
Constant	-4.162***	-2.985***	-1.555***	-1.254**	.877	1.184*	1.391	.119	-1.533*	-4.575	.213	-.239
	.016	*.051*	*.211*	*.286*	*2.402*	*3.267*	*4.017*	*1.126*	*.216*	*.010*	*1.238*	*.787*
	(.293)	(.388)	(.133)	(.485)	(.498)	(.507)	(.793)	(.309)	(.622)	(3.900)	(.594)	(.363)

Note: Beta values reported with Exp(B) in italics and standard errors in parentheses.
*$p \leq .05$
**$p \leq .01$
***$p \leq .001$

Table 38. Supplemental Analyses: Re-Arrest Regressed on Individual PACT Indicators for Diversion Releases

Variable	Diversion	Male Only	Female Only
Criminal History Indicators			
Age at first offense	.032	.017	.078*
	1.033	*1.017*	*1.082*
	(.017)	(.020)	(.032)
Adjudicated misdemeanors	.364***	.424***	.234**
	1.439	*1.529*	*1.264*
	(.047)	(.058)	(.085)
Adjudicated felonies	.111***	.125***	.049
	1.117	*1.133*	*1.051*
	(.021)	(.024)	(.049)
Adjudicated weapons offenses	-.246**	-.258*	-.235
	.782	*.773*	*.791*
	(.094)	(.101)	(.263)
Adjudicated against-person misdemeanors	.139**	.098	.218**
	1.149	*1.103*	*1.244*
	(.049)	(.060)	(.084)
Adjudicated against-person felonies	.012	-.013	.105
	1.012	*.987*	*1.111*
	(.037)	(.042)	(.076)
Secure detention placements	.136	.189	-.038
	1.146	*1.208*	*.963*
	(.098)	(.116)	(.192)
Commitment placements	.010	.044	-.288
	1.010	*1.045*	*.750*
	(.276)	(.330)	(.683)
Adjudicated escapes	-.632	.247	.368
	.532	*1.280*	*1.445*
	(1.562)	(.136)	(1.994)
Failure to appear warrants	.171	.224***	.053
	1.186	*1.251*	*1.054*
	(.110)	(.033)	(.196)
Social History Indicators			
Sex	.705***		
	2.023		
	(.048)		
School enrollment/conduct/ attendance/performance	.220***	.193***	.212***
	1.246	*1.213*	*1.236*
	(.028)	(.039)	(.051)
Current peers	.158***	-.111	.056
	1.172	*.895*	*1.057*
	(.033)	(.110)	(.066)
History of out-of-home placements	.002	.226***	.198
	1.002	*1.253*	*1.219*
	(.087)	(.042)	(.143)
History of running away	.194***	.143*	.154**
	1.215	*1.153*	*1.166*
	(.032)	(.060)	(.051)
Jail/imprisonment history of current household	.150**	.172***	.164
	1.162	*1.187*	*1.178*
	(.049)	(.044)	(.087)
Parental authority and control	.222***	.164***	.339***
	1.249	*1.179*	*1.404*
	(.036)	(.042)	(.067)
Current alcohol and drug use	.173***	.003	.184*
	1.188	*1.003*	*1.202*
	(.036)	(.098)	(.074)
History of physical/sexual	-.047	.066	-.109
	.954	*1.068*	*.897*
	(.074)	(.082)	(.114)
History of neglect	.041	.077	.012
	1.042	*1.080*	*1.012*
	(.064)	(.090)	(.103)
History of mental health problems	.100	.449***	.193
	1.105	*1.567*	*1.213*
	(.076)	(.051)	(.139)
Race	.421***	-1.603***	.359***
	1.523	*.000*	*1.431*
	(.043)	(.068)	(.082)
Constant	-2.311***	.000***	-2.340***
	.099	*1.000*	*.096*
	(.065)	(.000)	(.107)

Note: Beta values reported with Exp(B) in italics and standard errors in parentheses.
*$p \leq .05$
**$p \leq .01$
***$p \leq .001$

Table 39. Supplemental Analyses: Re-Arrest Regressed on Individual PACT Indicators for Probation Releases

Variable	Probation	Male Only	Female Only
Criminal History Indicators			
Age at first offense	.089***	.067***	.176***
	1.093	*1.069*	*1.193*
	(.009)	(.010)	(.020)
Adjudicated misdemeanors	.165***	.184***	.111***
	1.180	*1.202*	*1.117*
	(.015)	(.017)	(.030)
Adjudicated felonies	.074***	.073***	.084***
	1.077	*1.076*	*1.088*
	(.007)	(.008)	(.018)
Adjudicated weapons offenses	-.049	-.051	-.037
	.952	*.951*	*.963*
	(.033)	(.036)	(.091)
Adjudicated against-person misdemeanors	.006	.011	.004
	1.006	*1.011*	*1.004*
	(.018)	(.022)	(.035)
Adjudicated against-person felonies	-.073***	-.076***	-.063*
	.929	*.926*	*.939*
	(.013)	(.015)	(.031)
Secure detention placements	.101***	.107***	.071*
	1.106	*1.113*	*1.074*
	(.015)	(.017)	(.031)
Commitment placements	.031	.050*	-.038
	1.032	*1.051*	*.963*
	(.021)	(.023)	(.046)
Adjudicated escapes	-.278	-.110	-.657
	.757	*.896*	*.518*
	(.205)	(.246)	(.404)
Failure to appear warrants	.125***	.114***	.153***
	1.133	*1.121*	*1.165*
	(.020)	(.023)	(.037)
Social History Indicators			
Sex	.570***		
	1.769		
	(.025)		
School enrollment/conduct/ attendance/performance	.160***	.164***	.152***
	1.174	*1.178*	*1.164*
	(.013)	(.015)	(.027)
Current peers	.078***	.067***	.110***
	1.081	*1.069*	*1.116*
	(.015)	(.016)	(.032)
History of out-of-home placements	-.001	-.002	.005
	.999	*.998*	*1.005*
	(.036)	(.044)	(.062)
History of running away	.063***	.047**	.086***
	1.065	*1.048*	*1.089*
	(.012)	(.015)	(.021)
Jail/imprisonment history of current household	.174***	.168***	.193***
	1.190	*1.183*	*1.213*
	(.023)	(.026)	(.046)
Parental authority and control	.128***	.127***	.124***
	1.137	*1.135*	*1.132*
	(.017)	(.020)	(.036)
Current alcohol and drug use	.064***	.059***	.071*
	1.066	*1.060*	*1.074*
	(.016)	(.018)	(.035)
History of physical/sexual	-.034	-.085*	.035
	.967	*.918*	*1.035*
	(.031)	(.039)	(.053)
History of neglect	-.026	-.046	.006
	.975	*.956*	*1.006*
	(.025)	(.031)	(.042)
History of mental health problems	.054	.027	.120
	1.055	*1.028*	*1.127*
	(.033)	(.039)	(.062)
Race	.440***	.481***	.297***
	1.553	*1.618*	*1.346*
	(.021)	(.024)	(.045)
Constant	-1.855***	-1.233***	-2.048***
	.156	*.292*	*.129*
	(.037)	(.034)	(.068)

Note: Beta values reported with Exp(B) in italics and standard errors in parentheses.

*p≤.05

**p≤.01

***p≤.001

Table 40. Supplemental Analyses: Re-Arrest Regressed on Individual PACT Indicators for Residential Releases

Variable	Residential	Male Only	Female Only
Criminal History Indicators			
Age at first offense	.129***	.121***	.187***
	1.138	*1.129*	*1.205*
	(.020)	(.022)	(.056)
Adjudicated misdemeanors	.146***	.155***	.092
	1.157	*1.168*	*1.096*
	(.021)	(.023)	(.054)
Adjudicated felonies	.061***	.065***	.020
	1.063	*1.067*	*1.020*
	(.011)	(.012)	(.029)
Adjudicated weapons offenses	.037	.043	-.015
	1.037	*1.044*	*.985*
	(.048)	(.051)	(.162)
Adjudicated against-person misdemeanors	-.009	-.029	.056
	.991	*.971*	*1.058*
	(.029)	(.032)	(.068)
Adjudicated against-person felonies	-.064***	-.085***	.076
	.938	*.919*	*1.079*
	(.018)	(.019)	(.049)
Secure detention placements	.146***	.141***	.156**
	1.157	*1.151*	*1.169*
	(.020)	(.022)	(.050)
Commitment placements	.018	.028	-.046
	1.018	*1.028*	*.956*
	(.017)	(.019)	(.043)
Adjudicated escapes	-.002	.028	.011
	.998	*1.029*	*1.011*
	(.111)	(.136)	(.203)
Failure to appear warrants	.076**	.085**	.051
	1.079	*1.089*	*1.052*
	(.024)	(.027)	(.059)
Social History Indicators			
Sex	.853***		
	2.347		
	(.054)		
School enrollment/conduct/ attendance/performance	.061*	.086**	-.081
	1.063	*1.090*	*.922*
	(.025)	(.027)	(.065)
Current peers	.056**	.070**	-.025
	1.057	*1.072*	*.976*
	(.021)	(.023)	(.053)
History of out-of-home placements	-.058	-.057	-.065
	.943	*.945*	*.937*
	(.051)	(.058)	(.109)
History of running away	.027	.030	.006
	1.027	*1.031*	*1.006*
	(.017)	(.018)	(.042)
Jail/imprisonment history of current household	.086*	.089*	.075
	1.090	*1.093*	*1.078*
	(.037)	(.041)	(.091)
Parental authority and control	.162***	.117***	.371***
	1.175	*1.124*	*1.449*
	(.029)	(.032)	(.071)
Current alcohol and drug use	.072***	.071**	.076
	1.075	*1.074*	*1.079*
	(.022)	(.024)	(.053)
History of physical/sexual	-.139**	-.154**	-.063
	.870	*.858*	*.939*
	(.048)	(.055)	(.100)
History of neglect	.026	.029	.023
	1.026	*1.029*	*1.023*
	(.032)	(.037)	(.066)
History of mental health problems	.054	.072	-.024
	1.055	*1.075*	*.976*
	(.046)	(.053)	(.101)
Race	.520***	.539***	.412***
	1.682	*1.715*	*1.510*
	(.039)	(.042)	(.099)
Constant	-1.949***	-1.094***	-1.950***
	.142	*.335*	*.142*
	(.092)	(.084)	(.218)

Note: Beta values reported with Exp(B) in italics and standard errors in parentheses.

*$p \leq .05$

**$p \leq .01$

***$p \leq .001$

Table 41. Supplemental Analyses: Re-Arrest Regressed on Individual PACT Indicators for Post-Commitment Services Releases

Variable	Post-Commitment Services	Male Only	Female Only
Criminal History Indicators			
Age at first offense	.122***	.113***	.210**
	1.129	*1.119*	*1.234*
	(.026)	(.027)	(.076)
Adjudicated misdemeanors	.117***	.109***	.153*
	1.125	*1.115*	*1.166*
	(.025)	(.027)	(.071)
Adjudicated felonies	.042**	.041**	.038
	1.042	*1.042*	*1.039*
	(.013)	(.014)	(.038)
Adjudicated weapons offenses	-.019	-.021	-.003
	.982	*.980*	*.997*
	(.057)	(.059)	(.207)
Adjudicated against-person misdemeanors	.037	.027	.071
	1.038	*1.027*	*1.074*
	(.034)	(.037)	(.089)
Adjudicated against-person felonies	-.098***	-.103***	-.071
	.907	*.902*	*.931*
	(.021)	(.022)	(.059)
Secure detention placements	.117***	.118***	.110
	1.125	*1.125*	*1.116*
	(.023)	(.025)	(.064)
Commitment placements	.028	.040	-.047
	1.029	*1.041*	*.954*
	(.022)	(.024)	(.059)
Adjudicated escapes	.021	.039	.037
	1.021	*1.040*	*1.038*
	(.132)	(.156)	(.256)
Failure to appear warrants	.063*	.064*	.047
	1.065	*1.066*	*1.048*
	(.029)	(.031)	(.076)
Social History Indicators			
Sex	.773***		
	2.167		
	(.067)		
School enrollment/conduct/ attendance/performance	-.025	-.029	-.006
	.975	*.972*	*.994*
	(.029)	(.031)	(.076)
Current peers	.071*	.079*	.009
	1.073	*1.082*	*1.009*
	(.029)	(.031)	(.084)
History of out-of-home placements	-.066	-.051	-.134
	.936	*.951*	*.875*
	(.063)	(.070)	(.145)
History of running away	.027	.044	-.046
	1.028	*1.045*	*.956*
	(.021)	(.023)	(.052)
Jail/imprisonment history of current household	.070	.116*	-.205
	1.072	*1.124*	*.815*
	(.047)	(.051)	(.123)
Parental authority and control	-.023	-.030	.022
	.977	*.971*	*1.022*
	(.038)	(.041)	(.098)
Current alcohol and drug use	.062	.074	-.004
	1.064	*1.077*	*.996*
	(.046)	(.050)	(.131)
History of physical/sexual	-.022	-.076	.181
	.978	*.927*	*1.198*
	(.063)	(.071)	(.133)
History of neglect	.049	.012	.159
	1.050	*1.012*	*1.172*
	(.043)	(.049)	(.088)
History of mental health problems	-.028	-.061	.134
	.973	*.941*	*1.143*
	(.057)	(.064)	(.130)
Race	.401***	.401***	.400**
	1.493	*1.493*	*1.491*
	(.046)	(.049)	(.124)
Constant	-1.549***	-.764***	-1.670***
	.212	*.466*	*.188*
	(.108)	(.097)	(.265)

Note: Beta values reported with Exp(B) in italics and standard errors in parentheses.

*$p \leq .05$

**$p \leq .01$

***$p \leq .001$

Table 42. Supplemental Analyses: Re-Arrest Regressed on Individual PACT Indicators by Placement Types

Variable	Diversion Services	IDDS	General/ Intensive Probation	Probation Enhancement Services	Day Treatment/ Minimum Risk	Redirection Services	Low Risk Commitment	Moderate Risk Commitment	High Risk Commitment	Maximum Risk Commitment	Post Commitment - State	Post Commitment - Provider
Criminal History Indicators												
Age at first offense	.012	.093**	.072***	.069	.112**	.166***	.218***	.122***	.082	.387	.139**	.110***
	1.012	*1.097*	*1.075*	*1.071*	*1.118*	*1.181*	*1.244*	*1.129*	*1.085*	*1.473*	*1.150*	*1.116*
	(.020)	(.031)	(.010)	(.042)	(.037)	(.043)	(.066)	(.024)	(.050)	(.313)	(.049)	(.030)
Adjudicated misdemeanors	.422***	.221**	.183***	.223***	.064	.112*	.120	.139***	.138**	.308	.189***	.094**
	1.525	*1.247*	*1.201*	*1.250*	*1.066*	*1.118*	*1.127*	*1.150*	*1.148*	*1.361*	*1.208*	*1.099*
	(.058)	(.084)	(.017)	(.062)	(.044)	(.053)	(.070)	(.025)	(.050)	(.311)	(.049)	(.030)
Adjudicated felonies	.121***	.087*	.080***	.164***	-.018	.068*	-.006	.059***	.129***	.553*	.075**	.027
	1.129	*1.090*	*1.083*	*1.178*	*.982*	*1.070*	*.994*	*1.061*	*1.138*	*1.738*	*1.078*	*1.027*
	(.027)	(.037)	(.008)	(.032)	(.022)	(.027)	(.036)	(.013)	(.029)	(.230)	(.025)	(.015)
Adjudicated weapons offenses	-.144	-.387**	-.014	-.099	-.112	-.406**	.055	.022	.107	1.019	-.076	-.004
	.866	*.679*	*.986*	*.906*	*.895*	*.667*	*1.057*	*1.022*	*1.113*	*2.769*	*.927*	*.996*
	(.126)	(.141)	(.038)	(.145)	(.102)	(.130)	(.189)	(.058)	(.104)	(.694)	(.120)	(.065)
Adjudicated against-person misdemeanors	.161**	.112	-.002	.051	-.003	-.080	-.035	-.025	.071	.041	.044	.035
	1.174	*1.119*	*.998*	*1.052*	*.997*	*.923*	*.966*	*.976*	*1.073*	*1.042*	*1.045*	*1.035*
	(.062)	(.080)	(.021)	(.077)	(.057)	(.067)	(.093)	(.034)	(.069)	(.461)	(.068)	(.040)
Adjudicated against-person felonies	.067	-.054	-.059***	-.327***	-.025	-.052	-.098	-.024	-.125***	.385	-.093*	-.098***
	1.070	*.947*	*.943*	*.721*	*.975*	*.949*	*.906*	*.976*	*.882*	*1.470*	*.911*	*.907*
	(.049)	(.056)	(.015)	(.052)	(.043)	(.052)	(.074)	(.022)	(.038)	(.295)	(.041)	(.024)
Secure detention placements	.284*	-.043	.106***	.038	.016	.035	.262***	.129***	.157**	-.225	.128**	.119***
	1.329	*.958*	*1.111*	*1.039*	*1.016*	*1.036*	*1.300*	*1.138*	*1.170*	*.799*	*1.136*	*1.127*
	(.135)	(.151)	(.018)	(.057)	(.040)	(.048)	(.062)	(.023)	(.052)	(.330)	(.045)	(.027)
Commitment placements	-.241	-2.179	-.028	.080	.145*	-.001	-.012	.002	.094**	-.648**	.064	.009
	.786	*.113*	*.973*	*1.083*	*1.156*	*.999*	*.988*	*1.002*	*1.099*	*.523*	*1.067*	*1.009*
	(.287)	(4.106)	(.027)	(.053)	(.062)	(.069)	(.067)	(.022)	(.036)	(.242)	(.040)	(.026)
Adjudicated escapes	4.383		-.086	-.613	-.326	-1.406	-.609	-.067	.067	1.860	-.207	.095
	80.108		*.918*	*.542*	*.722*	*.245*	*.544*	*.935*	*1.069*	*6.425*	*.813*	*1.100*
	(8.225)		(.264)	(.459)	(.695)	(.776)	(1.035)	(.149)	(.179)	(2.015)	(.277)	(.152)
Failure to appear warrants	.135	.029	.147***	.134	.047	.053	-.057	.086**	.078	.268	.023	.078*
	1.144	*1.029*	*1.158*	*1.144*	*1.048*	*1.054*	*.945*	*1.090*	*1.081*	*1.307*	*1.023*	*1.081*
	(.128)	(.239)	(.023)	(.084)	(.055)	(.068)	(.083)	(.029)	(.058)	(.410)	(.056)	(.034)
Social History Indicators												
Sex	.766***	.593***	.586***	.549***	.573***	.440***	.959***	.881***	.847***	.352	.693***	.791***
	2.151	*1.810*	*1.796*	*1.731*	*1.774*	*1.553*	*2.609*	*2.412*	*2.332*	*1.422*	*1.999*	*2.206*
	(.058)	(.085)	(.029)	(.111)	(.089)	(.096)	(.162)	(.061)	(.164)	(1.522)	(.128)	(.079)
School enrollment/conduct/ attendance/performance	.226***	.196***	.173***	.147**	-.027	.112*	.112	.039	.099	-.198	.001	-.036
	1.254	*1.216*	*1.189*	*1.159*	*.973*	*1.119*	*1.118*	*1.040*	*1.104*	*.820*	*1.001*	*.965*
	(.034)	(.049)	(.015)	(.057)	(.050)	(.056)	(.082)	(.030)	(.056)	(.313)	(.054)	(.034)
Current peers	.133**	.213***	.094***	-.014	-.004	.104	.009	.054*	.097*	-.396	.134*	.049
	1.142	*1.237*	*1.099*	*.986*	*.996*	*1.110*	*1.009*	*1.056*	*1.102*	*.673*	*1.143*	*1.050*
	(.042)	(.055)	(.017)	(.063)	(.045)	(.057)	(.074)	(.025)	(.046)	(.338)	(.058)	(.033)
History of out-of-home placements	.071	-.093	.015	.106	-.175	.063	-.011	-.033	-.122	-.238	-.232	-.010
	1.074	*.911*	*1.015*	*1.112*	*.840*	*1.065*	*.989*	*.967*	*.885*	*.788*	*.793*	*.991*
	(.113)	(.138)	(.042)	(.138)	(.111)	(.134)	(.176)	(.061)	(.117)	(.853)	(.121)	(.074)
History of running away	.248***	.156***	.058***	.109*	.016	.029	.173**	.021	-.017	-.939**	.054	.017
	1.281	*1.169*	*1.060*	*1.115*	*1.016*	*1.029*	*1.189*	*1.022*	*.983*	*.391*	*1.055*	*1.018*
	(.047)	(.045)	(.014)	(.048)	(.033)	(.040)	(.058)	(.020)	(.042)	(.310)	(.041)	(.025)
Jail/imprisonment history of current household	.165**	.129	.166***	.100	.077	.228**	.192	.046	.147	.363	.072	.071
	1.179	*1.137*	*1.180*	*1.105*	*1.080*	*1.256*	*1.212*	*1.047*	*1.158*	*1.437*	*1.075*	*1.074*
	(.064)	(.079)	(.026)	(.096)	(.071)	(.087)	(.122)	(.044)	(.090)	(.504)	(.092)	(.055)
Parental authority and control	.251***	.169**	.110***	.207**	.048	.159*	.062	.142***	.250***	-.102	-.073	-.007
	1.285	*1.184*	*1.116*	*1.230*	*1.049*	*1.172*	*1.064*	*1.153*	*1.284*	*.903*	*.930*	*.993*
	(.047)	(.059)	(.020)	(.075)	(.057)	(.069)	(.099)	(.034)	(.067)	(.396)	(.073)	(.044)
Current alcohol and drug use	.169***	.175**	.058**	.247***	-.015	.092	.202*	.057*	.127*	.810	-.018	.102
	1.184	*1.191*	*1.060*	*1.280*	*.986*	*1.097*	*1.224*	*1.058*	*1.136*	*2.248*	*.982*	*1.108*
	(.046)	(.060)	(.018)	(.070)	(.047)	(.060)	(.083)	(.025)	(.055)	(.451)	(.080)	(.057)
History of physical/sexual	-.035	-.062	-.066	-.073	.051	.054	-.425*	-.054	-.245*	-.870	.027	-.039
	.966	*.940*	*.937*	*.930*	*1.052*	*1.055*	*.654*	*.947*	*.783*	*.419*	*1.027*	*.962*
	(.098)	(.113)	(.036)	(.124)	(.100)	(.111)	(.173)	(.057)	(.112)	(.755)	(.120)	(.074)
History of neglect	.123	-.010	-.006	-.091	-.006	-.094	.188	.007	.041	.891	.007	.063
	1.130	*.990*	*.994*	*.913*	*.994*	*.910*	*1.207*	*1.007*	*1.042*	*2.437*	*1.007*	*1.065*
	(.090)	(.091)	(.029)	(.095)	(.076)	(.092)	(.118)	(.038)	(.075)	(.613)	(.082)	(.050)
History of mental health problems	.110	.135	.031	.093	.147	.002	.044	.049	.121	1.109	.039	-.052
	1.116	*1.145*	*1.031*	*1.097*	*1.159*	*1.002*	*1.044*	*1.050*	*1.128*	*3.030*	*1.040*	*.950*
	(.108)	(.107)	(.038)	(.123)	(.103)	(.114)	(.172)	(.055)	(.108)	(.776)	(.115)	(.066)
Race	.488***	.304***	.436***	.604***	.412***	.384***	.593***	.534***	.407***	.267	.345***	.415***
	1.629	*1.355*	*1.547*	*1.829*	*1.510*	*1.469*	*1.810*	*1.705*	*1.502*	*1.306*	*1.412*	*1.514*
	(.054)	(.073)	(.023)	(.092)	(.072)	(.086)	(.125)	(.046)	(.092)	(.688)	(.090)	(.053)
Constant	-2.373***	-2.252***	-1.925***	-1.689***	-.925***	-1.271***	-2.119***	-1.874***	-2.351***	-2.865	-1.843***	-1.400***
	.093	*.105*	*.146*	*.185*	*.397*	*.281*	*.120*	*.153*	*.095*	*.057*	*.158*	*.247*
	(.077)	(.135)	(.040)	(.173)	(.158)	(.168)	(.286)	(.110)	(.244)	(1.852)	(.204)	(.129)

Note: Beta values reported with Exp(B) in italics and standard errors in parentheses.
*$p \leq .05$
**$p \leq .01$
***$p \leq .001$

PACT

FACTOR ANALYSIS REPORT

PHASE II STUDY

INTRODUCTION

Actuarial risk assessments trace their roots to the insurance and finance industries, where predictable patterns of life expectancy and monetary policies were sought despite random fluctuations in individual cases. In the field of corrections, actuarial assessments are stochastic, statistical models that use empirically derived risk factors to predict the likelihood of offending or recidivism within a given population. Like insurance tables, actuarial predictors of recidivism provide an estimate of the rate of re-offending within a given group, over a given period of time, based upon a set of shared characteristics or risk factors.

The Positive Achievement Change Tool (PACT) is such an actuarial tool used by the Florida Department of Juvenile Justice (Department) to estimate the overall risk of re-offending among juveniles referred to the Department for delinquent behavior. It relies on measures of risk factors that are summed to produce a scale related to an individual's history of offending behavior (criminal history score) and a scale related to their current status on social risk factors (social history score).[4] These are appropriate measures of risk as a trait, based on past behavior (compared to other offenders), and as a state (a present propensity to re-offend).

The criminal history score is a fairly straightforward additive scale based on a validated statistical model. The social history score, however, is a combination of dichotomous measures (such as gender or the occurrence of an event such as abuse or neglect), additive measures, and one measure that is somewhat more complex. The school performance measure within the social history scale relies on multiple indicators or aspects of known risk factors gathered through interviews and combined into a composite sub-scale that is intended to constitute a measure within the educational domain of risk. For this measure, poor school performance is indicated in terms of grades, behavior, enrollment status and attendance (all of which are associated with delinquent

[4] The PACT is additionally comprised of other measures that are not calculated into the criminal history and social history scales, and as such, as not referenced here. Social history is largely comprised of current, rather than historical indicators of risk.

behavior). These measures are combined in a PACT sub-scale as a measure for risk within the school domain. Other methods combine indicators within the PACT to constitute additive sub-scales measuring the degree of risk in the domains of current friends or companions, running away, and parental control and authority. Together, each of these measures is combined to produce the social history score, which is used in a matrix with the criminal history score to determine a youth's overall level of risk to re-offend (low, moderate, moderate-high, high).

The purpose of the present analysis was to examine the criminal history and social history scores using factor analysis to assess the individual questions currently used in the construction of the PACT domains and examine whether these questions represent distinct domains or constructs. Confirmatory factor analysis was used initially to assess the current PACT domains, followed by exploratory factor analysis to evaluate whether other factors or domains included in the PACT assessment might be considered for inclusion in calculating criminal history and social history scores, as well as the overall level of risk to re-offend.

METHODS

The PACT risk and needs assessment was designed to assess juvenile offenders' risks, needs, and protective factors as outlined in the "What Works" literature (Andrews & Bonta, 2006). It was one of the first substantive steps by the Department toward an evidence-based system founded on principles of effective treatment. Those principles included targeting treatment to individuals at high risk of re-offending and the risk factors that were predictive of re-offending behaviors. The PACT was created collaboratively by the Department and Assessments.com through federal funding from the United States Department of Justice, Office of Juvenile Justice and Delinquency Prevention (OJJDP). The Department customized its risk and needs assessment to reflect terminology and practices used in Florida, and added items related to mental health, depression, and suicide. The following section contains an explanation of case selection, a

description of the demographic characteristics of the confirmatory factor analysis sample, the PACT scales, and the analysis of the data.

Participants and Measures

The PACT consists of a pre-screen assessment and a full-assessment. For the purposes of the present analysis, the PACT full-assessments were extracted from the original validation sample (n=80,192) developed during Phase I of this study. The original sample included PACT pre-screen and full-assessments administered between July 1, 2007 and June 30, 2009. A total of 41,082 full-assessments were extracted from the original sample. In order to avoid problems of multicollinearity and increased error terms, the sample was further reduced to include only the most recent scoring of the PACT for each individual selected, yielding a factor analysis sample of 28,383 youth.

Demographic characteristics of the study sample are presented in Table 43. Most of the 28,383 youth assessed between FY 2007-08 and FY 2008-09 were male (79.5 percent). More than half of the releases were non-white (51.9%), and 14.8% were Hispanic. The majority of the sample (57%) were 16 years or younger at the time of the assessment, while another 42% were 17 years or older.

Table 43. Sample Descriptive Statistics

	N	Percent
Sex		
Female	5,811	20.5%
Male	22,572	79.5%
Race		
Non-white	13,650	48.1%
White	14,733	51.9%
Ethnicity		
Hispanic	4,204	14.8%
Non-Hispanic	24,179	85.2%
Age at admission		
13 years or younger	1,889	6.7%
14 to 15 years	7,537	26.6%
16 years	6,794	23.9%
17 years or older	12,163	42.9%
Total	28,383	100.0%

The PACT full-assessment is a 126-item, in-depth multiple choice assessment. The PACT assessment is designed as a semi-structured interview protocol that incorporates Motivational Interviewing techniques and measures both static and dynamic (changeable) risk factors. The instrument is auto-populated with client information from the Department's Juvenile Justice Information System (JJIS), including demographic and prior criminal history data. The automation of the youth's prior criminal history not only increases the accuracy of PACT calculations, but affords the interviewer more time to gather information on the youth's attitudes and behaviors.

The PACT yields a criminal history score and social history score upon which risk level classifications are based. The criminal history score is based solely on measures displayed in Table 44, including age at first offense, prior criminal offending, juvenile justice supervision and placement, escapes, and warrants for failure to appear before the court. The scores are ordinal and are weighted based on the validated model. The ranges for each measure vary, as is depicted in the table. The scale score is the sum of the weighted measure scores.

Table 44. Criminal History Score Measures

Criminal History Measures	Indicators
Age at first offense	Over 16 years, 16 years, 15 years, 13 to 14 years, Under 13 years
Adjudicated misdemeanors	None or one, two, three or four, five or more misdemeanors
Adjudicated felonies	None, one, two, three or more felonies
Adjudicated weapons offenses	None, one or more weapons offenses
Adjudicated against-person misdemeanors	None, one, two or more against-person misdemeanors
Adjudicated against-person felonies	None, one or two, three or more against-person felonies
Secure detention placements	None, one, two, three or more secure detention placements
Commitment placements	None, one, two more commitment placements
Adjudicated escapes	None, one, two or more escapes
Failure to appear warrants	None, one, two or more warrants

The social history score examines eleven individual and situational factors including the youth's sex, current school involvement, peers, dependency placements, a history of running away or being kicked out of the home, familial criminal justice system involvement, parental control and supervision, current alcohol and drug use, abuse and neglect, and mental health problems. Table

45 (below) displays the measures and the indicators that are used to score them. Most of the measures are dichotomous—they indicate only the presence or absence of the risk factor. Scores are weighted based on the validated model. Four of the measures are ordinal subscales. The scores from each of the 11 factors are summed to yield the social history score. A score of zero is indicative of low risk in terms of current social history factors that may influence the likelihood for future criminal offending.

Table 45. Social History Scale Measures

Social History Measures	Indicators
Sex	Female, male
School enrollment/conduct/attendance/performance	Graduated or enrolled without major problems in conduct, attendance or performance; problems reported by teachers, calls to parents, some full-day unexcused absences, or mostly Cs and Ds, with some Fs; calls to police, habitual truant, some Ds and mostly Fs, dropped out, expelled or suspended
Current peers	Has pro-social friends and no anti-social friends, has no friends or both pro-social and anti-social friends, has all anti-social friends, is a gang member/associate
History of out-of-home placements	No history of out-of-home or emergency foster shelter care placements exceeding 30 days, one or more out-of-home placements
History of running away	No history of running away or being kicked out of home, one instance of running away or being kicked out of home, two or more instances of running away or being kicked out of home
Jail/imprisonment history of current household	No jail/imprisonment history for siblings, mother or father currently living in the household; mother, father, and/or siblings currently living in the household has jail/imprisonment history
Parental authority and control	Youth usually obeys and follows rules; youth sometimes obeys, obeys some rules; youth consistently disobeys and/or is hostile
Current alcohol and drug use	No current alcohol or drug use that is causing family conflict, disrupting education, causing health problems, interfering with keeping prosocial friends, or contributing to criminal behavior, current alcohol or drug use that is causing family conflict, disrupting education, causing health problems, interfering with keeping prosocial friends, or contributing to criminal behavior
History of physical/sexual	No history of physical or sexual abuse, victim of physical or sexual abuse
History of neglect	No history of neglect, victim of neglect
History of mental health problems	No history of mental health problems; diagnosed with mental health problems, mental health medication prescribed, mental health treatment prescribed, or mental health medication and treatment prescribed

The number of risk categories (three or four) and the cut points for determining level of risk (low, moderate, moderate-high and high) were established by scientific formulation, as well as Departmental policy decisions. Some jurisdictions base cut points on the percentages of offenders who would be re-arrested within each category of risk. For example, low-risk offenders are composed of offenders with the lowest scores who as a group re-offend at no greater than 20%

three years after release. Other jurisdictions choose to use the distribution of scores. For example, using percentiles, standard deviations or simply dividing the groups into lower, middle and upper thirds to determine the cut points. The cut points for the PACT were determined by means of a structured decision-making tool. The total Criminal history score and social history score are factored together following the matrix depicted in Table 46 to calculate a youth's overall risk to re-offend and corresponding risk level classification. Cut points for the criminal history and social history scores were designated through Departmental policy decisions that took into account both the distribution of youth classified into each matrix category, as well as the unique characteristics of Florida's delinquency population.

Table 46. PACT Scoring Matrix

Criminal History Score	Social History Score		
	0 to 5	6 to 9	10 to 18
0 to 5	Low	Low	Moderate
6 to 8	Low	Moderate	Moderate-high
9 to 11	Moderate	Moderate-high	High
12 to 31	Moderate-high	High	High

Procedures

The goal of the first analysis was to examine the criminal history and social history scales to assess the individual questions currently used in the construction of the PACT domains and examine whether these questions represented distinct domains or constructs. Confirmatory factor analysis was used initially to assess the current PACT domains.

Confirmatory factor analysis is commonly used in the social sciences to determine whether there is a relationship between the structure of a set of items, such as those found in sociometric scales and the concepts they are intended to represent. It should answer the question whether a scale that is intended to represent a construct is homogeneous, or "hangs together." The implication for this analysis was whether the criminal history and the social history scales were intended to represent such constructs. This conceptual issue was important because methodologically the PACT assessment is an actuarial tool. Parts of the PACT, such as the

criminal history score, represent a stochastic statistical model—a model based on mathematical probabilities. The items within the scale are historical and "fixed," and were statistically significantly related to the outcome of re-offending. The social history score differs in that it represents an attempt to quantify risk in an area—the current social history state of offender risk—with parts that are not as amenable to direct measurement. This scale is intended to produce a score that represents the present risk to re-offend as indicated by conditions in 11 areas of social history interaction that have been widely accepted as predictors of re-offending behavior.

Based on the characteristics of the construction of the scores and their use in predicting recidivism, factor analysis can be used with the PACT in more than one way. With the criminal history scale, factor analysis can be used to increase understanding of the underlying concepts the scale may be measuring. With the social history scale, it can be used, for example, to examine whether the educational performance sub-scale is unidimensional, and if not, whether the factors that emerged from the analysis make sense with regard to what the subscale is intended to measure. An analysis can also be conducted with the entire scale, for the same purpose. In addition, exploratory factor analysis can be used to evaluate the structure of the scale and the possibility of modifying it to improve performance.

RESULTS

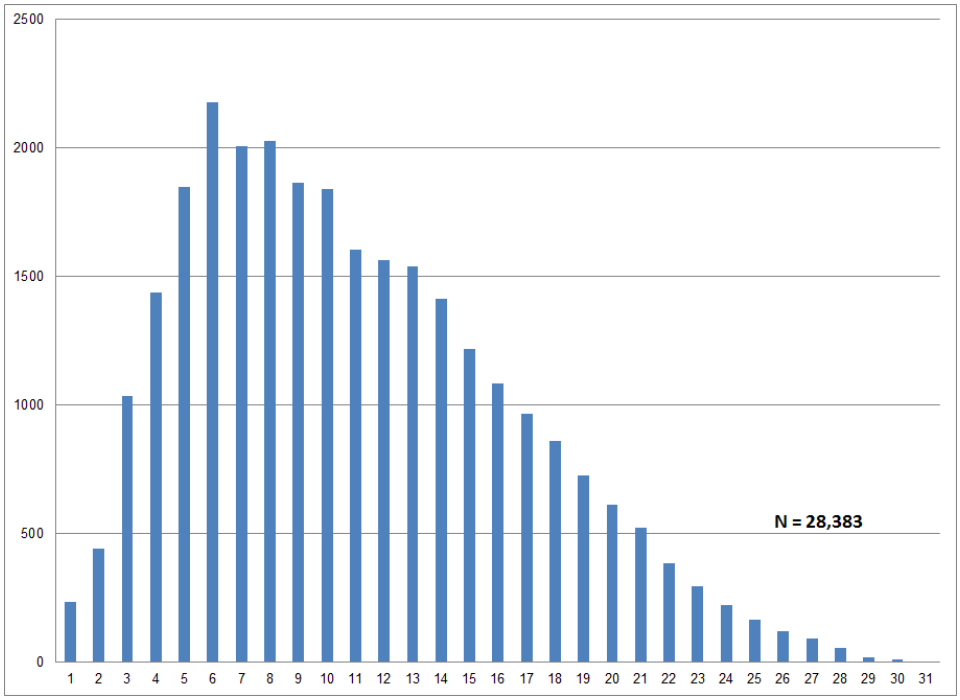
Assessment of the Criminal History Scale

Descriptive statistics for the criminal history scale measures and total score are displayed in Table 47, below. The criminal history scores ranged from 0 to 31, with a standard deviation of 5.6 and a mean score of ten. The histogram displayed in Figure 4 illustrates the distribution which skews to the right.

Table 47. Criminal History Score Measures Descriptive Statistics

Criminal History Measures N = 28383	Mean	Median	Mode	Standard Deviation
Age at First Offense	2.8	3.0	3.0	1.1
Misdemeanor Referral Total	.8	.0	.0	1.0
Felony Referral Total	2.6	2.0	2.0	2.0
Weapon Referrals	.1	.0	.0	.4
Against-Person Misdemeanor Referrals	.5	.0	.0	.7
Against-Person Felony Referrals	.7	.0	.0	1.0
Confinements in Secure Detention More than 48 Hours	1.2	1.0	.0	1.2
Commitment orders at least 1 day served residential	.7	.0	.0	1.2
Escapes	.0	.0	.0	.1
Warrants for Failure to Appear or Absconding	.5	.0	.0	.8
Criminal History Total Score	10.0	9.0	5.0	5.6

Figure 4. Distribution of Criminal History Scale Scores



Correlations between the measures and the total score are displayed in Table 48, below. All between-measure correlations were significant at $p < .001$, with the exception of the correlation between offenses with weapons and escapes, which was significant at $p < .01$. Because the items entered into the construction model are assumed to be independent, one would expect low between-measure correlations (between 0 and .3), and moderate (.3 to .6) to high (.7 to 1) correlations with the total score. Total misdemeanor referrals correlated moderately with age at

first offense, person misdemeanors, failures to appear and confinements in secure detention and residential treatment. Total felony referrals also correlated moderately with confinements in secure detention and residential treatment. The referral counts were based upon the number of adjudicated referrals, and as the numbers of referrals increases, it makes sense that the numbers of secure detention and residential treatment confinements would likewise increase. Almost all the measures displayed a moderate correlation with the total score, with the exception of weapon referrals and escapes. Only 4,137 youth (14.6%) within the sample had weapons referrals, and only 278 were adjudicated for escape (about 1%). The low base rate for these measures may have contributed to the low correlations.

In order to assess the internal consistency of the scale, a reliability analysis was conducted yielding a coefficient alpha. The alpha statistic ranges from 0 to 1.0, with acceptable scores greater than or equal to .70. The analysis yielded an alpha of .706, meeting this standard. In addition, an item analysis was conducted that produced a table with the changes in alpha with item deletions. The deletion of either the weapons referrals or the escapes measure increased the alpha, but only by less than one percent. It should be noted that even though a scale is internally consistent, it may not be unidimensional.

A principal components factor analysis with varimax rotation was conducted on the measures within the criminal history scale. To ensure that multicollinearity was not a problem, a test was run (KMO and Bartlett's test of sphericity) which revealed no problems. The analysis was not intended to be confirmatory, and therefore, the measures were not constrained to load on a given number of factors. The result of the analysis was a rotated component matrix displayed in Table 49, consisting of four factors with eigenvalues greater than 1. Eigenvalues represent the sum of the squared factor loadings on each factor, and were used as cut-offs in selecting which factors were appropriate for interpretation. These four factors accounted for 64% of the variance, and approached the desirable 70% rate.

Table 48. Correlation Matrix for Criminal History Scale Score

Criminal History Score Measures N = 28,383	Age at First Offense	Misdemeanor Referral Total	Felony Referral Total	Weapon Referrals	Against-Person Misdemeanor Referrals	Against-Person Felony Referrals	Confinements in Secure Detention More than 48 Hours	Commitment orders at least 1 day served residential	Escapes	Warrants for Failure to Appear or Absconding	Criminal History Total Score
Age at First Offense	1	0.336	0.261	0.082	0.238	0.194	0.295	0.257	0.047	0.204	0.572
Misdemeanor Referral Total	0.336	1	0.064	0.048	0.500	0.062	0.382	0.302	0.055	0.303	0.530
Felony Referral Total	0.261	0.064	1	0.219	-0.038	0.421	0.456	0.389	0.116	0.216	0.724
Weapon Referrals	0.082	0.048	0.219	1	-0.042	-0.030	0.127	0.094	0.015	0.036	0.208
Against-Person Misdemeanor Referrals	0.238	0.500	-0.038	-0.042	1	0.097	0.221	0.167	0.041	0.117	0.360
Against-Person Felony Referrals	0.194	0.062	0.421	-0.030	0.097	1	0.252	0.224	0.043	0.074	0.508
Confinements in Secure Detention More than 48 Hours	0.295	0.382	0.456	0.127	0.221	0.252	1	0.496	0.106	0.507	0.761
Commitment orders at least 1 day served residential	0.257	0.302	0.389	0.094	0.167	0.224	0.496	1	0.147	0.323	0.679
Escapes	0.047	0.055	0.116	0.015	0.041	0.043	0.106	0.147	1	0.090	0.160
Warrants for Failure to Appear or Absconding	0.204	0.303	0.216	0.036	0.117	0.074	0.507	0.323	0.090	1	0.516
Criminal History Total Score	0.572	0.530	0.724	0.208	0.360	0.508	0.761	0.679	0.160	0.516	1

Table 49. Factor Analysis Results for Criminal History Scale

Criminal History Scale Measures Rotated Component Matrix	Component			
	1	2	3	4
Age at First Offense	.519	.374	.019	.141
Misdemeanor Referral Total	.818	-.015	.212	.065
Felony Referral Total	-.057	.764	.262	.289
Weapon Referrals	-.039	.020	.006	.880
Against-Person Misdemeanor Referrals	.796	-.027	.001	-.187
Against-Person Felony Referrals	.053	.844	-.059	-.232
Confinements in Secure Detention More than 48 Hours	.391	.423	.515	.255
Commitment orders at least 1 day served residential	.282	.413	.496	.159
Escapes	-.166	-.046	.747	-.249
Warrants for Failure to Appear or Absconding	.313	.091	.599	.197

Measures that had moderate to high loadings on a component (factor) indicated that there was a shared commonality among them. Five measures had loadings greater than .30 on the first factor. These measures included age at first offense, total number of misdemeanors, number of against-person misdemeanors, confinements in secure detention, and warrants for failure to appear. This factor may be indicative of a risk group composed of low-level misdemeanants "flying under the radar," engaged in frequent offending and serious enough to be placed in detention, but not serious enough to be committed to a residential program.

Age at first offense also loaded on the second factor, but the other measures that shared the component were related to felony offenses. Total felony referrals, against-person felonies, confinements in secure detention and commitments to residential treatment also loaded on this factor, perhaps denoting a risk group of more serious delinquents.

Four measures shared the third factor, which included confinements in secure detention and residential treatment, along with escapes and failures to appear. This factor may represent the construct of greater justice system involvement including those youth who are in the "deep end" of the juvenile justice continuum of treatment.

Finally, weapons referrals loaded by itself on the fourth factor. Although this measure does not seem to share much with the other measures, it may contribute to the prediction model independently.

Assessment of the Social History Scale

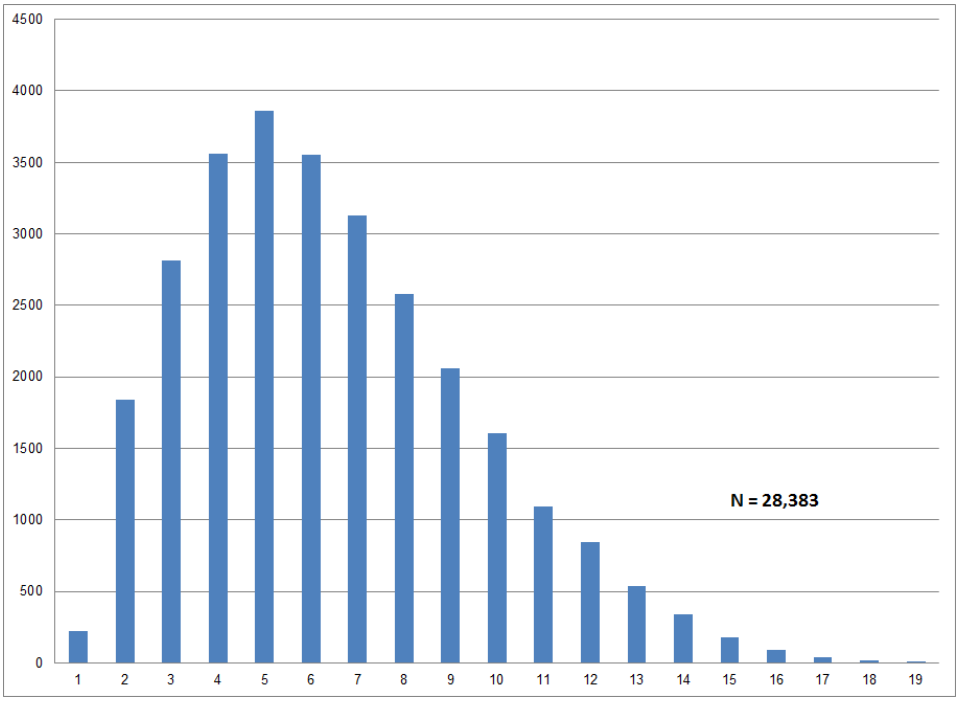
Descriptive statistics for the social history scale measures and total score are displayed in Table 50, below. The social history scores ranged from 0 to 18. The mean score was 5.5, with a standard deviation of 3.1.

Table 50. Descriptive Statistics for Social History Score Measures

Social History Measures N = 28383	Mean	Median	Mode	Standard Deviation
Gender	.8	1.0	1.0	.4
School	1.1	1.0	2.0	.8
Peer Relationships	.8	1.0	1.0	.8
Foster Care	.1	.0	.0	.4
Running Away	.8	.0	.0	1.2
Family Criminality	.3	.0	.0	.5
Parental Control	.7	1.0	1.0	.7
Alchohol and Drugs	.3	.0	.0	.7
Abuse	.2	.0	.0	.4
Neglect	.2	.0	.0	.5
Mental Health	.2	.0	.0	.4
Social History Score	5.5	5.0	4.0	3.1

The histogram displayed in Figure 5, below, illustrates the social history score distribution, which like the criminal history score, skews to the right.

Figure 5. Distribution of Social History Scale Scores



Correlations between the measures and the total score are displayed in Table 51, below. The majority of between-measure correlations were significant at $p < .001$, with the exception of the correlations between current alcohol/drug use with gender and neglect, and neglect with peer associations, which were significant at $p < .01$. Three correlations were low and insignificant: peers with out-of-home dependency placements and mental health issues, and out-of-home dependency placements and current alcohol and drug abuse. Because the items entered into the construction model are assumed to be independent, one would expect low between-measure correlations (between 0 and .3), and moderate (.3 to .6) to high (.7 to 1) correlations with the total score. Correlations between measures and the total score ranged from .292 to .647. An important exception was the correlation between gender and the total score, which was quite low. Correlations between the measures were low, with the exception of two moderate correlations between neglect and out-of-home dependency placements, and between parental control and school performance.

Table 51. Correlation Matrix for Social History Scale Score

Social History Score Measures N = 28,383	Gender	School	Peer Relations	Foster Care	Running Away	Family Criminality	Parental Control	Alchohol and Drugs	Abuse	Neglect	Mental Health	Social History Score
Gender	1	-0.021	0.025	-0.106	-0.231	-0.043	-0.072	0.014	-0.208	-0.087	-0.091	-0.042
School	-0.021	1	0.254	0.036	0.124	0.084	0.307	0.198	0.046	0.042	0.041	0.532
Peer Relationships	0.025	0.254	1	0.001	0.125	0.084	0.298	0.199	0.031	0.014	0.002	0.511
Foster Care	-0.106	0.036	0.001	1	0.248	0.075	0.106	-0.004	0.256	0.408	0.163	0.366
Running Away	-0.231	0.124	0.125	0.248	1	0.075	0.295	0.130	0.260	0.194	0.177	0.647
Family Criminality	-0.043	0.084	0.084	0.075	0.075	1	0.110	0.049	0.085	0.074	0.030	0.292
Parental Control	-0.072	0.307	0.298	0.106	0.295	0.110	1	0.198	0.122	0.088	0.142	0.607
Alchohol and Drugs	0.014	0.198	0.199	-0.004	0.130	0.049	0.198	1	0.044	0.015	0.034	0.449
Abuse	-0.208	0.046	0.031	0.256	0.260	0.085	0.122	0.044	1	0.273	0.237	0.376
Neglect	-0.087	0.042	0.014	0.408	0.194	0.074	0.088	0.015	0.273	1	0.157	0.390
Mental Health	-0.091	0.041	0.002	0.163	0.177	0.030	0.142	0.034	0.237	0.157	1	0.311
Social History Score	-0.042	0.532	0.511	0.366	0.647	0.292	0.607	0.449	0.376	0.390	0.311	1

School performance is of particular interest because it was the one composite sub-scale among the measures for social history. The school performance measure was a scale that includes four distinct indicators: academic performance, enrollment status, conduct, and attendance. The algorithm used to score the measure, however, limited the ability to assess its internal consistency and internal structure. The analysis therefore considered how the measure contributed to the social history score, rather than how well it captured the concept of school performance.

In order to assess the internal consistency of the scale, a reliability analysis was conducted yielding a coefficient alpha. The alpha statistic ranges from 0 to 1.0, with generally strong scores considered to be equal to or greater than .70. The analysis yielded an alpha of .541, a value below this standard. In addition, an item analysis was conducted that produced a table with the changes in alpha associated with item deletions. The deletion of gender increased the alpha, but only by about four percent.

A principal components factor analysis with varimax rotation was conducted on the measures within the social history scale. A KMO and Bartlett's test of sphericity revealed no problem with multicollinearity. The initial analysis constrained the analysis to one factor, which accounted for only 21% of the variance. An examination of the eigenvalues suggested that there were two additional components that might contribute, so the analysis method was freed to extract components based upon their eigenvalues. The measures were not constrained to load on a given number of factors. The result of the analysis was a rotated component matrix displayed in Table 52 (below), consisting of three factors with eigenvalues greater than one. These three factors accounted for 45.0% of the variance, which is below the desirable 70% standard.

Measures that had moderate to high loadings on a component (factor) indicated that there was a shared commonality among them. Four measures had loadings greater than .3 on the first factor: school performance, types of peer relationships, parental control, current alcohol or drug abuse.

This factor may indicate a risk group composed of youth who are not responding to conventional rules or authority, and generally engaging in antisocial behavior, regardless of gender or mental health problems. Four factors loaded on the second factor: gender (girls), running away, a history of physical or sexual abuse, and mental health problems. Three measures load on the third factor: out-of-home dependency placements and both experience of abuse and neglect. These patterns correspond to similar findings in the research literature on delinquent girls and dependency-involved youth.

Table 52. Factor Analysis Results for Social History Scale

Social History Scale Measures Rotated Component Matrix	Component		
	1	2	3
Gender	.087	-.779	.187
School Performance	.659	.029	.033
Types of Peer Relationships	.682	-.054	.015
Placement in Foster Care	-.026	.203	.752
Episodes of Running Away	.285	.614	.180
Family Criminality	.239	-.047	.284
Parental Control	.665	.268	.079
Abuse of Alcohol or Drugs	.559	.021	-.025
Experience of Abuse	.009	.547	.381
Experience of Neglect	-.019	.139	.785
Mental Health Problems	.028	.431	.241

Exploratory Factor Analysis

One of the goals of the evaluation was to examine whether or not other information currently being collected by the PACT may have a greater predictive power than perhaps the underlying variables currently used in calculating risk scores and levels. The initial factor analyses reported here demonstrated relatively strong alpha levels for the current Criminal history score. As such, attention shifted. Though there are numerous statistical approaches that could be utilized in addressing the inquiry, such as structural equation modeling, that may be more appropriately suited for testing such a hypothesis, the scope of the current evaluation was limited to an exploratory factor analysis. The intent here was rather to evaluate whether other factors or domains should be considered for inclusion in the current calculation of PACT risk scores and levels to re-offend.

A four-step approach was developed to address the hypothesis that other factors currently not included in scoring calculations could improve the predictive power of the overall social history score used in the risk categorization and, therefore, the overall predictive power between level of risk-to-re-offend and subsequent offending:

1. The first step of the approach examined the Pearson correlations between each possible response from Domains 3 through 11 of the PACT full-assessment as they relate to subsequent arrest following one year of release from a Department placement (N=28,383).
2. The second step used stepwise logistic regression to determine which of the variables that had the highest correlations to subsequent arrest accounted for the most variance observed.

3. The third step used principal component analysis to test if the variables retained in the regression model were inter-correlated together within more general constructs or factors. This third step was important because it reduced the number of variables that were essentially measuring the same construct into a more concise concept that can then be used as a distinct variable for the predictive analysis.
4. The last step in the approach utilized each of the previous techniques to present an alternative social history score and then tested the alternative to the current social history score.

Table 53 presents the results of the Pearson correlations for each PACT item listed in Domains 3 through 11 and their relationship to subsequent arrest. As can be seen, none of the risk items presented had a strong correlation ($r>0.4$) to subsequent arrest. Rather, the correlations ranged from a high of 0.123 (a negative association) for the interviewer's assessment that the youth was very likely to stay in school (3b–11–1) to items with a correlation less than 0.001 (e.g., 8b–1-6, alcohol caused health problems, 6b-1-2, one positive adult relationship, 7b-1-6, youth feels close to extended family, etc.).

Table 53. Correlation Coefficients of Relationship Between Social History Items in PACT Domains 3 – 11 and Subsequent Arrest

Item[1]	r	Item	r	Item	r	Item	r	Item	r	Item	r	Item	r
3a - 1 - 1	-0.080**	4a - 1 - 3	0.025**	7a - 1 - 1	-0.027**	7b - 9 - 2	0.038**	8b - 2 - 2	0.049**	9a - 11 - 3	-0.006	10 - 11 - 2	0.080**
3a - 1 - 2	0.059**	4a - 2 - 1	-0.053**	7a - 1 - 2	0.018**	7b - 9 - 3	0.012*	8b - 2 - 3	0.028**	9a - 12 - 1	0.007	10 - 11 - 3	0.028**
3a - 1 - 3	0.046**	4a - 2 - 2	0.001	7a - 1 - 3	0.013*	7b - 10 - 1	0.019**	8b - 2 - 4	0.027**	9a - 12 - 2	-0.007	11 - 1 - 1	-0.060**
3a - 1 - 4	0.042**	4a - 2 - 3	0.041**	7a - 1 - 4	0.014*	7b - 10 - 2	-0.008	8b - 2 - 5	0.020**	9a - 12 - 3	-0.003	11 - 1 - 2	0.035**
3a - 1 - 5	-0.002	4b - 1 - 1	-0.043**	7a - 2 - 1	-0.047**	7b - 10 - 3	-0.057**	8b - 2 - 6	0.014*	9a - 13 - 1	0.005	11 - 1 - 3	0.032**
3a - 2 - 1	-0.103**	4b - 1 - 2	-0.054**	7a - 2 - 2	0.017**	7b - 10 - 4	0.005	8b - 2 - 7	0.034**	9a - 13 - 2	0.059**	11 - 2 - 1	-0.076**
3a - 2 - 2	-0.042**	4b - 1 - 3	0.027**	7a - 2 - 3	0.025**	7b - 10 - 5	-0.009	8b - 2 - 8	0.022**	9a - 13 - 3	-0.075**	11 - 2 - 2	0.070**
3a - 2 - 3	0.021**	4b - 1 - 4	0.042**	7a - 2 - 4	0.023**	7b - 10 - 6	0.000	8b - 2 - 9	0.012*	9a - 14 - 1	0.005	11 - 2 - 3	0.021**
3a - 2 - 4	0.031**	4b - 2 - 1	0.066**	7a - 2 - 5	0.017**	7b - 11 - 1	-0.034**	8b - 3 - 1	-0.004	9a - 14 - 2	-0.005	11 - 3 - 1	-0.049**
3a - 2 - 5	0.019**	4b - 2 - 2	-0.026**	7a - 3 - 1	-0.023**	7b - 11 - 2	0.033**	8b - 3 - 2	0.045**	9b - 1 - 1	0.007	11 - 3 - 2	0.036**
3a - 2 - 6	0.079**	4b - 2 - 3	-0.054**	7a - 3 - 2	0.013*	7b - 11 - 3	0.012*	8b - 3 - 3	0.002	9b - 1 - 2	-0.012*	11 - 3 - 3	0.024**
3a - 3 - 1	-0.104**	4b - 2 - 4	-0.030**	7a - 3 - 3	0.021**	7b - 11 - 4	-0.007	8b - 3 - 4	0.008	9b - 1 - 3	-0.002	11 - 4 - 1	-0.059**
3a - 3 - 2	0.041**	4b - 2 - 5	-0.044**	7a - 4 - 1	-0.069**	7b - 12 - 1	-0.080**	8b - 3 - 5	0.017**	9b - 1 - 4	-0.012*	11 - 4 - 2	0.006
3a - 3 - 3	0.068**	4b - 2 - 6	-0.034**	7a - 4 - 2	0.046**	7b - 12 - 2	0.047**	8b - 3 - 6	-0.004	9b - 1 - 5	-0.003	11 - 4 - 3	0.042**
3a - 3 - 4	-0.001	4b - 3 - 1	-0.055**	7a - 4 - 3	0.031**	7b - 12 - 3	0.049**	8b - 3 - 7	-0.001	9b - 1 - 6	-0.003	11 - 4 - 4	0.036**
3a - 3 - 5	-0.029**	4b - 3 - 2	-0.043**	7a - 4 - 4	0.042**	7b - 13 - 1	-0.072**	8b - 3 - 8	-0.003	9b - 1 - 7	-0.015**	11 - 5 - 1	-0.013*
3a - 4 - 1	0.007	4b - 3 - 3	0.035**	7a - 4 - 5	0.027**	7b - 13 - 2	0.042**	8b - 3 - 9	0.000	9b - 2 - 1	-0.018**	11 - 5 - 2	0.012
3a - 4 - 2	0.039**	4b - 3 - 4	0.048**	7a - 4 - 6	0.032**	7b - 13 - 3	0.037**	8b - 3 - 10	-0.011	9b - 2 - 2	0.004	11 - 5 - 3	0.014*
3a - 4 - 3	-0.039**	5a - 1 - 1	-0.005	7a - 5 - 1	0.006	7b - 14 - 1	-0.087**	8b - 3 - 11	-0.001	9b - 2 - 3	0.005	11 - 5 - 4	0.007
3b - 1 - 1	-0.002	5a - 1 - 2	0.041**	7a - 5 - 2	0.006	7b - 14 - 2	0.004	8b - 3 - 12	0.001	9b - 2 - 4	0.006	11 - 5 - 5	-0.001
3b - 1 - 2	-0.038**	5a - 1 - 3	-0.038**	7a - 5 - 3	0.015**	7b - 14 - 3	0.065**	8b - 3 - 13	-0.003	9b - 3 - 1	0.009	11 - 5 - 6	0.010
3b - 1 - 3	-0.001	5a - 2 - 1	0.019**	7a - 5 - 4	-0.014*	7b - 14 - 4	0.039**	8b - 4 - 1	-0.012*	9b - 3 - 2	0.002	11 - 5 - 7	0.008
3b - 1 - 4	0.014*	5a - 2 - 2	-0.038**	7b - 1 - 1	-0.003	7b - 15 - 1	-0.079**	8b - 4 - 2	0.047**	9b - 3 - 3	-0.019**	11 - 6 - 1	0.028**
3b - 1 - 5	0.024**	5a - 3 - 1	-0.039**	7b - 1 - 2	0.006	7b - 15 - 2	0.017**	8b - 4 - 3	0.010	9b - 3 - 4	0.003	11 - 6 - 2	-0.009
3b - 1 - 6	-0.002	5a - 3 - 2	0.001	7b - 1 - 3	-0.011	7b - 15 - 3	0.057**	8b - 4 - 4	0.011	9b - 4 - 1	0.005	11 - 6 - 3	-0.003
3b - 2 - 1	-0.078**	5a - 3 - 3	-0.002	7b - 1 - 4	-0.052**	7b - 15 - 4	0.031**	9a - 1 - 1	0.006	9b - 4 - 2	-0.002	11 - 6 - 4	-0.026**
3b - 2 - 2	0.001	5a - 4 - 1	0.003	7b - 1 - 5	-0.016**	7b - 16 - 1	-0.041**	9a - 1 - 2	0.002	9b - 4 - 3	-0.015**	11 - 6 - 5	-0.022**
3b - 2 - 3	0.048**	5a - 4 - 2	-0.011	7b - 1 - 6	-0.009	7b - 16 - 2	0.030**	9a - 1 - 3	-0.002	9b - 4 - 4	0.009	11 - 6 - 6	-0.018**
3b - 2 - 4	0.014*	5a - 4 - 3	-0.035**	7b - 1 - 7	0.011	7b - 16 - 3	0.026**	9a - 1 - 4	-0.010	9b - 5 - 1	0.002	11 - 6 - 7	-0.012*
3b - 2 - 5	-0.021**	5b - 1 - 1	0.042**	7b - 1 - 8	0.010	7b - 16 - 4	0.001	9a - 1 - 5	0.010	9b - 5 - 2	-0.007	12 - 1 - 1	0.022**
3b - 2 - 6	-0.015*	5b - 1 - 2	0.010	7b - 1 - 9	0.022**	8a - 1 - 1	-0.040**	9a - 1 - 6	0.003	9b - 5 - 3	-0.002	12 - 1 - 2	0.008
3b - 2 - 7	-0.017**	5b - 1 - 3	-0.041**	7b - 1 - 10	0.027**	8a - 1 - 2	0.040**	9a - 1 - 7	-0.017**	10 - 1 - 1	-0.079**	12 - 1 - 3	-0.017**
3b - 2 - 8	0.029**	5b - 2 - 1	-0.047**	7b - 1 - 11	0.003	8a - 1 - 3	0.015**	9a - 2 - 1	0.005	10 - 1 - 2	0.009	12 - 1 - 4	-0.021**
3b - 3 - 1	-0.099**	5b - 2 - 2	0.007	7b - 1 - 12	0.000	8a - 1 - 4	0.008	9a - 2 - 2	-0.009	10 - 1 - 3	0.063**	12 - 2 - 1	0.052**
3b - 3 - 2	0.054**	5b - 2 - 3	0.028**	7b - 1 - 13	0.003	8a - 1 - 5	0.002	9a - 2 - 3	-0.005	10 - 1 - 4	0.032**	12 - 2 - 2	0.049**
3b - 3 - 3	0.041**	5b - 2 - 4	0.026**	7b - 1 - 14	-0.006	8a - 1 - 6	0.000	9a - 2 - 4	-0.008	10 - 2 - 1	-0.026**	12 - 2 - 3	-0.011
3b - 4 - 1	-0.099**	5b - 2 - 5	-0.018**	7b - 1 - 15	0.009	8a - 1 - 7	0.025**	9a - 2 - 5	-0.006	10 - 2 - 2	0.003	12 - 2 - 4	-0.071**
3b - 4 - 2	0.039**	5b - 3 - 1	0.048**	7b - 1 - 16	-0.012*	8a - 1 - 8	0.011	9a - 2 - 6	0.019**	10 - 2 - 3	-0.062**	12 - 3 - 1	0.048**
3b - 4 - 3	0.043**	5b - 3 - 2	-0.048**	7b - 2 - 1	0.042**	8a - 1 - 9	-0.008	9a - 3 - 1	-0.038**	10 - 2 - 4	0.061**	12 - 3 - 2	-0.018**
3b - 5 - 1	0.032**	5b - 3 - 3	0.007	7b - 2 - 2	0.025**	8a - 2 - 1	-0.110**	9a - 3 - 2	-0.010	10 - 2 - 5	0.003	12 - 3 - 3	-0.018**
3b - 5 - 2	-0.024**	5b - 4 - 1	0.048**	7b - 2 - 3	-0.043**	8a - 2 - 2	0.111**	9a - 3 - 3	0.010	10 - 2 - 6	-0.015**	12 - 3 - 4	-0.024**
3b - 5 - 3	-0.022**	5b - 4 - 2	-0.006	7b - 2 - 4	-0.058**	8a - 2 - 3	0.044**	9a - 3 - 4	0.052**	10 - 3 - 1	-0.073**	12 - 4 - 1	0.042**
3b - 5 - 4	-0.022**	5b - 4 - 3	-0.048**	7b - 3 - 1	-0.063**	8a - 2 - 4	0.031**	9a - 3 - 5	0.017**	10 - 3 - 2	-0.018**	12 - 4 - 2	0.008
3b - 5 - 5	-0.044**	6a - 1 - 1	0.020**	7b - 3 - 2	0.045**	8a - 2 - 5	0.025**	9a - 4 - 1	0.043**	10 - 3 - 3	0.084**	12 - 4 - 3	-0.018**
3b - 6 - 1	-0.044**	6a - 1 - 2	0.008	7b - 3 - 3	0.025**	8a - 2 - 6	0.016**	9a - 4 - 2	-0.038**	10 - 3 - 4	0.024**	12 - 4 - 4	-0.044**
3b - 6 - 2	-0.032**	6a - 1 - 3	-0.014*	7b - 3 - 4	0.034**	8a - 2 - 7	0.050**	9a - 4 - 3	-0.029**	10 - 4 - 1	-0.049**	12 - 5 - 1	0.046**
3b - 6 - 3	-0.008	6a - 1 - 4	-0.029**	7b - 3 - 5	0.020**	8a - 2 - 8	0.020**	9a - 5 - 1	-0.014*	10 - 4 - 2	-0.028**	12 - 5 - 2	0.015*
3b - 6 - 4	0.023**	6a - 2 - 1	-0.010	7b - 3 - 6	0.027**	8a - 2 - 9	0.002	9a - 5 - 2	0.014*	10 - 4 - 3	0.056**	12 - 5 - 3	-0.032**
3b - 7 - 1	-0.029**	6a - 2 - 2	-0.034**	7b - 4 - 1	-0.012*	8a - 3 - 1	-0.081**	9a - 6 - 1	-0.043**	10 - 4 - 4	0.022**	12 - 5 - 4	-0.041**
3b - 7 - 2	-0.043**	6a - 2 - 3	0.068**	7b - 4 - 2	-0.009	8a - 3 - 2	0.048**	9a - 6 - 2	0.037**	10 - 5 - 1	-0.072**	12 - 6 - 1	0.041**
3b - 7 - 3	0.012*	6a - 2 - 4	0.052**	7b - 4 - 3	0.015**	8a - 3 - 3	0.015*	9a - 6 - 3	0.016**	10 - 5 - 2	0.064**	12 - 6 - 2	0.046**
3b - 7 - 4	0.017**	6b - 1 - 1	0.030**	7b - 4 - 4	-0.002	8a - 3 - 4	0.048**	9a - 6 - 4	-0.005	10 - 5 - 3	0.021**	12 - 6 - 3	-0.047**
3b - 7 - 5	0.013*	6b - 1 - 2	0.000	7b - 4 - 5	-0.007	8a - 3 - 5	0.015**	9a - 6 - 5	0.011	10 - 6 - 1	-0.075**	12 - 6 - 4	-0.043**
3b - 8 - 1	-0.042**	6b - 1 - 3	-0.025**	7b - 4 - 6	0.010	8a - 4 - 1	-0.074**	9a - 7 - 1	-0.008	10 - 6 - 2	0.038**	12 - 7 - 1	0.036**
3b - 8 - 2	-0.020**	6b - 1 - 4	-0.022**	7b - 5 - 1	-0.014*	8a - 4 - 2	0.008	9a - 7 - 2	0.008	10 - 6 - 3	0.047**	12 - 7 - 2	0.043**
3b - 8 - 3	0.030**	6b - 2 - 1	0.050**	7b - 5 - 2	-0.004	8a - 4 - 3	0.043**	9a - 7 - 3	0.015*	10 - 7 - 1	-0.081**	12 - 7 - 3	-0.042**
3b - 8 - 4	0.022**	6b - 2 - 2	-0.015*	7b - 5 - 3	0.021**	8a - 4 - 4	0.054**	9a - 7 - 4	-0.004	10 - 7 - 2	0.024**	12 - 7 - 4	-0.040**
3b - 9 - 1	-0.059**	6b - 2 - 3	-0.065**	7b - 5 - 4	0.033**	8a - 5 - 1	-0.072**	9a - 7 - 5	-0.009	10 - 7 - 3	0.052**	12 - 8 - 1	0.043**
3b - 9 - 2	-0.013*	6b - 3 - 1	-0.001	7b - 5 - 5	0.001	8a - 5 - 2	0.057**	9a - 8 - 1	-0.053**	10 - 7 - 4	0.046**	12 - 8 - 2	-0.031**
3b - 9 - 3	-0.011	6b - 3 - 2	-0.046**	7b - 5 - 6	0.005	8a - 5 - 3	0.039**	9a - 8 - 2	0.020**	10 - 8 - 1	-0.078**	12 - 8 - 3	-0.020**
3b - 9 - 4	0.023**	6b - 3 - 3	0.040**	7b - 5 - 7	0.012*	8a - 6 - 1	-0.038**	9a - 8 - 3	0.017**	10 - 8 - 2	0.059**	12 - 9 - 1	0.039**
3b - 9 - 5	0.039**	6b - 3 - 4	0.038**	7b - 6 - 1	0.013*	8a - 6 - 2	0.038**	9a - 8 - 4	0.031**	10 - 8 - 3	0.036**	12 - 9 - 2	-0.026**
3b - 10 - 1	-0.022**	6b - 4 - 1	-0.013*	7b - 6 - 2	0.035**	8b - 1 - 1	0.054**	9a - 9 - 1	0.002	10 - 8 - 4	0.022**	12 - 9 - 3	-0.020**
3b - 10 - 2	-0.039**	6b - 4 - 2	0.017**	7b - 6 - 3	-0.050**	8b - 1 - 2	0.002	9a - 9 - 2	0.006	10 - 9 - 1	-0.080**	12 - 10 - 1	-0.036**
3b - 10 - 3	-0.029**	6b - 4 - 3	-0.006	7b - 7 - 1	-0.054**	8b - 1 - 3	0.006	9a - 9 - 3	-0.012*	10 - 9 - 2	0.045**	12 - 10 - 2	0.045**
3b - 10 - 4	0.016**	6b - 5 - 1	-0.094**	7b - 7 - 2	0.044**	8b - 1 - 4	0.003	9a - 9 - 4	-0.006	10 - 9 - 3	0.050**	12 - 10 - 3	-0.014*
3b - 10 - 5	0.023**	6b - 5 - 2	0.065**	7b - 7 - 3	0.025**	8b - 1 - 5	-0.001	9a - 10 - 1	-0.006	10 - 9 - 4	0.024**	12 - 10 - 4	-0.020**
3b - 11 - 1	-0.123**	6b - 5 - 3	0.050**	7b - 7 - 4	-0.004	8b - 1 - 6	0.002	9a - 10 - 2	0.006	10 - 10 - 1	-0.064**	12 - 11 - 1	-0.057**
3b - 11 - 2	0.065**	6b - 6 - 1	-0.075**	7b - 8 - 1	0.023**	8b - 1 - 7	0.006	9a - 10 - 3	-0.002	10 - 10 - 2	0.043**	12 - 11 - 2	0.041**
3b - 11 - 3	0.045**	6b - 6 - 2	-0.030**	7b - 8 - 2	0.035**	8b - 1 - 8	0.005	9a - 10 - 4	-0.001	10 - 10 - 3	0.036**	12 - 11 - 3	0.039**
4a - 1 - 1	-0.030**	6b - 6 - 3	0.091**	7b - 8 - 3	-0.058**	8b - 1 - 9	0.004	9a - 11 - 1	-0.005	10 - 10 - 4	0.018**	12 - 11 - 4	0.007
4a - 1 - 2	-0.003	6b - 6 - 4	0.027**	7b - 9 - 1	-0.044**	8b - 2 - 1	0.010	9a - 11 - 2	0.007	10 - 11 - 1	-0.088**	12 - 11 - 5	-0.027**

[1] Items are identified by domain (3a to 12), question number, and the identifying response number to each question. ** p<.01; * p<.05

Highlighted cells represent the individuals items with a significant correlation to subsequent arrest where r>=.05

Although none of the individual items had a strong correlation by itself, it is possible that a culmination of items may well relate to subsequent arrest. To test this, items with the strongest correlations were selected for further analysis (cut off criteria: r>=.05). These included items displayed in Table 54, from strongest to weakest:

Table 54. Correlations Coefficients of Relationship Between Selected Social History Indicators and Subsequent Arrest

Item[1]	Abbreviated Text Associated With Item	Absolute Value of r	Item[1]	Abbreviated Text Associated With Item	Absolute Value of r
3b - 11 - 1	Interviewer's assessment ... - Very likely to stay in sc....	0.123	7b - 13 - 1	Parental authority ... - Youth usually obeys and follows....	0.072
8a - 2 - 1	History of drug use - No past drug use	0.110	12 - 2 - 4	Goal setting - Sets realistic goals	0.071
3a - 3 - 1	Age at first expulsion ... - No expel/suspend	0.104	7a - 4 - 1	History of jail/imprisonment ... - No jail/imprisonment	0.069
3a - 2 - 1	History of expulsions ... - No expel/suspend	0.103	6a - 2 - 3	History of anti-social ... - Had anti-social friends	0.068
3b - 4 - 1	Youth believes school ... - Believes school is encouragi....	0.099	4b - 2 - 1	Types of structured ... - No structured recreational act....	0.066
3b - 3 - 1	Youth believes there ... - Believes getting an education....	0.099	6b - 2 - 3	Current pro-social ... - Has strong pro-social community....	0.065
6b - 5 - 1	Currently admires/emulates ... - Does not admire, emulat....	0.094	10 - 10 - 1	Accepts responsibility ... - Accepts responsibility for	0.064
6b - 6 - 3	Current resistance ... - Rarely resists goes along with	0.091	7b - 3 - 1	Jail/imprisonment ... - No one with history of being in	0.063
10 - 11 - 1	Youth's belief in ... - Believes he or she will be succe....	0.088	10 - 2 - 3	Primary purpose ... - Impulse	0.062
7b - 14 - 1	Consistent appropriate ... - Consistently appropriate pu....	0.087	11 - 1 - 1	Tolerance for frustration - Rarely gets upset over small....	0.060
10 - 3 - 3	Optimism - Low aspirations: little sense of purpose or	0.084	3b - 9 - 1	Youth's attendance ... - Good attendance with few abs....	0.059
10 - 7 - 1	Respect for property ... - Respects property of others	0.081	11 - 4 - 1	Belief in fighting ... - Believes physical aggression is....	0.059
8a - 3 - 1	History of referrals ... - Never referred for drug/alcoh....	0.081	7b - 8 - 3	Family provides ... - Opportunities for involvement prov....	0.058
3a - 1 - 1	Youth is a special ... - No special education need	0.080	7b - 2 - 4	Annual combined ... - $50,000 and over	0.058
10 - 9 - 1	Attitude toward ... - Abides by conventions/values	0.080	12 - 11 - 1	Control of aggression - Never had a problem with aggress....	0.057
7b - 12 - 1	Parental supervision - Consistent supervision	0.080	7b - 10 - 3	Family member(s) ... - Feels close to father/male careta....	0.057
7b - 15 - 1	Consistent appropriate ... - Consistently appropriate re....	0.079	10 - 4 - 3	Impulsive; acts ... - Impulsive; often acts before think....	0.056
10 - 1 - 1	Primary emotion ... - Nervous, afraid, worried, ambivale....	0.079	4b - 3 - 1	Current interest ... - Currently involved in 2 or more u....	0.055
10 - 8 - 1	Respect for authority ... - Respects most authority figu....	0.078	8b - 1 - 1	Current alcohol use - Not currently using alcohol	0.054
3b - 2 - 1	Type of school in ... - Public academic	0.078	7b - 7 - 1	Family willingness ... - Consistently willing to support....	0.054
11 - 2 - 1	Hostile interpretation ... - Primarily positive view of	0.076	4b - 1 - 2	Current interest ... - Currently involved in 1 structure....	0.054
9a - 13 - 3	Currently has health ... - Private insurance	0.075	9a - 8 - 1	History of Anger ... - No history of anger/irritability	0.053
10 - 6 - 1	Empathy, remorse, ... - Has empathy for his or her victi....	0.075	4a - 2 - 1	History of unstructured ... - Involved in 2 or more unst....	0.053
8a - 4 - 1	History of attending ... - Never attended drug/alcohol e....	0.074	7b - 1 - 4	All persons with ... - Biological father	0.052
8a - 5 - 1	History of participating ... - Never participated in tre....	0.072	9a - 3 - 4	History of witnessing ... - Has witnessed violence in th....	0.052
10 - 5 - 1	Belief in control ... - Believes he or she can avoid/sto....	0.072	7b - 6 - 3	Support network ... - Strong support network	0.050

[1] Items are identified by domain (3a to 12), question number, and the identifying response number to each question.

The next step in the exploratory analysis was to reduce the list of selected variables to those that would best account for the variability observed in subsequent arrest. The statistical approach used for this analysis was a Backward Stepwise Logistic Regression using the Wald Statistic. The Backward Stepwise Logistic Regression procedure was selected because it starts with assumption that each variable significantly contributes to the overall model. The procedure tests the maximum likelihood that the removal of items may improve the overall model's goodness of fit. At each step, a variable is eliminated from the model as long as an improvement in the overall model's goodness of fit χ^2 statistic is observed. The final results of the model are presented in Table 55.

Table 55. Stepwise Logistic Regression Results of Selected PACT Items as Predictors of Subsequent Arrest

Item[1]	Abbreviated Text Associatd With Item	B	S.E.	Wald	df	Sig	R	Exp(B)
3b - 11 - 1	Age at first expulsion ... - No expel/suspend	-1.49	0.65	5.3	1	0.02	-0.01	0.23
8a - 2 - 1	History of expulsions ... - No expel/suspend	1.19	0.65	3.4	1	0.07	0.01	3.30
3a - 3 - 1	Primary purpose ... - Impulse	-0.77	0.10	57.4	1	0.00	-0.04	0.46
3a - 2 - 1	Annual combined ... - $50,000 and over	-0.21	0.05	16.8	1	0.00	-0.02	0.81
6b - 5 - 1	History of drug use - No past drug use	-0.19	0.03	43.4	1	0.00	-0.03	0.83
6b - 6 - 3	Currently has health ... - Private insurance	-0.18	0.03	33.7	1	0.00	-0.03	0.83
7b - 14 - 1	Interviewer's assessment ... - Very likely to stay in sc....	-0.17	0.03	32.3	1	0.00	-0.03	0.84
10 - 3 - 3	Youth is a special ... - No special education need	-0.16	0.03	38.2	1	0.00	-0.03	0.85
3a - 1 - 1	Current pro-social ... - Has strong pro-social community....	-0.16	0.05	9.7	1	0.00	-0.01	0.85
10 - 1 - 1	Current interest ... - Currently involved in 1 structure....	-0.14	0.05	9.2	1	0.00	-0.01	0.87
3b - 2 - 1	Current alcohol use - Not currently using alcohol	0.13	0.03	22.0	1	0.00	0.02	1.14
9a - 13 - 3	History of unstructured ... - Involved in 2 or more unst....	-0.12	0.03	13.3	1	0.00	-0.02	0.88
8a - 4 - 1	History of anti-social ... - Had anti-social friends	0.12	0.03	12.3	1	0.00	0.02	1.13
8a - 5 - 1	History of participating ... - Never participated in tre....	-0.12	0.05	6.2	1	0.01	-0.01	0.89
12 - 2 - 4	Type of school in ... - Public academic	-0.11	0.03	18.3	1	0.00	-0.02	0.89
7a - 4 - 1	History of attending ... - Never attended drug/alcohol e....	-0.11	0.04	5.8	1	0.02	-0.01	0.90
6a - 2 - 3	Support network ... - Strong support network	0.10	0.03	10.5	1	0.00	0.01	1.11
4b - 2 - 1	Jail/imprisonment ... - No one with history of being in	-0.09	0.03	8.6	1	0.00	-0.01	0.91
6b - 2 - 3	Primary emotion ... - Nervous, afraid, worried, ambivale....	-0.09	0.03	11.9	1	0.00	-0.02	0.91
7b - 3 - 1	All persons with ... - Biological father	-0.09	0.03	7.4	1	0.01	-0.01	0.92
10 - 2 - 3	Currently admires/emulates ... - Does not admire, emulat....	-0.08	0.03	7.9	1	0.00	-0.01	0.92
7b - 2 - 4	Consistent appropriate ... - Consistently appropriate pu....	-0.08	0.03	6.6	1	0.01	-0.01	0.93
7b - 10 - 3	Types of structured ... - No structured recreational act....	-0.08	0.05	2.9	1	0.09	0.00	0.93
4b - 1 - 2	Optimism - Low aspirations: little sense of purpose or	0.07	0.03	5.0	1	0.03	0.01	1.08
7b - 7 - 1	Family willingness ... - Consistently willing to support....	0.07	0.03	4.9	1	0.03	0.01	1.08
8b - 1 - 1	Current resistance ... - Rarely resists goes along with	0.07	0.03	5.6	1	0.02	0.01	1.08
4a - 2 - 1	Goal setting - Sets realistic goals	-0.07	0.03	4.4	1	0.04	-0.01	0.93
7b - 1 - 4	History of jail/imprisonment ... - No jail/imprisonment	-0.07	0.03	5.2	1	0.02	-0.01	0.93
7b - 6 - 3	Family member(s) ... - Feels close to father/male careta....	-0.06	0.03	3.8	1	0.05	-0.01	0.94
Constant		0.68	0.07	86.4	1	0.00		

[1] Items are identified by domain (3a to 12), question number, and the identifying response number to each question.

Nagelkerke - Pseudo R^2 = .064 -2 Log Likelihood = 37,941.2; Goodness of Fit = 28,342.5

Notably, the variables that "best" fit the model presented in Table 55 are those considered "pro-social" rather than indicators of any specific risk. This may be due to a variety of reasons, including the possibility that the extent of behaviors (e.g., skipped school once versus several times in the past) is less important than the simple dichotomy of either exhibiting the behavior or not. Though the model's overall power of prediction is still weak (pseudo r^2 = .064), the model can be used as means of exploring options for calculating a social history score that may have more predictive power than the current calculation for the overall social history score.

To investigate further the possibility that a "better" fitting calculation may exist than the current one, the variables retained in the logistic regression model were tested for the possibility that certain items in the model were measuring relatively similar constructs. To test if some variables

could be consolidated to individual factors, a principal component analysis was utilized as a means of data reduction. Table 56 presents the results of the principal component analysis and highlights which variables had a loading value of 0.30 or better.

Table 56. Results of the Principal Component Analysis of Selected PACT Items

		Factor Loadings									
Item[1]	Abbreviated Text Associatd With Item	1	2	3	4	5	6	7	8	9	10
3a - 3 - 1	Age at first expulsion ... - No expel/suspend	.10	.04	.98**	.02	.04	.03	.03	.03	.03	.08
3a - 2 - 1	History of expulsions ... - No expel/suspend	.10	.04	.98**	.02	.04	.03	.03	.03	.03	.08
10 - 2 - 3	Primary purpose ... - Impulse	-.05	-.03	.04	.01	-.04	-.03	.05	.02	.05	.70**
7b - 2 - 4	Annual combined ... - $50,000 and over	-.01	-.07	.00	-.01	.06	.17	.01	.15	.67**	.01
8a - 2 - 1	History of drug use - No past drug use	.21	.58**	.04	.11	.08	-.01	-.09	.00	.01	.34*
9a - 13 - 3	Currently has health ... - Private insurance	.00	-.02	.03	.00	.12	.10	.09	.15	.70**	-.03
3b - 11 - 1	Interviewer's assessment ... - Very likely to stay in sc....	.55**	.09	.09	.19	-.01	.13	.15	-.05	.29	.11
3a - 1 - 1	Youth is a special ... - No special education need	.40**	.04	.22	-.01	.06	-.07	-.12	-.03	.29	-.33*
6b - 2 - 3	Current pro-social ... - Has strong pro-social community....	.06	.05	.05	.12	.03	.71**	.12	.00	.06	.10
4b - 1 - 2	Current interest ... - Currently involved in 1 structure....	.09	.02	.01	.93**	.03	.00	.04	.03	.00	.00
8b - 1 - 1	Current alcohol use - Not currently using alcohol	-.24	-.09	.06	-.03	-.03	-.09	.43**	-.05	-.08	-.30
4a - 2 - 1	History of unstructured ... - Involved in 2 or more unst....	.13	.02	-.02	.04	-.03	.63**	-.05	.03	.07	-.06
6a - 2 - 3	History of anti-social ... - Had anti-social friends	-.17	-.11	-.11	.00	-.11	-.05	.01	.02	.04	-.50**
8a - 5 - 1	History of participating ... - Never participated in tre....	-.05	.90**	.02	-.02	.00	.03	.01	.01	-.03	-.05
3b - 2 - 1	Type of school in ... - Public academic	.15	.34*	.04	.15	-.10	-.21	.14	-.14	.39*	.14
8a - 4 - 1	History of attending ... - Never attended drug/alcohol e....	-.06	.90**	.03	.00	.01	.02	.01	.01	-.03	-.02
7b - 6 - 3	Support network ... - Strong support network	.16	-.02	.02	.06	.08	.46**	.50**	.07	.16	.10
7b - 3 - 1	Jail/imprisonment ... - No one with history of being in	.06	.02	.02	.01	.87**	.02	.10	-.02	.07	.03
10 - 1 - 1	Primary emotion ... - Nervous, afraid, worried, ambivale....	.42**	.20	.11	.08	.04	.07	.18	.09	-.13	-.18
7b - 1 - 4	All persons with ... - Biological father	.03	.01	.03	.02	.02	-.02	.01	.83**	.20	-.02
6b - 5 - 1	Currently admires/emulates ... - Does not admire, emulat..	.66**	-.01	.05	-.01	.06	.17	.07	.06	-.10	.18
4b - 2 - 1	Types of structured ... - No structured recreational act....	-.14	-.05	-.03	-.90**	-.02	-.21	-.05	-.03	-.04	-.02
7b - 14 - 1	Consistent appropriate ... - Consistently appropriate pu....	.41**	.05	.03	.07	.08	.07	.62**	.06	.05	.10
10 - 3 - 3	Optimism - Low aspirations: little sense of purpose or	-.63**	.04	-.01	-.10	-.01	-.04	-.14	-.03	-.10	.06
7b - 7 - 1	Family willingness ... - Consistently willing to support....	.28	.02	-.01	.05	.11	.05	.70**	.09	.11	.06
6b - 6 - 3	Current resistance ... - Rarely resists goes along with	-.69**	.00	-.02	-.04	-.06	-.05	-.05	-.07	.09	-.15
12 - 2 - 4	Goal setting - Sets realistic goals	.45**	-.09	.02	.00	.01	.45**	.04	.01	.11	-.03
7a - 4 - 1	History of jail/imprisonment ... - No jail/imprisonment	.08	.02	.06	.02	.87**	.00	.05	.05	.09	.03
7b - 10 - 3	Family member(s) ... - Feels close to father/male careta....	.12	-.01	.02	.04	.00	.08	.10	.82**	.06	.04

Note. Rotation method: varimax. Extraction method: Eigenvalues>1. The factors account for 60% of the variance. Bartlett's Test of Sphericity: Sig. <.001

** *Loadings were >=.40; * >=.30*

[1] Items are identified by domain (3a to 12), question number, and the identifying response number to each question.

The identification of principal components or factors in principal component analysis occurs by calculating the eigenvalues of a matrix that consists of the variables' relation to each other. The number of eigenvalues that are positive ($\lambda >= 1$) becomes the determination of the number of factors the set of variables represent. For each factor that is generated, identification of the representation of the factors is based on the loading value of each variable within the factor.

Based on this analysis ten factors were identified and labeled as follows (each factor is represented as being perceived as less likely to be re-arrested):

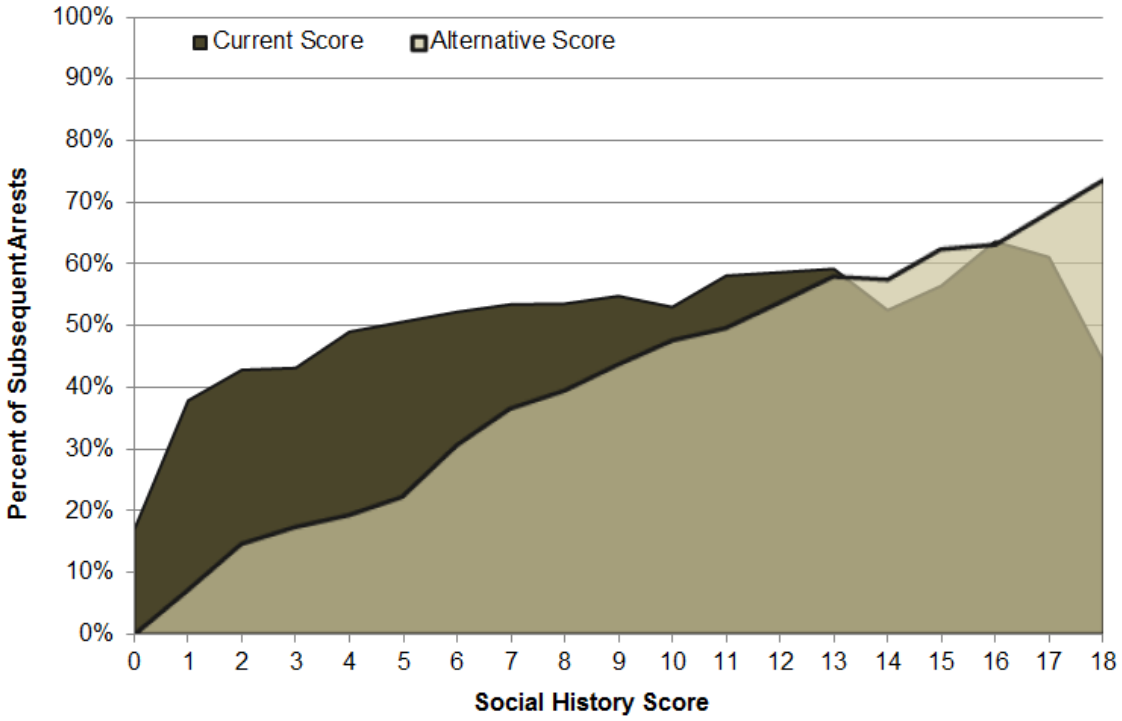
- Factor 1 Demonstrates pro-social thinking
- Factor 2 Does not have any problems with drugs
- Factor 3 Has no history of school suspensions or expulsions
- Factor 4 Is involved in structured/unstructured activities
- Factor 5 Does not know anyone that is imprisoned
- Factor 6 Has a good support network
- Factor 7 Has a good family environment
- Factor 8 Is close to their father
- Factor 9 Is part of a higher socioeconomic environment
- Factor 10 Is not easily influenced by peers

The final part of the exploratory analysis was to create a new social history score that incorporated the findings from the previous steps. This alternative score is based on the variables that were selected, by means of the analysis, as having the highest levels of association with the odds of subsequent re-arrest. Further, the score weights were distributed to each item based on their direct correlation to re-arrest. As with the current score, gender was also added into the score and again was weighted based on its correlation to subsequent arrest. The score was then fitted to the same scale as the current social history score for comparison purposes.

Figure 6 demonstrates the relationship between the current social history score (dark) and the alternative social history score (light) as it compared to average subsequent arrest rate. As can be seen, the alternative score demonstrated a clearer relationship to subsequent arrest than the current score. However, though the correlation between the alternative score (r = .227) more than doubled compared to the current score (r = .106), the relationship is still weak at the individual

level. Having noted this, when viewing the score, not as an incremental change, but rather as hierarchical, the relationship appears demonstratively better (as is demonstrated in Figure 6).

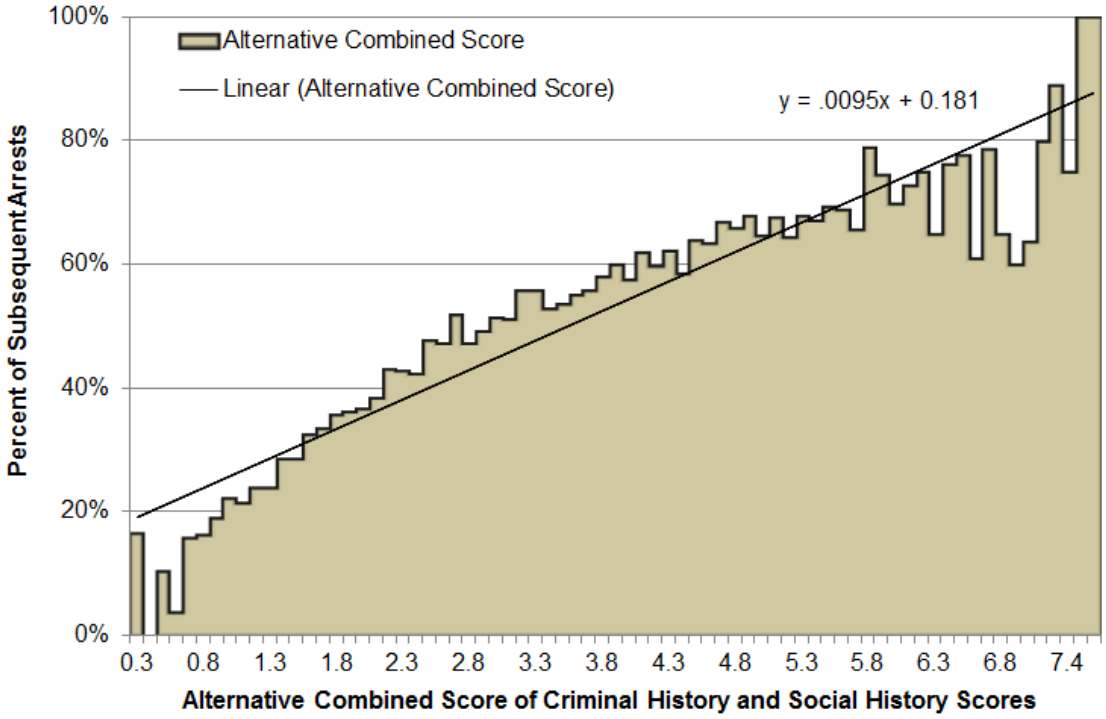
Figure 6. Comparison Between Current Social History and Alternative Social History Scores by Subsequent Arrest



To test further whether the alternative score would yield better predictive power for subsequent arrest than the current score configuration, the alternative social history score was combined with current criminal history score to create a combined total scale representative of the two primary PACT constructs. The current method of combining the two scores uses a matrix-based method to categorize youth into four risk categories: low, moderate, moderate-high, and high. Rather than limiting the independent scores to these categories, the current criminal history score was combined with the alternative social history score at a weight of 2:1, with criminal history being weighted more heavily than social history. The resulting formula used was: (2 x CHS + SHS)/10. The alternative score was then tested to see if the strength of the relationship improved. Figure 7 shows the results.

As can be seen, the relationship plots well with the overall percent of subsequent arrests. The correlation moderately improved with the alternative combined score, from a Pearson's correlation of 0.227 to a correlation of 0.256.

Figure 7. Alternative Combined Score Relative to Subsequent Arrest



The final step in creating the alternative score was to test to see whether there was an overall improvement in classification. As mentioned earlier, the current method assigns classifications based on a matrix of scaled criminal and social history scores. Rather than using that approach, the alternative method used the sample distributions of the alternative combined score so that relatively one third fell within the low risk category, fifty percent split evenly within the moderate risk and moderate-high risk levels, and the remaining cases fell within the high risk category. The sample distributions of both the current risk classifications and the alternative classification are provided in Table 57.

Table 57. Sample Distribution of Current and Alternative Risk to Reoffend Categories

	Percent of Sample	
Risk Category	Current	Alternative
Low	36%	32%
Moderate	17%	25%
Moderate-High	28%	25%
High	20%	18%
Total N	28,383	

Table 58 demonstrates the overall percent of subsequent arrests for both the current and alternative risk classifications. Overall, youth categorized in the lower risk categories had a smaller re-arrest rate than the higher risk categories for both the current and alternative classifications. If there were no differences in classification we would expect to see a distribution similar to the total 49% in each classification; the fact that we do not demonstrates that there are differences between each group. The alternative classification, though mostly similar to the current classification, does demonstrate some slight differences in the extremes of the categories. In other words the difference between the low risk and high risk category for the alternative method is 34 percentage points, while the current method shows a difference of 27 percentage points. This implies a greater variance in the alternative classification scheme than the current method, and suggests an overall improved construct.

Table 58. Percent of Subsequent Arrests of Current and Alternative Risk to Reoffend Categories

	Percent of Sample	
Risk Category	Current	Alternative
Low	35%	33%
Moderate	49%	49%
Moderate-High	58%	57%
High	62%	67%
Total	49%	49%

To test the differences between the current and alternative methods of classification further a logistic regression model was calculated where subsequent arrest was the dependent variable and where each risk category was compared to the high risk category as an indicator. The results demonstrated that there was a slight improvement in the alternative model compared to the current model (Nagelkerke's pseudo r^2=.080 and Nagelkerke's pseudo r^2=.063, respectively).

In conclusion, there does appear to be other information currently collected by the PACT that may be used to create alternative social history scoring that could increase the instrument's predictive power. However, the degree to which that improvement is any more predictive is small (less than .02); mainly due to the fact that as revealed in the correlation matrices (Tables 53 and 54, above) at the individual level, the strength of the relationship between any of the social history indicators and recidivism is relatively weak. Conversely, at an aggregate level there is a clear pattern demonstrated in which youth scored and assessed as lower risk have, on average, notably lower rates of recidivism than those scored and assessed as higher risk youth. In addition, there appears to be more predictive power in examining the pro-social aspects of the PACT rather than focusing predominately on the anti-behavioral components.

DISCUSSION AND RECOMMENDATIONS

The purpose of the present analysis was to examine the criminal history and social history scales using factor analysis to assess the individual measures currently used in the construction of the PACT domains, and to examine whether these measures represent distinct domains or constructs. The criminal history scale is primarily an actuarial tool based on statistical modeling, as opposed to a sociometric tool used to gauge abstract or theoretical constructs. Even so, some patterns emerged which increased understanding of the nature, as well as the extent of recidivism risk. The factor analysis suggested groups of offenders with different clusters or types of risk: low-level misdemeanants, more serious delinquents who commit serious offenses, "deep-end" youth with histories of detention and commitment, and youth involved in weapons offenses. Although the

variance explained by the three factors which resulted from the social history scale was somewhat low, the analysis likewise suggested distinct groups of youth involved in the juvenile justice system: defiant youth with multiple problems in multiple settings—school, home, peer relationships and/or drug or alcohol abuse; girls with mental health issues who have experienced abuse and run away; and dependent/delinquent youth who have experienced neglect and abuse and have been placed in out-of-home dependency programming. Finally, the exploratory factor analysis suggests that there might be ways to reconfigure PACT indicators to increase its predictive ability.

Other procedures, including an analysis of the patterns of intercorrelations among the measures of each of the scales, as well as reliability analysis, were used to assess the structural integrity of the two scales. Whereas the criminal history score yielded a generally high alpha indicating internal consistency, and its correlations displayed the expected patterns, the social history score produced lower values and less consistency. It is important to emphasize that the PACT assessment was engineered from a largely actuarial perspective (relative to its scoring of overall level of risk to re-offend). The method built a statistical model based on probabilities derived from population data, rather than a theory-based approach involving abstract concepts that lend themselves to factor analysis. Caution is therefore urged in relying upon factor analysis alone for insights as to how well the tool performs or potential recommendations for improvement. Other tools and processes must be included as well, including validity and reliability analyses, internal consistency analysis, and test-retest reliability analysis, all of which are important in measuring and ensuring the accuracy of a risk assessment tool. Monitoring the quality of data entry, including automated processes which populate the assessment, as well as the programming used to generate scoring, are also important components to an effective, maintenance system. In addition, it is appropriate to periodically re-validate the actuarial model, including the measures within it, as the population changes to maintain and improve predictive ability. Probably the most cost-effective method would be an evaluation of the static risk part of the PACT. Further studies should explore the use of existing criminal history and recidivism data by itself to build a more current model of risk

to recidivate in order to maximize the predictive power (especially the Receiver Operator Characteristic) of the trait or static risk aspect of the instrument. Further analysis could also examine if indeed the pro-social elements are better predictors than the anti-social ones at estimating the state or dynamic risk aspects.

PACT

INTER-RATER RELIABILITY REPORT

PHASE III STUDY

INTRODUCTION

Studies examining the effectiveness of risk assessment instruments often focus solely on predictive validity, without consideration as to the consistency of instrument administration and fidelity to assessment training. As Knapp, Leenarts, Born & Oosterveld (2010) note, while risk assessment research has focused heavily on the predictive validity of instruments, examinations of reliability have generally been neglected in the literature. Despite the paucity of research, the need to examine the reliability of an instrument is a critical element in considering its overall accuracy in rating offender risk to re-offend (Baird, 2009).

Offender risk assessment instruments are typically administered by probation officers or other juvenile justice practitioners (hereinafter referred to as 'staff'), and as such, their inferences and judgments may affect consistency in instrument scoring (Knapp et al., 2010). In large part, risk assessment instruments were developed in response to concerns over subjectivity and inconsistency in judicial sentencing of offenders. An embedded goal, therefore, of risk assessments is the reduction of subjectivity and inconsistency in offender scoring.

Research indicates that static (fixed) criminal history indicators are generally the most consistently rated, while dynamic social history indicators that change over time involve greater subjectivity (Austin, Coleman, Peyton, & Johnson, 2003; Baird, 2009). Indicators of social risk and needs often exhibit reduced consistency in rater scoring (Baird, 2009). Compounding the likelihood for inconsistency is the number of social history items contained in an instrument. Baird (2009) argues that inter-rater reliability is critical when instruments include 25 or more items, and a large number of dynamic factors included in the instrument scoring. The PACT assessment includes more than 25 items for both the criminal history and social history scoring, and as such, careful examination of rater agreement on the PACT is warranted. The section that follows sets forth details regarding the reliability study sample selection and the underlying methods used to evaluate inter-rater reliability.

METHODS

Juvenile probation officers and provider staff who have completed requisite training, use motivational interviewing techniques to administer the PACT assessment to all youth referred to the Department of Juvenile Justice (Department). Youth are assessed on a number of domains related to their criminal history, social history, attitudes and behaviors, aggression, and skills. Responses to instrument questions involving prior criminal history and social history are used to calculate the PACT criminal history score and social history score. A matrix which combines these scores is used to determine a youth's overall level of risk to re-offend (low, moderate, moderate-high, and high).

The PACT includes both a pre-screen and full-assessment. The pre-screen is administered to all youth and the full-assessment is administered to those assessed as moderate-high or high risk on the pre-screen. The PACT is integrated with the Department's Juvenile Justice Information System (JJIS), thereby enabling automated scoring of the criminal history domain and corresponding criminal history score. Following the interview process with youth, staff members enter the appropriate responses to the social history domain questions into the PACT software. When all 46 items in the pre-screen are completed, the PACT software scores the answers and produces the youth's level of risk to reoffend. If scoring from these 46 items indicates that a youth is moderate-high to high risk, the staff will be prompted to complete a full-assessment on the youth and answer an additional 80 items. Computation of the criminal history score, social history score, and overall level of risk, are identical for both the pre-screen and full-assessment.

In addition to automated scoring of the criminal history domain, the social history indicator of the sex of a youth is also auto-populated by JJIS. As such, reliability in scoring criminal history indicators and scores, as well as the scoring of sex, was not examined as part of the current reliability study. Rather, the evaluation focused on inter-rater agreement in the scoring of the

remaining individual social history indicators, social history score, and overall level of risk to re-offend.

A random sample of 400 staff (hereinafter referred to as 'staff raters'), who had completed the requisite PACT training and were identified by the Department as staff actively engaged in administering PACT assessments at the time of the study,[5] was selected to participate in the study. The Department requested that two videotaped PACT training interviews be used in conducting the inter-rater reliability component of the overall study.[6] The training videos were developed by the Department in collaboration with the PACT developer. The videos depicted the PACT assessment being administered during separate interviews with two juvenile offenders, a Caucasian female (Grace) and an African-American male (Andrew).[7] Each PACT interview was approximately one hour in duration. Similar to Morton (2009), the current study was designed to measure the extent to which the administration of the PACT produces consistent scoring, holding constant staff interviewing style. While interviewing style may impact inter-rater reliability, the examination of this construct was beyond the timing and scope of the current evaluation.

An introductory email from the Department was initially sent to each staff rater selected to participate in the study informing them that they had been selected for the study. A subsequent instructional email was sent to staff detailing the procedures to follow in viewing the case study videotapes and scoring the PACT assessments. Staff was asked to view the video interviews in their entirety, and then complete a Community PACT (hereinafter PACT) full-assessment for each

[5] Only those staff identified as currently involved in the administration of PACT assessments, as opposed to those previously trained but no longer actively conducting assessments, were included in the pool from which the study participants were randomly selected.

[6] The evaluators originally proposed to develop a number of videotaped interviews which would allow for exhaustive variation in sex/race/ethnicity categories of staff raters and assessed youth. Given timing restrictions for the completion of the study contract, the Department requested that the two, previously developed PACT training videotapes be used to evaluate inter-rater reliability. Department staff noted that the videotaped case studies selected had not yet been used for training purposes and thus the sample of staff raters would not previously have been exposed to the interviews prior to participating in the study.

[7] Note, these are not the real names of the subjects interviewed.

youth. The Department provided the responses of a 'master rater' for each video for comparison with the responses of staff participating in the study.

The primary research questions for the reliability phase of the evaluation were:

1. To what extent do staff raters agree in their scoring of the PACT social history indicators and the overall level of risk to reoffend?
2. To what extent do the staff raters and master rater agree in their scoring of the PACT social history indicators and overall level of risk to reoffend?

Operational Definitions

As noted earlier, the PACT assessment is administered by trained juvenile probation officers and provider staff. Staff raters were grouped into two categories when examining inter-rater reliability: Department staff and provider staff.

Demographic characteristics of the staff raters and master rater were likewise included in evaluating the consistency in PACT administration across multiple raters. Demographic information was provided by the Department and included staff sex, age, race, and ethnicity.

Inter-rater reliability was examined across each of the social history indicators, the total social history score, and overall level of risk to reoffend, with the exception of sex, which is auto-populated through the PACT interface with the JJIS system. As such, the sex of the youth is based upon the youth's official record and therefore, there is 100% agreement across raters for this social history indicator.

Table 59 delineates the operationalized definitions of the PACT variables examined in assessing inter-rater reliability and the covariates used in examining demographic differences in rater scores.

Table 59. PACT Reliability Analysis Variables

Variable	Values	Attributes
Social history indicator		
School enrollment/conduct/attendance/performance	1 to 3	Graduated or enrolled without major problems in conduct, attendance or performance (1); problems reported by teachers, calls to parents, some full-day unexcused absences, or mostly Cs and Ds, with some Fs (2); calls to police, habitual truant, some Ds and mostly Fs, dropped out, expelled or suspended (3)
Current peers	1 to 4	Has pro-social friends and no anti-social friends (1), has no friends or both pro-social and anti-social friends (2), has all anti-social friends (3), is a gang member/associate (4)
History of out-of-home placements	1 to 2	No history of out-of-home or emergency foster shelter care placements exceeding 30 days (1), one or more out-of-home placements (2)
History of running away	1 to 3	No history of running away or being kicked out of home (1), one instance of running away or being kicked out of home (2), two or more instances of running away or being kicked out of home (3)
Jail/imprisonment history of current household	1 to 2	No jail/imprisonment history for siblings, mother or father currently living in the household (1); mother, father, and/or siblings currently living in the household has jail/imprisonment history (2)
Parental authority and control	1 to 3	Youth usually obeys and follows rules (1); youth sometimes obeys, obeys some rules (2); youth consistently disobeys and/or is hostile (3)
Current alcohol and drug use	1 to 2	No current alcohol or drug use that is causing family conflict, disrupting education, causing health problems, interfering with keeping prosocial friends, or contributing to criminal behavior (1), current alcohol or drug use that is causing family conflict, disrupting education, causing health problems, interfering with keeping prosocial friends, or contributing to criminal behavior (2)
History of physical/sexual	1 to 2	No history of physical or sexual abuse (1), victim of physical or sexual abuse (2)
History of neglect	1 to 2	No history of neglect (1), victim of neglect (2)
History of mental health problems	1 to 2	No history of mental health problems (1); diagnosed with mental health problems, mental health medication prescribed, mental health treatment prescribed, or mental health medication and treatment prescribed (2)
Covariates		
PACT risk level (risk to re-offend)	1 to 4	Low risk (1), moderate risk (2), moderate-high risk (3), high risk (4)
Staff race (as available)	1 to 2	White (1), non-white (2)
Staff age (as available)	21-66 years	Scale variable in years
Staff type	1 to 2	DJJ staff (1), provider staff (2)

Data Sources and Sample Description

The Department provided the evaluators with the master list of staff actively engaged in completing PACT assessments at the time of the study. The list identified 1,201 Department and provider employees meeting this criterion, and a random sample of 400 staff raters was drawn from this cohort.

Each of the 400 staff randomly selected to participate in the study were asked to view both the Grace and Andrew videos and assess each youth at the conclusion of the videotaped interviewed. Of the 400 staff randomly selected to participate in the inter-rater reliability study, 306

staff completed a PACT assessment of Grace and 306 staff completed a PACT assessment of Andrew (77% response rate), representing a considerably higher rate of participation than other similar research (Morton, 2009). It should be noted that 295 staff raters completed a PACT for both youth, while an additional 22 staff completed a PACT for only one youth (11 of the 22 completed a PACT for Andrew and another 11 staff completed a PACT for only Grace). Thus, there was a grand total of 317 staff raters involved in the inter-rater reliability study.

Table 60 presents the descriptive statistics of the original random sample, the staff participants, and the staff non-participants.[8] The original sample reflected the general demographics of those actively engaged in conducting PACT assessments at the time of the research, with most staff raters being female (66%), non-white (52%) and non-Hispanic (92%). Most raters were under the age of 51 years old (75%) and were employed by the Department (72%). Roughly similar proportions of raters were from the north (28%), central (37%), and south (35%) Department designated regions of the state. The master rater was a white female who was 40 years of age at the time of the study and was employed by the Department.

The participant raters largely mirrored the demographic composition of the original sample. Non-participants were comprised of slightly larger percentages of whites, staff under the age of 31 years, staff located in the central region, and staff employed by provider agencies, as opposed to the Department. These differences, however, were impacted by relatively small sample sizes within each demographic category.

[8] The terminology *non-participants* is used generally here, as a number of the non-participants were those who did not comply with the procedural instructions for the study in some manner, and thus had to be removed from the sample. These instances included staff who failed to use the unique identification number assigned to them in their procedural email (n=17), staff who failed to complete an assessment in its entirety (n=3), and staff who completed a pre-screen, rather than a PACT full-assessment (n=7). Another twenty-one staff left their positions of employment during the study period; fifteen indicated they could not complete the assessments; seven had email addresses that were returned as undeliverable; one staff indicated she was deaf and could not see the faces of the staff or youth on the videos adequately enough to be able to read their lips; and one was removed due to being on medical leave. Of the original sample of 400, only 11 failed to respond.

Table 60. Sample Descriptive Statistics

	Total		Participants		Non-Participants	
	N	Valid Percent	N	Valid Percent	N	Valid Percent
Sex						
Female	264	66.0%	207	65.3%	57	68.7%
Male	136	34.0%	110	34.7%	26	31.3%
Race						
Non-white	182	51.9%	161	52.6%	21	46.7%
White	169	48.1%	145	47.4%	24	53.3%
Unknown	49		11		38	
Ethnicity						
Non-Hispanic	326	92.4%	282	91.9%	44	95.7%
Hispanic	27	7.6%	25	8.1%	2	4.3%
Unknown	47		10		37	
Age						
30 years or younger	99	25.8%	77	24.4%	22	31.9%
31 through 37 years	96	25.0%	81	25.7%	15	21.7%
38 through 50 years	92	24.0%	75	23.8%	17	24.6%
51 years or older	97	25.3%	82	26.0%	15	21.7%
Unknown	16		2		14	
Region						
North	113	28.3%	88	27.8%	25	30.1%
Central	148	37.0%	114	36.0%	34	41.0%
South	139	34.8%	115	36.3%	24	28.9%
Rater type						
DJJ staff	288	72.0%	252	79.5%	36	43.4%
Provider staff	112	28.0%	65	20.5%	47	56.6%
Master rater	1	100.0%	1	100.0%	1	100.0%

Staff and master rater assessment responses were entered into and scored by the PACT system software, and Department staff extracted the data from the system and provided it to the evaluators.

Data Analysis

Percent agreement among staff raters in the scoring of each social history indicator, social history score, and resulting risk levels was calculated, as was the percent agreement between staff raters and the master rater. Demographic differences among raters and youth assessed were further examined relative to PACT scoring (as these data were available from the Department). To adjust for chance agreement among the raters, Fleiss' Generalized Kappa was calculated. The

statistic is an appropriate measure of inter-rater reliability when agreement in rating involves more than two raters (Fleiss, 1971; Gwet, 2001; Gwet, 2010).

RESULTS

The findings of the inter-rater reliability study revealed strong agreement among raters on a number of the social history indicators and scores, and weaker agreement on other items. Consistency in ratings was higher on the scoring of Andrew, than it was for Grace. Tables 61 and 62 present the breakdown of staff raters' responses on each of the ten indicators for the assessments of Andrew and Grace, respectively. The master rater response is highlighted in bold. The majority of staff raters agreed with the scoring of the master rater on nine out of ten social history indicators assessed for both Andrew and Grace.

The percentage of agreement among staff raters on Andrew's PACT assessment was quite strong (90% and higher) for the following social history indicators: history of child welfare out-of-home placements, history of running away or being kicked out of the home, history of physical or sexual abuse, history of neglect, and history of mental health problems. Greater differences in scoring for Andrew were found on the school performance, current friends, and parental authority indicators. In part, this is reflective of the fact that these indicators contain three or more categories, increasing the likelihood that subtle differences in question responses will result in different scores. Raters' responses to the school measures are collapsed by the PACT software into three possible scores:

1. Graduated or enrolled without major problems in conduct, attendance or performance
2. Enrolled – and – a) problems reported by teachers, or b) calls to parents, or c) some full-day unexcused absences, or d) mostly Cs and Ds, some Fs.
3. Enrolled – and – a) calls to police, or b) habitually truant, or c) some Ds and mostly Fs, or d) dropped out, expelled or suspended.

Table 61. Inter-Rater Agreement on PACT Assessment - Andrew

Social History Indicator	Frequency	Percent
School Status in Most Recent Term		
Graduated or enrolled without major problems in conduct, attendance or performance	122	39.9%
Enrolled and problems reported by teachers - OR - calls to parents - OR - some full-day unexcused absences - OR -mostly Cs and Ds, some Fs	**159**	**52.0%**
Enrolled - AND - calls to police - OR -habitual truant - OR - some Ds and mostly Fs - OR - dropped out, expelled or suspended	25	8.2%
Current Friends/Companions		
Has prosocial friends and no antisocial friends	47	15.4%
Has no friends, or has prosocial and antisocial friends	**193**	**63.1%**
Has all antisocial friends	64	20.9%
Is a gang member/associate	2	0.7%
History of Child Welfare Out-of-Home Placements		
No out-of-home placements exceeding 30 days	**280**	**91.5%**
1 or more out-of-home placements	26	8.5%
History of Running Away/Being Kicked Out of Home		
No history	**300**	**98.0%**
1 instance of running away/kicked out of home	2	0.7%
2 or more instances of running away/kicked out of home	4	1.3%
Jail/Imprisonment History of Current Household		
No history	**179**	**58.8%**
Mother, father, or siblings in current household with history	127	41.5%
Parental Authority and Control		
Youth obeys and follows rules	106	34.6%
Youth sometimes obeys	**191**	**62.4%**
Youth consistently disobeys and/or is hostile	9	2.9%
Current Alcohol and Drug Use		
No current alcohol or drug use causing problems	231	75.5%
Current use causing problems	**75**	**24.5%**
History of Physical or Sexual Abuse		
No history	**293**	**95.8%**
Victim of Physical and/or Sexual Abuse	13	4.2%
History of Neglect		
No history of neglect	**306**	**100.0%**
Victim of neglect	0	0.0%
History of Mental Health Problems		
No history of mental health problems	**306**	**100.0%**
History of mental health problems and/or medication	0	0.0%
Total Raters	306	100.0%

*The Master Rater response for each Social History Indicator is highlighted in **bold**.

Table 62. Inter-Rater Agreement on PACT Assessment - Grace

Social History Indicator	Frequency	Percent
School Status in Most Recent Term		
Graduated or enrolled without major problems in conduct, attendance or performance	92	30.1%
Enrolled and problems reported by teachers - OR - calls to parents - OR - some full-day unexcused absences - OR -mostly Cs and Ds, some Fs	34	11.1%
Enrolled - AND - calls to police - OR -habitual truant - OR - some Ds and mostly Fs - OR - dropped out, expelled or suspended	**180**	**58.8%**
Current Friends/Companions		
Has prosocial friends and no antisocial friends	71	23.2%
Has no friends, or has prosocial and antisocial friends	71	23.2%
Has all antisocial friends	**164**	**53.6%**
Is a gang member/associate	0	0.0%
History of Child Welfare Out-of-Home Placements		
No out-of-home placements exceeding 30 days	**173**	**56.5%**
1 or more out-of-home placements	133	43.5%
History of Running Away/Being Kicked Out of Home		
No history	**145**	**47.4%**
1 instance of running away/kicked out of home	21	6.9%
2 or more instances of running away/kicked out of home	140	45.8%
Jail/Imprisonment History of Current Household		
No history	**275**	**89.9%**
Mother, father, or siblings in current household with history	31	10.1%
Parental Authority and Control		
Youth obeys and follows rules	9	2.9%
Youth sometimes obeys	**171**	**55.9%**
Youth consistently disobeys and/or is hostile	126	41.2%
Current Alcohol and Drug Use		
No current alcohol or drug use causing problems	**173**	**56.5%**
Current use causing problems	133	43.5%
History of Physical or Sexual Abuse		
No history	**294**	**96.1%**
Victim of Physical and/or Sexual Abuse	12	3.9%
History of Neglect		
No history of neglect	**300**	**98.0%**
Victim of neglect	6	2.0%
History of Mental Health Problems		
No history of mental health problems	**290**	**94.8%**
History of mental health problems and/or medication	16	5.2%
Total Raters	306	100.0%

*The Master Rater response for each Social History Indicator is highlighted in **bold**.

Thirteen separate dichotomous (yes/no) questions on the PACT instrument are used in calculating the score on the school history indicator. In the case of Andrew, the master rater responded yes on two of the 13 questions: Andrew was enrolled in school and he was making Cs and Ds, some Fs. Using Motivational Interviewing techniques to answer the thirteen school questions, staff may have consistently concluded that Andrew was enrolled, had not had problems reported by teachers, had not had calls to parents, had not had calls by police, had not had unexcused absences, had not been habitually truant, had not been suspended or expelled or dropped out, but missed the one affirmative answer on the questionnaire regarding Andrew's grades. Review of the staff raters' individual responses reveals that this was exactly what occurred in 118 instances. The single question regarding Andrew's grades altered the overall school performance rating (as determined by the master rater) from the first category referenced above, to the second category, thereby increasing Andrew's social history score on the PACT assessment. While the question was nonetheless assessed differently by staff, it is important to consider inter-rater reliability within the context of the scoring nuances discussed here.

Examination of PACT scoring for Grace reflected greater divergence among staff raters than found with Andrew's assessment. In particular, on four of the social history indicators, staff raters were somewhat split on their scores: history of out-of-home placements, history of running away, parental authority and control, and current alcohol/drug use. Each will be examined in more detail to explore factors potentially impacting the results and to identify areas for improvement.

The majority (56.5%) of the staff raters scored Grace as having no-out-of home placements, while another 43.5% assessed her as having one or more placements. During the interview, Grace indicated that following her arrest for battery against her mother, she was transferred from juvenile detention to a shelter, where she remained for three weeks. The actual item on the PACT assessment reads as follows: *History of court-ordered or DCF voluntary out-of-home and shelter care placements exceeding 30 days*. While Grace did in fact have an out-of-home placement, it did not exceed 30 days. As will be discussed below, timing requirements may be overlooked by some

assessors. Enhanced instructions for these items, as well as additional staff training may improve the consistency in raters' scoring on the community PACT assessment.

Staff raters were at opposite ends of the spectrum in assessing Grace's history of running away. Forty-seven percent of the staff scored Grace has having no history of running away, while 46% indicated that she had two of more instances of running away. The item on the PACT assessment reads as follows: *History of running away or getting kicked out of home: Include times the youth did not voluntarily return within 24 hours, and include incidents not reported by or to law enforcement.*

At the beginning of the PACT interview, Grace discussed in detail how she had voluntarily left her mother's home to live with a friend for a few weeks. When asked if this was her idea or her mother's, Grace indicated it was her choice to go to the friend's house but that her mother was okay with her doing this. She additionally explained that she would see her mother roughly every other day or whenever she needed to get some clothes. After her first arrest, Grace was court-ordered to remain in her mother's home, however she still stayed with her friend and failed to obey the court order. Grace noted that her mother was not particularly strict and didn't really punish her for failing to obey rules.

Grace's responses shed light on the staff raters' scoring on the social history indicator of running away. The strict interpretation of the PACT item might lead one to conclude that Grace had both *voluntarily* left the home and *failed to return within 24 hours*. Yet, commonly held notions of running away may instead define this construct as instances where the child has left the home *without parental consent*, has failed to return within 24 hours, and whose whereabouts are unknown to the parent or guardian. The criteria of without parental consent and unknown whereabouts of the youth were not met in this case. Grace's mother did not report that her daughter had left the home to authorities. She purportedly approved of Grace staying with the friend and she allowed Grace to stop by and get clothes from the family home as she needed.

The findings on the social history indicator related to running away do not easily lend themselves to a straightforward staff training recommendation. The question is: does it make a difference to the predictive accuracy of the PACT to define running away as it is currently described in the instrument? Future research might involve pilot testing alternative definitions of running away to determine whether there is a stronger predictor of risk to re-offend, than the current operationalization of the item. The current definition may apply a variable of parental diligence into the measure of running away if the rater believes that the parent or guardian's approval of the youth leaving the home should be a factor in determining whether the youth has a history of running away. This may not reflect the intended measure of the social history indicator and may lead to inconsistency in scoring of this item, as it did here. It is also possible to envision situations where a youth may leave the home to live in a more pro-social environment. Such a move would seem to be more reflective of a protective factor, than a risk factor. Furthermore, given that research has found that girls are more often referred for running away than boys (Belknap, 2006; Chesney-Lind, 2003), it is critical that a clear, uniform definition of this variable be used to avoid a potential criminalizing effect that disproportionately impacts girls.

Turning to the social history indicator of parental authority and control, fifty-six percent of the staff raters concluded Grace sometimes obeyed rules, and 41% indicated that she consistently disobeyed and/or was hostile. The item on the PACT assessment reads as follows: *Parental authority and control*. The choices available for selection include: a) youth usually obeys and follows rules, b) youth sometimes obeys or obeys some rules, or c) youth consistently disobeys and/or is hostile. The scoring of this indicator for Grace was a judgment call on the part of the rater. Throughout the PACT interview, Grace repeatedly said that she disobeyed court orders to remain in the home, broke curfew, and removed an electronic ankle monitor. She also explained she received a battery charge when she came home intoxicated and her mother refused to drive her to get take-out food. She ended up throwing a book and hitting her mother in the head, causing her to bleed. Some raters may have perceived this to meet the definition of 'is hostile,'

despite the fact that according to the timeline of events, it had not occurred within the last six months, which is the time period raters are to consider in assessing this item on the community PACT instrument.

It is not clear whether staff raters made a distinction between failing to obey court orders and failing to obey parental rules. Grace noted that her mother was not particularly strict in setting rules or enforcing them. While Grace clearly disobeyed court orders, it was not as clear whether she was disobeying parental authority and control. A more detailed, clear and uniform definition of the risk indicator that takes these issues into consideration, may help to reduce inconsistency in ratings.

The last social history indicator resulting in varying scores in staff assessments for Grace related to her current alcohol and drug use. These items on the PACT assessment ask the rater to consider the preceding six months and read as follows:

Youth's alcohol use (check all that apply): a) not currently using alcohol, b) currently using alcohol, c) alcohol disrupts education, d) alcohol causes family conflict, e) alcohol interferes with keeping pro-social friends, f) alcohol causes health problems, g) alcohol contributes to criminal behavior, h) youth needs increasing amounts of alcohol to achieve same level of intoxication or high, and/or i) youth experiences withdrawal problems.

Youth's drug use (check all that apply): a) not currently using drugs, b) currently using drugs, c) drugs disrupt education, d) drugs cause family conflict, e) drugs interfere with keeping pro-social friends, f) drugs cause health problems, g) drugs contribute to criminal behavior, h) youth needs increasing amounts of drugs to achieve same level of intoxication or high, and/or i) youth experiences withdrawal problems.

Grace said that she was actively using drugs during the preceding six months. She noted, however, that while she was consistently using drugs, she was able to do "everything else right."

That said, in the past, she had clearly had situations in which her drug use caused family conflict, interfered with keeping pro-social friends, and contributed to criminal behavior. While her current charge may have involved drugs, Grace did not overtly state this during the interview. The divergence in scoring may reflect differences in perception on timing – history of drug use versus current drug use – and/or differences in perception related to the events leading to her most recent offense. In either case, PACT training may be used to reinforce the relevance of time periods being considered in each assessment item. Additional clarification could be added to the current alcohol and drug use items to similarly reinforce time periods and uniformly define when problems should be characterized as impacting the youth's current criminal behaviors.

Staff raters exhibited close to perfect agreement in assessing Grace relative to her history of sexual or physical abuse, neglect, and mental health problems. The same was true in staff PACT assessments of Andrew. This may in part be due to the dichotomous (yes/no) nature of these risk factors limiting rater variability. The overall degree to which staff raters agreed with the master rater is presented in Table 63. With the exception of the social history indicators involving a history of running away/being kicked out of the home and current alcohol/drug use, the majority of staff agreed with the master rater in assessing social history risk factors.

Table 63. Staff Raters and Master Rater Agreement on PACT Assessments by Case Study Youth

	Grace		Andrew		Fleiss' Kappa[a]	
Social History Indicator	Frequency	Percent Agreement	Frequency	Percent Agreement	Kappa	95% C.I.
SHQ2 - Current School	180	59%	159	52%	0.1553	0.1553-0.1643
SHQ3 - Current Friends	164	54%	223	73%	0.1036	0.0990-0.1083
SHQ4 - Out-of-Home Placements	173	57%	280	92%	0.1562	0-1498-0.1626
SHQ5 - History of Running Away/Being Kicked Out	145	47%	300	98%	0.2738	0.2682-0.2795
SHQ6 - Current Family Jail/Imprisonment	275	90%	179	59%	0.1256	0.1192-0.1320
SHQ7 - Parental Authority and Control	171	56%	191	62%	0.1079	0.1032-0.1126
SHQ8 - Current Alcohol and Drugs	173	57%	75	25%	0.0369	0.0305-0.0433
SHQ9 - History of Abuse	294	96%	293	96%	-0.0032	-0.0096-0.0032
SHQ10 - History of Neglect	300	98%	306	100%	0.0067	0.0002-0.0131
SHQ11 - Mental Health Problems/Medications	290	95%	306	100%	0.0237	0.0172-0.0301
Total	306	100%	306	100%		

a. Fleiss' Kappa was calculated on the operationalized indicators used in PACT scoring, with the columns representing the categories or scores of the raters and the rows representing each case (Grace and Andrew) rated. Note, Fleiss' Kappa can be low when high levels of agreement exist and individual ratings are accurate (Uebersax, 1988).

Staff ratings on running away diverged from the master rater only on Grace's assessment. This was explored in greater depth previously. As shown in Table 63, only 75 staff raters agreed with the master rater in scoring current alcohol and drug use on Andrew's assessment. Further examination of these scores revealed that the master rater indicated that Andrew had been using drugs during the previous six months and that the drug use caused family conflict. During the PACT interview, Andrew explained that his current charge occurred when he was riding home with friends after playing video games and was pulled over by law enforcement. The officer asked for permission to search the vehicle, and thinking that no one had any contraband, Andrew and his friends agreed to the search. The officer asked Andrew to remove his shoe and found a single marijuana leaf in his shoe. Andrew said he "had no clue" the leaf was in his shoe at the time. He was arrested and the officer contacted his mother. When asked how his mother reacted, Andrew explained that she was mad because she had to leave work. Andrew additionally explained that his mother knew that he smoked marijuana and allowed him to do so in his room, rather than outside the home where he might get into trouble. It would appear that the majority of staff raters did not characterize Andrew's drug use as causing family conflict. The instance leading to his current arrest did not involve the *use* of drugs, and rather involved the possession of drugs, thus it would not be characterized as contributing to his criminal behavior per se. Whether Andrew's marijuana usage ultimately caused family conflict is a judgment call and given the divergence in staff ratings may warrant additional clarification as to what is defined as "family conflict."

Assessed risk levels are auto-calculated by the PACT software based upon raters' responses to the instrument questions. Table 64 presents the frequency and percentage distributions of staff raters' risk level scores for Grace and Andrew. As can be seen, the overwhelming majority of staff (73%) assessed Andrew as being moderate-high risk. The majority of staff raters (53%) likewise assessed Grace as being moderate-high risk. While the master rater's risk level score for Andrew matched that of the majority of staff raters, it did not match for Grace's assessed risk level. The master rater assessed Grace as having a social history score of five, which when combined with

her total criminal history score resulted in a moderate risk level designation. Grace was on the border between Moderate and Moderate High in social history score, such that one additional point in the score would result in a designation of moderate-high risk.

Table 64. Frequency and Percentage of Staff Risk Level Scores by Case Study Youth

	Grace		Andrew	
PACT Risk Levels	Frequency	Percent Agreement	Frequency	Percent Agreement
Low Risk	0	0%	0	0%
Moderate Risk	**100**	**33%**	0	0%
Moderate-High Risk	162	53%	**224**	**73%**
High Risk	44	14%	82	27%
Total	306	100%	306	100%
Fleiss' Generalized Kappa[a]	K = 0.0735		95% C.I. = 0.0688-0.0783	

a. Fleiss' Kappa was calculated on the operationalized indicator used in PACT scoring, with the columns representing the risk level scores of the raters and the rows representing each case (Grace and Andrew) rated. Note, Fleiss' Kappa can be low when high levels of agreement exist and individual ratings are accurate (Uebersax, 1988).

*The Master JPO response for each Social History Indicator is highlighted in **bold**.

The characteristics of staff who consistently disagreed with the master rater scores for Andrew (disagreed four or five times on the ten social history indicators; no staff disagreed more than 5 times) were further explored. The demographics of these staff did not differ drastically from that of the total sample of staff raters who assessed Andrew. Forty percent were male, compared to 35% in the total sample. Among the staff raters with consistent divergence in scores from the master rater, 23% were provider staff, which compares to 20% in the total staff cohort who completed a PACT assessment for Andrew.

Examination of staff raters who consistently disagreed with the master rater scores for Grace (disagreed four to seven times on the ten social history indicators), revealed no significant demographic differences between these raters and the total sample of staff completing assessment for Grace. Forty-one percent were from the central region, which was slightly higher than the region's representation in the total sample (35%).

DISCUSSION AND RECOMMENDATIONS

The current study examined the inter-rater reliability of the Positive Achievement Change Tool (PACT) risk assessment by comparing randomly selected staff raters' responses on the scored PACT items that are not auto-populated through the interface with the Department's JJIS system. Raters viewed two case study PACT interviews with a female juvenile offender (Grace) and a male juvenile offender (Andrew), and then subsequently completed a community PACT full-assessment for each youth. Percent agreement among raters was generally high (greater than 90% agreement) on the social history indicators involving a history of physical or sexual abuse, history of neglect, and history of mental health problems.

Examination of the PACT assessments for Andrew revealed that 60% of more of the raters agreed in scoring the social history indicators involving current friends or companions, history of child welfare out-of-home placements, history of running away or being kicked out of the home, parental authority and control, history of physical or sexual abuse, history of neglect, and history of mental health problems. Staff rater agreement was under 60% in assessing Andrew's school performance and jail/imprisonment history of current household.

There was greater divergence in staff ratings on Grace's PACT assessment than that found with Andrew. In particular, on four of the social history indicators, staff raters were somewhat split on their scores: history of out-of-home placements, history of running away, parental authority and control, and current alcohol/drug use.

Staff rater scores were also compared to a master rater's assessment of both Grace and Andrew. The majority of staff raters agreed with the scoring of the master rater on nine out of ten social history indicators in assessing both youth. While no clear staff characteristics were associated with divergence from the master rater's scores, additional evaluation of Grace and Andrew's interviews and staff responses revealed areas that may warrant future examination for potential instrument enhancements. In particular, staff had difficulty agreeing in the scoring of

whether Grace had a history of running away. This construct may require further clarification of the definition of running away to include any, or all, of the following criteria: child voluntarily left the home, parent does not consent to child leaving the home, child left the home and failed to return within 24 hours, and/or child's whereabouts are unknown to the parent. Future research might also examine situations in which a youth leaves an anti-social home environment to live in a more pro-social home setting, with particular emphasis on the impact that this has on risk to re-offend.

The PACT item involving parental authority and control might provide additional detail in defining what constitutes obeying rules and being hostile. It is not particularly clear how raters should handle those instances where a parent fails to set and enforce rules in the first place. The parent may generally not condone the youth's involvement in delinquency, but whether such behavior represents a prima facie disobedience is unclear. Notably, this item resulted in lower staff agreement than with other PACT items for both Grace and Andrew. Grace indicated that her mother was not particularly strict in setting rules or enforcing them. While Grace clearly disobeyed court orders, it was not as clear that she was disobeying parental authority and control. Moreover, Andrew's mother actually approved of his smoking marijuana in her home. When he was later picked up for having a marijuana leaf in his shoe, his mother was reportedly more upset with having to leave work than with any overt disobedience on his part. Greater consistency in scoring might be achieved through more detailed and clear definitions on PACT questions used in scoring a youth's overall level of risk to re-offend.

Refresher training for those responsible for administering PACT assessments should emphasize the importance of the specific time periods to be considered on a number of the interview questions. For example, it is important that staff who conduct PACT assessments are cognizant of the need to determine whether an out-of-home placement exceeded 30 days in length. When conducting an initial community PACT assessment, as was the case in the current study, a number of the items distinguish between history and current involvement, with the latter referring to behaviors during the last six months. Given that a single response may result in a higher calculated

risk level, it is critical to ensure the appropriate time period is considered when answering each PACT item.

Future research on the inter-rater reliability of the PACT instrument should examine the influence of rater interview styles on assessment scoring, comparing multiple raters' administration of a community PACT full assessment on the same youth. Additionally, use of multiple videotaped PACT assessments involving youth of varying sex, race, and ethnic backgrounds, as well as youth with varying risk profiles (low, moderate, moderate-high, and high), would allow for a more detailed examination of the impact of such factors on inter-rater consistency in PACT scoring.

In 2005, the Department embarked upon the process of developing and implementing a standardized risk and needs assessment instrument to be used with all youth referred to the system. Juvenile justice services in Florida are centralized with management and oversight of all delinquency referrals residing with the Department, thereby facilitating the implementation of the PACT in all jurisdictions and courts around the state. Unlike similar instruments with set scoring configurations, Florida tailored its instrument to the characteristics of the state's delinquency population and maintained control over instrument changes. This approach, coupled with the magnitude of Florida's juvenile justice system, resulted in a statewide system of assessment and case management. Florida presents a rich backdrop against which to examine the validity and reliability of a fourth-generation risk/needs assessment instrument. The findings from the current demonstrated strong inter-rater agreement on many of the social history indicators. The majority of staff raters agreed with the master rater on nine of the ten social history indicators. Coupled with the findings from the earlier phases of the evaluation, Florida has demonstrated that data-driven risk and needs assessment can be achieved statewide, and that evidence-based practices can be used to not only inform initial intake decisions but to facilitate a comprehensive system of care that begins the moment the youth enters the system and concludes upon exit.

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