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Assessing Risk in Adolescent Offenders: A Comparison of Risk Profiles versus Summed Risk Factors

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Assessing Risk in Adolescent Offenders:
A Comparison of Risk Profiles versus Summed Risk Factors

A Thesis

Submitted to the Graduate Faculty of the
University of New Orleans
in partial fulfillment of the
requirements for the degree of

Master of Science
in
Psychology

by
Katherine A. Gottlieb
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Abstract

Research supports interventions for high-risk juvenile offenders to reduce recidivism. Methods for assessing delinquent risk vary, however. Aggregate risk scores (i.e. number of risk factors) and specific risk profiles (i.e. types of risk factors) are both empirically supported techniques. This study compared aggregate scores versus profiles for predicting measures of criminal severity among detained adolescents ($n=292$). Twenty-four risk factors from the Structured Assessment of Violence Risk in Youth (SAVRY) were summed to calculate aggregate scores. Using latent class analysis (LCA), profiles were identified based on scores from the following theoretically important SAVRY risk factors: Risk Taking/Impulsivity, Anger Management Problems, Low Empathy/Remorse (CU traits), and Attention Deficit/Hyperactivity Difficulties. LCA identified one low-risk profile, plus two high-risk profiles differentiated by levels of CU traits. Aggregate scores significantly predicted four out of six criminal severity indicators, while profiles failed to predict any measures. Results support aggregate scores over profiles for assessing delinquent severity.

Risk assessment, juvenile offending, callous-unemotional traits

Assessing Risk in Adolescent Offenders:

A Comparison of Risk Profiles versus Summed Risk Factors

Chronic criminal involvement, beginning with childhood and adolescent delinquency, is a costly problem in contemporary society. Over 10 years ago, an economist calculated that every career criminal costs the United States legal system approximately \$40,000 per year (Cohen, 1998). Projected rates of delinquent recidivism suggest that more than half of juvenile offenders released in a given period will reoffend within 12 months of leaving custody (<http://www.ojjdp.gov/>). Taken together, these figures imply a significant ongoing social and financial burden, beginning with delinquency in childhood and culminating in a persistent criminal lifestyle.

To counterbalance such bleak statistics, there is a growing body of evidence indicating that specifically targeted treatment programs can help reduce recidivism in delinquent populations. For instance, several studies involving multi-component and individualized treatment have generated positive results, including significantly reduced recidivism among juvenile offenders (Alexander & Parsons, 1973; Gordon, Arbuthnot, Gustafson & McGreen, 1988; Gordon, Graves & Arbuthnot, 1995; Klein, Alexander & Parsons, 1977) and reduced incidence of sibling delinquency (Klein et al., 1977). Also, participation in substance abuse treatment is associated with significantly lower rates of juvenile reoffending (Luchansky, He, Longhi, Krupski & Stark, 2006), and completion of certain specialized treatment programs can specifically reduce sexual recidivism among adolescents (Worling & Curwen, 2000; Worling, Littlejohn & Bookalam, 2010). These findings all affirm the value of initiating targeted treatments to disrupt delinquent involvement in youth, before a criminal lifestyle has been established.

In order to implement these specialized treatments, however, the offenders most at risk for recidivism and, as a result, most in need of intervention, must first be identified. Further, these treatments typically are tailored to the individual needs of the juvenile offender, which necessitates an accurate assessment of these individual needs. By predicting overall risk and specific patterns of risk, juvenile delinquents can be selected and appropriately placed for early intervention efforts to reduce rates of repeat offending. Thus, it is important to establish effective methods for predicting risk for future delinquent behavior in the juvenile justice system. Various methods of assessing risk for reoffending have been used in past research with forensic populations. The two most common methods have involved estimating risk based on either the total number of risk factors (more aggregate risk factors predicts higher risk), or on specific risk profiles (certain patterns of risk factors predict higher risk). These two strategies distinguish between assessments based on the quantity (i.e. sheer number) versus the quality (i.e. specific types) of risk factors. There is substantial evidence from research to support both methods.

Risk Assessment: Aggregate Risk Scores

A number of assessment tools incorporating a broad range of risk and protective factors are currently used in the juvenile justice system to evaluate risk. These tools are typically based on research identifying variables that have been statistically linked to more prolific or severe criminal outcomes. For example, various studies have identified risk factors that significantly predict criminal reoffending. Common findings indicate that the likelihood of continued criminal involvement is strongly predicted by aspects of previous offense history such as younger age at first offense (Benda, Corwyn & Toombs, 2001; Feder,

2001), greater number of prior adjudications (Benda et al., 2001; Worling & Långström, 2003), the presence of peers during acts of delinquency (Benda et al., 2001; Benda & Tollett, 1999; Worling & Långström, 2003), and a history of carrying weapons, particularly while committing offenses (Benda et al., 2001; Benda & Tollett, 1999; Worling & Långström, 2003). Repeat offending is also associated with certain personal history variables such as gang affiliation (Benda et al., 2001; Benda & Tollett, 1999), substance abuse (Benda et al., 2001; Mulder, Brand, Bullens & Van Marle, 2010), low intelligence scores (Feder, 2001; Mulder et al., 2010), poor social adjustment (Benda et al., 2001; Massac, 1998; Mulder et al., 2010; Worling, 2001), emotional disorders (Mulder et al., 2010; Worling & Långström, 2003), and growing up in broken or single-parent homes (Benda et al., 2001; Benda & Tollett, 1999; Rodgers, 1996).

Using these findings, several risk assessment tools have been developed which count the number of risk factors present for a child. These aggregate scores have been associated with an array of offense variables in the community, including risk for general offending (Hoge, 2010) and recidivism (Catchpole & Gretton, 2003; Hastings, Krishnan, Tangney & Stuewid, 2011; Wormith, Olver, Stevenson & Girard, 2007), and risk for violent offending (Hoge, 2010; Marshall, Egan, English & Jones, 2006) and reoffending (Catchpole & Gretton, 2003; Wormith et al., 2007). Pooled scores have also been linked to measures of problems the youth may have while incarcerated, including measures of general institutional misconduct (Hastings et al., 2011; Holsinger, Lowenkamp & Latessa, 2006; Thompson, 2006) and violent misconduct (Marshall et al., 2006). Thus, there is clear data to support the contention that summing across risk factors from multiple domains is a

strong predictor of negative outcomes, both within the juvenile justice system and in the community.

Risk Assessment: Distinct Risk Profiles

The second approach to risk assessment has focused on characteristics of certain subgroups of offenders who show specific profiles of risk factors and are at high risk for particular patterns of criminal behavior. While this method may be applied to various domains of risk, a growing number of studies have established subtypes based on personality profiles. For instance, a body of evidence connects certain personality factors with the offender subgroups identified in Terrie Moffitt's influential developmental taxonomy of delinquent behavior (Moffitt, 1993). Moffitt's theory, which links early-onset antisocial behavior (i.e. prior to adolescence) with more severe patterns of offending in comparison to adolescent-onset delinquency, has garnered support in subsequent research. For example, in a sample of nearly 500 male participants in a national birth cohort, about half of individuals whose antisocial behavior began in childhood would later exhibit serious delinquency. By young adulthood, these life-course-persistent (LCP) subjects showed significant differences in criminal history compared to subjects with adolescent-onset antisocial behavior, including a greater incidence of violent offending (Moffitt, Caspi, Dickson, Silva & Stanton, 1996). In the same sample, by 32 years old, the LCP participants still displayed more serious negative outcomes compared to adolescent-onset subjects, again including histories of serious violence (Odgers et al., 2008). These findings demonstrate the importance of early-onset to delinquency as a predictor of risk for severe, chronic, and violent criminal behavior.

Additional research has supported a relationship between specific personality traits and distinct developmental pathways to severe offending, which may contribute to chronic patterns of antisocial behavior among early-onset offenders. For example, some childhood-onset antisocial youths experience problems with impulsivity and emotion regulation (Moffitt & Caspi, 2001) and another group of early-onset offenders presents with a callous and unemotional (CU) interpersonal style characterized by an apparent lack of empathy or guilt, a lack of concern over performance in important areas, and shallow or deficient affect (Dandreaux & Frick, 2009; Frick, 2009). Groups of impulsive/dysregulated and CU children and adolescents have also been distinguished on other relevant constructs, including different patterns of aggression. For example, a meta-analysis of results across 11 studies demonstrated that emotion dysregulation and attention deficit symptoms are related to reactive aggression, but show little or no consistent relationship with proactive aggression (Card & Little, 2006). Combined with studies showing that both proactive and reactive aggression are associated with CU traits (e.g. Enebrink, Andershed & Långström, 2005; Fanti, Frick & Georgiou, 2009; Kruh, Frick & Clements, 2005), these results bolster the distinction of an emotionally dysregulated group characterized by mainly reactive aggression, compared with a CU group that exhibits high levels of both reactive and proactive aggression.

Within the early-onset delinquent population, both CU and impulsive/dysregulated groups appear to be at elevated risk for chronic offending. Yet the available evidence also indicates potentially important differences across these groups in measures of offense severity (e.g. Kaplan & Cornell, 2004; Vitacco, Caldwell, Van Rybroek & Gabel, 2007), criminal versatility (e.g. Campbell, Porter & Santor, 2004; Smallbone, Wheaton & Hourigan,

2003), and institutional misconduct (e.g. Edens, Poythress, Lilienfeld & Patrick, 2008; Edens, Poythress, Lilienfeld, Patrick & Test, 2008; Hicks, Vaidyanathan & Patrick, 2010). Thus, it is important to determine which offense characteristics may be shared by both CU and impulsive/dysregulated antisocial groups and which characteristics differ between the two.

Offense Severity. In this context, higher offense severity will refer to more serious acts of delinquency, such as breaking and entering, assault with a weapon, rape, and other violent offenses or felony charges. Past studies have found associations between impulsivity and attention problems, and greater offense severity (Foley, Carlton & Howell, 1996; Sibley et al., 2011). Furthermore, hostility and emotion dysregulation have also been linked with measures of more severe offending, such as criminal violence (Firestone, Nunes, Moulden, Broom & Bradford, 2005; Shao, Xie, Qiao & Huang, 2009).

CU traits have also been specifically connected with higher rates of offending, including violent offending (Kaplan & Cornell, 2004; Vitacco, Caldwell, Van Rybroek & Gabel, 2007). For instance, a study following a sample of 157 male delinquents into young adulthood found that subjects with high Psychopathy Checklist: Youth Version (PCL:YV) scores were at significantly higher risk for violent incidents, even after controlling for other risk factors such as past violent and nonviolent offending history (Gretton, Hare & Catchpole, 2004). This suggests that the presence of psychopathic traits, which include callous-unemotional traits, independently predicts violent behavior in adolescent offenders. Thus, it appears that both impulsive/dysregulated and CU offenders are especially likely to commit severe and violent crimes.

Sexual Violence. In general, violent sexual offending refers to sexual crimes that involve physical contact with the victim. Researchers have identified CU traits as a risk factor specifically predicting both the likelihood and degree of sexual violence. For example, in a group of 150 adolescent sex offenders, youths with high CU traits had significantly more victims and used higher levels of sexual violence (Lawing, Frick & Cruise, 2010). This indicates that, when juveniles with CU traits commit sexual crimes, they are more likely than low CU offenders to offend repeatedly and to use more severe violence against their victims. In another sample of male delinquents, violent sexual offenders had significantly higher CU traits than either nonsexual violent offenders or nonviolent offenders (Caputo, Frick & Brodsky, 1999). These results may indicate a subtle difference in risk for violent offending between the CU and impulsive/dysregulated groups. That is, although both groups appear to be at equally high risk for criminal violence in general, CU delinquents are more likely than other offenders to engage in repeated and severe sexual violence.

Criminal Versatility. For the purpose of this paper, criminal versatility will be conceptualized as the summed number of different types (or categories) of delinquent acts reported for each subject. In past research with juvenile offenders, impulsivity and attention problems have been associated with greater criminal versatility (Sibley et al., 2011). However, CU traits have also been linked to especially prolific rates of delinquency and increased criminal versatility (e.g. Sikorski, 2006; Vaughn, Howard & DeLisi, 2008). Specifically, higher levels of CU traits predict elevated levels of both violent and nonviolent offending (Campbell, Porter & Santor, 2004; Smallbone, Wheaton & Hourigan, 2003), indicating a pattern of diverse criminal activity. Similarly, in a school-based sample,

children with both CU traits and conduct problems had higher rates of both proactive and reactive aggression, whereas those with conduct problems but with normative levels of CU traits only showed higher rates of reactive aggression (Frick, Cornell, Barry, Bodin & Dane, 2003).

Together, these results support the existence of a group of delinquent youth with high CU traits (characterized by a combination of reactive and proactive aggression) who show more severe patterns of offending than another group of impulsive and emotionally dysregulated youth (characterized by reactive aggression alone). These two profiles can be contrasted with a third group of relatively low-risk delinquents (characterized by low levels of general aggression). These results would suggest that youth with low impulsivity and CU traits will have the lowest levels of offending (especially violent offending), those with high impulsivity/dysregulation will have the next highest delinquency rates, and those with high CU traits will have the highest and most versatile pattern of delinquency compared to all other juveniles.

Institutional Misconduct. In addition to predicting criminal behavior in the community, risk assessments have also been used to predict problems within institutions. This is also an important outcome to consider, given that youth with criminal histories are often placed in out-of-home settings and the safety of these institutional environments is critical. Thus, prediction of institutional misconduct is an important goal of risk assessment. In research, institutional misconduct is often defined as total institutional infractions, nonaggressive infractions, and instances of aggressive misconduct such as verbal aggression and assault against other youth or detention staff. Impulsivity and attention problems have been connected with patterns of institutional misconduct in a

number of studies (DeLisi, Beaver, Vaughn, Trulson, Kosloski, Drury & Wright, 2010; Walters, 2007). Hostility and emotion dysregulation have also been empirically linked to institutional maladjustment (Dolan & Blackburn, 2006; Noffsinger, 2007). Together, these findings support a connection between measures of impulsivity/dysregulation and misconduct among incarcerated adolescents.

Research has also examined the relationship between CU traits and institutional adjustment. However, these findings have been relatively inconsistent. Some results indicate that CU traits predict higher rates of violent and aggressive institutional misconduct (Edens, Poythress & Lilienfeld, 1999; Marshall, Egan, English & Jones, 2006), whereas this link has not been found in other studies (Edens, Poythress, Lilienfeld & Patrick, 2008; Edens, Poythress, Lilienfeld, Patrick & Test, 2008). Further, when CU traits were directly compared to other risk factors predicting institutional misconduct, impulsivity was found to be significantly associated with institutional adjustment (Hicks, Vaidyanathan & Patrick 2010; Walters, 2003) and aggressive misconduct (Edens, Poythress, Lilienfeld, Patrick & Test, 2008), but CU traits were not. This suggests that, generally, institutional maladjustment is more consistently associated with impulsivity and emotional dysregulation than with CU traits.

Summary of Conclusions. Taken together, it appears that attention problems, impulsivity, emotional dysregulation, and CU traits are all associated with high risk for recidivism and violent offending in the community. However, sexual violence is more likely among CU offenders than any other delinquent group. Further, offenders with CU traits tend to show more criminal versatility than impulsive/dysregulated offenders, and impulsive offenders are more versatile than typical (low CU and low impulsive)

delinquents. Finally, impulsivity and emotion dysregulation are more consistent predictors of institutional misconduct than CU traits, although findings for detained CU adolescents are mixed. One possible reason for these differences is that impulsive, emotionally dysregulated juveniles are unable to control their disruptive behavior. This may lead to an array of adjustment problems, including involvement in delinquency and subsequent difficulty following rules within institutional settings like juvenile detention. On the other hand, CU adolescents may engage in delinquency in a more intentional, goal-directed manner. This could result in prolific, opportunistic delinquent behavior, leading to arrest and adjudication. Once in custody, however, these more self-regulated offenders may choose to limit disruptive behavior in order to minimize their time in detention. Support for this hypothesis is provided by differences in aggression in delinquents with and without CU traits. For example, Marsee and Frick (2007) found that detained girls with high CU traits are more likely to engage in proactive aggression, which is used for instrumental gain. On the other hand, anger and emotional dysregulation were associated with reactive aggression, which occurs in response to perceived threat. Thus, juvenile delinquents with CU traits may exert more control over their aggressive, or otherwise disruptive, behavior, and engage in misconduct only when it is likely to result in personal gain.

The Structured Assessment of Violence Risk in Youth (SAVRY)

Based on this research, there is evidence supporting both specific profiles of risk and aggregate risk scores for use with detained adolescents, but no research has directly compared these two approaches in the same sample with the same measure. One risk assessment measure that can be applied using either method is the Structured Assessment of Violence Risk in Youth (SAVRY; Borum, Bartel & Forth, 2003). The SAVRY is a structured

clinical assessment tool designed to guide clinical interviews and help generate standardized risk estimates within detained adolescent populations (Borum et al., 2003). The organization of the SAVRY includes three basic categories of risk factors: the Historical Risk Factors subscale (composed of 10 specific items), the Social/Contextual Risk Factors subscale (6 items), and the Individual Risk Factors subscale (8 items). The SAVRY can be used to generate a numerical risk rating by combining risk factors across the three categories to form an aggregate Risk Total score. The SAVRY includes additional features that may be useful for research and clinical application, such as protective factors, critical items, and an evaluator risk rating which provides a subjective judgment of overall risk, taking all these factors into account. However, the present study focuses only on scores obtained from summing the ratings of the 24 risk factors. In addition to the SAVRY Total score, the risk factors can be used individually to describe certain patterns of risk. For example, the Individual Risk Factors subscale contains items pertaining to attention deficits, anger control, impulsivity, and CU traits. As indicated by the previously reviewed research, these characteristics appear to be important for defining different developmental pathways to early-onset and serious offending.

The usefulness of the SAVRY in juvenile justice settings has been supported in several studies. The predictive validity of the SAVRY has been empirically supported for measures of general recidivism, and also for a breakdown of violent and nonviolent reoffending. For example, in a sample of 121 convicted juveniles, SAVRY scores produced receiver operator characteristic (ROC) values ranging from .66 to .80 for general, violent, and nonviolent recidivism at 1 year and 3 years following each participant's release (Meyers & Schmidt, 2008). The predictive validity of the SAVRY has also been confirmed

for both male and female juvenile offenders in a high-risk sample of 144 delinquents where it once again predicted both general and violent reoffending (Penney, Lee & Moretti, 2010). Furthermore, the SAVRY Risk Total score was shown to significantly predict all types of reoffending five years following release in a sample of 500 male adolescent offenders (Vincent, Chapman & Cook, 2011).

These findings are bolstered by comparisons with other assessment scales used to predict risk in delinquent populations. Specifically, the SAVRY has shown incremental validity over other scales that predict general and violent recidivism. For instance, a comparison of the Youth Level of Service/Case Management Inventory (YLS/CMI), the Psychopathy Checklist: Youth Version (PCL:YV), and the SAVRY among adolescent offenders showed that the SAVRY provided the most incremental validity of the three tools in predicting general and violent recidivism (Welsh, Schmidt, McKinnon, Chattha & Meyers, 2008). A contemporary study of male juvenile delinquents in the United Kingdom confirmed the incremental validity of the SAVRY over the PCL:YV for predicting both general and violent reoffending (Dolan & Rennie, 2008). These findings support the ability of the SAVRY to predict offending outcomes at least as effectively as other assessment tools commonly applied in juvenile offender populations.

In addition, research using the SAVRY has shown an association between risk scores and various measures of institutional adjustment. The SAVRY Risk Total score and each of the domain scores were correlated with aggressive institutional misconduct in a sample of 179 incarcerated male delinquents (Borum, Bartel & Forth, 2003). These findings were also recently extended to a sample of Dutch adolescent offenders, where the SAVRY was a significant predictor of physical violence, rule violations, and verbal threats during custody

(Lodewijks, Doreleijers, de Ruiter & Borum, 2008). Thus, the SAVRY also seems to be valid for predicting both nonviolent and violent institutional misconduct among adjudicated adolescents.

Importantly, results validating the use of the SAVRY in predicting negative outcomes for delinquents, both during custody and following release, appear to generalize across gender (Meyers & Schmidt, 2008; Penney, Lee & Moretti, 2010), racial and ethnic groups (Meyers & Schmidt, 2008; Vincent, Chapman & Cook, 2011), and different nationalities (Dolan & Rennie, 2008; Gammelgård, Koivisto, Eronen & Kaltiala-Heino, 2008; Lodewijks, Doreleijers, de Ruiter & Borum, 2008; Rieger, Stadtland, Freisleder & Nedopil, 2009). Thus, the SAVRY has been empirically supported in delinquent populations as a risk assessment tool for both violent and nonviolent offending and for institutional adjustment across diverse samples.

It is important to note that most of these studies have utilized the SAVRY Risk Total score, which sums all of the domains to form a single aggregate risk score (Borum, Bartel & Forth, 2003; Dolan & Rennie, 2008; Meyers & Schmidt, 2008; Penney, Lee & Moretti, 2010; Vincent, Chapman & Cook, 2011). However, other scores from the SAVRY have also been used, such as the evaluator risk rating which requires the persons scoring the SAVRY to make a subjective judgment of each youth's overall risk (e.g. Dolan & Rennie, 2008; Meyers & Schmidt, 2008; Vincent et al., 2011). In addition, some studies have used the individual domain scores from the SAVRY. For example, preliminary data showed significant correlations between each of the SAVRY domain scores and the PCL:YV and YLSI, two scales that have shown associations with recidivism and violent behavior in delinquent populations (Borum et al., 2003). Also, the SAVRY domain scores were compared to both

self-report and official measures of violent and nonviolent recidivism in a sample of high-risk Canadian adolescents (Penney et al., 2010). In this study, significant correlations were found for the Historical domain scores on all four measures. Additionally, the Individual Risk domain was significantly correlated with nonviolent recidivism and with self-reported violent reoffending, while the Social/Contextual domain was significantly correlated with official nonviolent recidivism only (Penney et al., 2010). Thus, the predictive validity of the SAVRY domain scores have also been empirically supported, though not as thoroughly as the Total Risk scores.

Taken together, this literature on the validity of the SAVRY suggests that, to date, studies have largely relied on aggregate risk scores from the SAVRY or on the risk domains. However, no studies have examined the predictive validity of individual risk items or specific patterns of items. Thus, it is not clear if there are certain patterns of risk that can predict offending in the community or within institutions, independent of the overall and domain risk scores.

Statement of the Problem

Based on this research, it is clear that there is evidence supporting the use of both specific profiles of risk and aggregate risk scores in adolescent juvenile offenders. However, more research is needed to identify the most effective method for measuring risk in the juvenile justice system by comparing these two methods within the same sample and using the same measure. Therefore, the purpose of this study is to examine the two models of risk assessment using the SAVRY as a risk measurement instrument. Analyses compare the predictive utility of (1) SAVRY Total scores including a total of 24 risk factors, and (2) several distinct risk profiles based on past research using individual risk items. Based on

existing research, the Risk Taking/Impulsivity (impulsivity), Anger Management Problems (emotion dysregulation), Attention Deficit/Hyperactivity Difficulties (attention problems) and Low Empathy/Remorse (CU traits) items from the SAVRY were selected for latent class analysis in a sample of adolescents adjudicated for a criminal offense in the state of Louisiana over a 1-year period. Based on past research showing distinct profiles of offenders, three groups were expected to emerge on the basis of these items. The first risk profile (Group 1) was predicted to present with moderate to low scores on all four risk factors. The second expected profile (Group 2) would be similar to Group 1 on three of the risk factors, but score high on the CU traits item. Finally, Group 3 was expected to score high on all risk factors except CU traits. These three groups and the SAVRY Total score were each used to postdict severity of past offending (i.e., number of past offenses, criminal versatility and violence), and type of offending (i.e., violent vs. nonviolent offending, sexual violence) and to predict institutional adjustment (i.e., changes to more severe legal status while on custody, indicating misconduct) while in state custody.

The following hypotheses were tested:

- (1) SAVRY Total Risk scores were expected to postdict general offending history and predict institutional adjustment.
- (2) The emergence of three groups was predicted using latent class analysis, resulting in the three offender profiles described above (Group 1 - low on all risk factors; Group 2 - low on all risk factors except CU traits; Group 3 - high on all risk factors except CU traits).
- (3) Group membership was hypothesized to predict different patterns of offending. Specifically, it was predicted that (a) Group 1 would have the lowest overall levels of

criminal offending, (b) Groups 2 and 3 would both have higher offense rates and more violent offending than Group 1, (c) Group 2 would have more violent sexual offenses than Groups 1 or 3, (d) Group 2 would have a more versatile offense history than Group 3, and Group 3 would be more versatile than Group 1, and (e) Group 3 would have more institutional misconduct than either Group 1 or 2.

(4) The group differences predicted in Hypothesis 3 were expected to remain significant after controlling for SAVRY Total scores.

Method

Participants

The sample consisted of youths who were adjudicated for crimes committed in 4 Louisiana parishes during 2010, and were placed into the custody of the Louisiana Office of Juvenile Justice (OJJ). These four sites were a subsample of Louisiana parishes selected to participate in the MacArthur Foundation's Models for Change in Juvenile Justice Initiative (La-MfC). These parishes were chosen for participation in the initiative because they provide a broad representation of the state of Louisiana in terms of geography, urban and rural residences, and structure of the juvenile justice system (e.g. local facilities for probation vs. state run probation; separate juvenile and adult courts).

Youth may be referred to OJJ either because they have been charged with a criminal offense (adjudicated delinquent) or because a juvenile court has ruled their family to be in need of services (<http://ojj.la.gov/>). Thus, OJJ encompasses both serious delinquent offenders and youth referred for very minor infractions through Title VII of the Louisiana Children's Code, a program called Families in Need of Services (FINS). FINS charges include truancy, running away from home, possession or use of alcohol, and other minor

delinquent acts. Within OJJ, a youth may be supervised by OJJ without leaving their community setting, assigned to a residential placement (non-secure custody), or placed on secure custody (<http://ojj.la.gov/>). The least restrictive applicable option is selected for each case.

The sample originally included 294 admissions to OJJ for offenders referred from Caddo, Calcasieu, Jefferson, and Rapides Parishes. One participant had two separate admissions during 2010 and was excluded from analyses, decreasing the final sample size to 292 youths. Of these 292 participants, the majority was male (78.4%). In addition, the largest group of participants was identified as African-American ($n = 233, 79.8\%$), followed by a smaller Caucasian group ($n = 54, 18.5\%$), with minimal missing data ($n = 5, 1.7\%$). Subjects ranged in age from 10.75 to 17.61 years old at the time of adjudication, with the majority falling in mid to late adolescence ($M = 15.18, SD = 1.38$).

Procedures

As part of the ongoing MacArthur Foundation's Models for Change research program, OJJ began administering the SAVRY for all juveniles in their custody in 2009. This protocol was initiated as part of an effort to promote evidence-based assessment procedures for risk and needs assessment within the Louisiana juvenile justice system. Juvenile probation officers (JPOs) from all participating facilities were enrolled in a workshop designed to train them on proper administration of the SAVRY. Following completion of this training program, each JPO was required to follow up with three practice assessments as well as a booster training session 6 months later (Vincent, Guy, Gershenson & McCabe, 2012). Policies were also implemented within OJJ to encourage regular administration and reporting of SAVRY assessments (Vincent et al., 2012). OJJ allowed

UNO to obtain data from their institutional database to help them evaluate the usefulness of the SAVRY, and these data are used in the current study.

Measures

SAVRY. As mentioned before, the SAVRY is a structured clinical assessment tool developed for use within adolescent populations. The purpose of the SAVRY is to guide clinicians and other evaluators to consider empirically-supported risk factors when assessing a youth for violence potential (Borum, Bartel & Forth, 2003). The information needed to score each SAVRY item is gathered through multiple convergent sources (Borum et al., 2003). SAVRY administration typically entails interviewing the youth in question, as well as supplemental interviewing of a parent or authority figure and/or file review to augment and confirm the youth's responses. For each risk factor, a score of low (0), moderate (1), or high (2) is assigned, resulting in a range of possible scores from 0 to 48 on the Total (24-item) SAVRY scale. Consistent with the SAVRY model of structured professional judgment, the appropriate score for each item is selected at the discretion of the evaluator after consideration of all relevant information gathered in the assessment process.

In the sample used for this study, SAVRY Total scores ranged from 2 to 41 ($M = 19.42$, $SD = 8.04$), and Cronbach's alpha indicated good internal consistency for SAVRY risk factors ($\alpha = .86$). Also, scores on four specific items from the Individual Risk Factors subscale of the SAVRY were used to identify distinct groups of participants. Specifically, participants were grouped based on their scores from Item 18 (Risk Taking/Impulsivity), Item 20 (Anger Management Problems), Item 21 (Low Empathy/Remorse), and Item 22 (Attention Deficit/Hyperactivity Difficulties). For conceptual ease, Item 18 was treated as a

measure of impulsivity, Item 20 was treated as a measure of emotion dysregulation, Item 21 as a measure of CU traits, and Item 22 as a measure of attention problems.

A recent review of research supporting the reliability of the SAVRY in other samples has reported promising results. Across six available studies, inter-rater reliability has shown good to excellent agreement, with intraclass correlation coefficients (ICCs) ranging from .81 to .97 for SAVRY Total scores (Borum, Lodewijks, Bartel & Forth, 2010). In addition, internal consistency for the SAVRY Total score was found to be .82 in a validation sample of offenders. Other results have also found good internal consistency for the SAVRY risk factor domain scores (Borum et al., 2010).

Results from recent studies conducted within the Louisiana juvenile justice system have confirmed the high reliability of the SAVRY in an applied setting following the LaMfC training protocol used in the current sample. In a sample of juveniles on probation in Caddo Parish, 10 recently trained JPOs obtained excellent inter-rater agreement on SAVRY Total Risk scores compared to a trained research assistant (ICC = .94) (Vincent, Guy, Gershenson & McCabe, 2012). These high levels of inter-rater reliability were replicated and extended in a similar study involving data from a mix of local and state Louisiana probation offices, including results from 36 newly trained JPOs and three research assistants (Vincent, Guy, Fusco & Gershenson, 2012). Inter-rater agreement was once again excellent for the SAVRY Total score (single measure ICC = .86), as well as for the Individual (ICC = .86) and Historical (ICC = .81) risk factors domain scores. Inter-rater reliability was relatively lower for the Social/Contextual risk factors domain score, but agreement was still considered good (ICC = .67). The reliability of the individual SAVRY items was quite variable, with ICC values ranging from .34 to .84. Inter-rater agreement

was good for Items 20 (emotion dysregulation; ICC = .74), 21 (CU traits; ICC = .70), and 22 (attention problems, ICC = .75). Agreement was substantially lower for Item 18 (impulsivity; ICC = .50), suggesting that interpretation of this item may be less consistent and scoring was subsequently less reliable (Vincent, Guy, Fusco & Gershenson, 2012).

It is worth noting that, for each item in the SAVRY manual, there is a description of what constitutes a low, moderate, or high score for that item. However, these descriptions vary widely in the degree of detail provided. For instance, the CU traits item (Item 21) has up to 11 lines of description per rating option, including specific examples (e.g. showing no emotional distress over wrongful behavior even after verbal admission, seeming indifferent to others' distress, etc.). Although comparatively briefer, the descriptions for the attention problems (Item 22) and emotion dysregulation (Item 20) items both include some example of the specific behaviors to be rated (e.g. extreme restlessness, hyperactivity, or concentration problems; outbursts in which others are threatened, frightened, or harmed). On the other hand, the impulsivity item (Item 18) only states that the youth has significant, minor/less serious, or no problems with risk taking or impulsivity (Borum, Bartel & Forth, 2003). Thus, the lower ICC scores for Item 18 may be related to the comparatively low specificity of the rating manual regarding this item.

Offense Severity. Offense severity can be defined a number of ways, but many researchers have asked groups of participants to rank the severity of various offenses (e.g. Figlio, 1975; Sellin & Wolfgang, 1964; Wellford & Wiatrowski, 1975; Wolfgang, Figlio, Tracy & Singer, 1985). Among other findings, such studies have consistently noted differences in ratings between violent versus nonviolent crimes (Ramchand, MacDonald, Haviland & Morral, 2009). Another method for assessing offense severity involves measuring the

monetary cost associated with different types of crime (e.g. Cohen, 1988; Miller, Cohen & Wiersema, 1996). Although this method is typically used to rank specific offense types, it can also support the use of offense rates and criminal diversity as measures of severity. The more prolific and opportunistic the offender, the more charges (s)he is likely to accrue; thus, higher rates and diversity of offenses suggest greater past and future cost to society, which indicates higher severity.

In addition to these measures of offense history, the severity of placement following adjudication may serve as a supplemental index of offending severity as determined by professionals within the justice system, with secure custody representing the most serious placement option. Because initial placement decisions are influenced by factors such as criminal record and perceived seriousness of current charges, the resulting legal status severity for each offender is expected to follow similar patterns as related severity measures, including number of petitioned charges and history of violent offending. Thus, for the purpose of this paper, offense severity will be evaluated using each subject's history of placement on secure custody, as well as the number of prior offenses on record, the diversity of past offenses, and a distinction between violent and nonviolent offenders, including a specific measure of violent sexual offenses.

History of Prior Offenses. In this study, offense history will be defined as the number of petitioned charges that have been referred to OJJ for each youth during the years 2006 through 2010. Within the present sample, the number of petitioned charges for each participant ranged from 0 to 16, with a strong positive skew ($M = 2.05$, $SD = 1.96$). The majority of subjects had only one petitioned charge on record ($n = 159$, 54.5%), and less than 10 percent of the sample had five or more petitioned charges (fewer than five

petitioned charges: $n = 267$, 91.4%). A total of six participants were recorded with no petitioned charges in OJJ because these individuals' charges were petitioned locally, but subsequently referred to OJJ. For this reason, a participant may have no petitioned charges, but one or more adjudicated charges in the OJJ database. Because the number and nature of charges petitioned outside OJJ are unknown, the diversity index scores and history of violent (and violent sexual) offending could not be obtained for these six cases.

Violent and Nonviolent Offending. When using the SAVRY, the concept of violence is defined as forcible sexual assault, a threat delivered while carrying a weapon, or any act of physical violence serious enough to cause injury to one or more other individuals, regardless of whether or not any injury is actually inflicted (Borum, Bartel & Forth, 2003). For the purposes of this study, violent offenses were divided into several categories: violent sexual offenses (e.g. aggravated rape, sexual battery), assault and battery (e.g. simple or aggravated assault/battery, murder, kidnapping), and robbery charges (armed robbery and simple robbery). All offenses that did not fit this definition were considered nonviolent. This included any charges categorized as nonviolent sexual offenses, trespassing, disorderly conduct, larceny, grand theft, drug offenses, vandalism, obstruction of law enforcement, status offenses, and nonviolent weapons offenses (e.g. theft of a firearm, illegal carrying of weapons).

For analyses, a code was used designating whether the participant had only a history of non-violent offenses during the previous four years, or whether the participant had at least one violent offense. Another variable was created designating whether or not the participant had a history of at least one violent sexual offense. Results for participants with one or more petitioned charges ($n = 286$) showed that nearly half of the sample had a

history of at least one violent petitioned offense (Yes = 123, 42.1%; No = 163, 55.1%). In contrast, less than five percent had a history of one or more violent sex offenses (Yes = 14, 4.8%; No = 271, 92.8%).

Criminal Versatility. Criminal versatility refers to a diverse criminal history, including charges from multiple categories of offenses without a special focus on any particular category. In the present dataset, criminal charges were divided into the following eleven categories: (1) violent sexual offenses, (2) nonviolent sexual offenses, (3) trespassing and disorderly conduct, (4) larceny and grand theft, (5) drug offenses, (6) assault and battery, (7) weapons offenses, (8) vandalism, (9) robbery, (10) status offenses, and (11) obstruction of law enforcement. These category selections were based on the range of petitioned charges available in the present dataset, as well as methodology used by other researchers who have employed similar techniques to evaluate patterns of offending history for incarcerated delinquents (e.g. McGloin, Sullivan, Piquero & Pratt, 2007).

A diversity index score (D) was used to evaluate criminal versatility based on these eleven categories. D was calculated using the following equation, in which m represents a given crime category and p is the proportion of offenses in each category:

$$D = 1 - \sum_{m=1}^M p_m^2$$

The diversity index provides information about the likelihood that any two offenses recorded for an individual subject will belong to different offense categories. The higher the value of D for a particular subject, the more likely it is that any given pair of offenses chosen at random from that person's record will fall under different categories. Therefore, the higher the value for D is in this equation, the more diverse the criminal history in

question, and thus the more versatile the offender. The maximum value for D is given by the formula $(k - 1)/k$, where k represents the total number of crime categories. Thus, with eleven offense categories defined, the maximum possible value for D in this study was .91.

According to preliminary analyses, diversity index scores for participants with one or more petitioned charges ($n = 286$) ranged from .00 to .74, with a strong positive skew ($M = .18, SD = .26$). Frequency analysis showed that the majority of participants committed offenses within only one crime category (diversity index = .00, $n = 190, 65.1\%$), leading to relatively low overall criminal diversity in this sample. This relatively low variability may be partially due to the limited nature of OJJ records, which are likely to exclude a substantial number of locally petitioned offenses. However, an adequate number of participants in this sample committed crimes in two or more categories ($n = 96, 32.9\%$) to allow for continued analyses.

Secure Custody Placements. Because initial placement within the juvenile justice system functions as an official indicator of offender severity, a variable identifying subjects who were assigned to the most severe legal status (i.e. secure custody) was included in this study. For analyses, a code was used designating whether each participant had a history of one or more secure custody placements during the previous year. Results from the full sample showed that the majority of participants had spent no time on secure custody during this admission to OJJ (Yes = 18, 6.2%; No = 274, 93.8%).

Institutional Misconduct. Because no record of institutional infractions was available for the present sample, institutional misconduct was inferred indirectly from the number of times each offender moved from a less serious legal status to a more serious legal status during 2010 OJJ custody. However, initial descriptive statistics revealed that no

subject was transferred to a more serious legal status more than one time while in OJJ custody during 2010. Accordingly, transfer to a more serious legal status was recoded dichotomously to distinguish subjects who had moved to a more serious legal status once from those who never had. Within the present sample, descriptive analyses showed that the majority of subjects had never been moved to a more serious LS (Yes = 41, 14.0%; No = 251, 86.0%). Thus, according to this measure, institutional adjustment problems were only evident for a small subset of participants.

Considering that only this one indirect indicator of institutional adjustment was available in the current study, it is important to acknowledge the limitations of the legal status transfer measure. Specifically, while this variable does indicate adjustment problems for participants who begin with less serious placements, it is not able to capture institutional adjustment for offenders who commit infractions once they are already on secure custody. Moreover, each infraction may not be penalized with increased legal status; in fact, it is very likely that multiple minor infractions would usually be required to justify legal status transfer. Thus, this variable may underestimate institutional maladjustment, especially for participants who were initially placed on secure custody, but also for many less severe offenders. Accordingly, results for this measure should be interpreted with caution.

A summary of descriptive statistics for all variables used in this dataset is available in Tables 1 and 2 (see Appendix A: Frequencies and Descriptive Statistics).

Results

Preliminary Analyses

Associations with Demographic Variables. Prior to testing the main study hypotheses, the associations between SAVRY scores and demographic variables (i.e., age, race, and sex) were tested and reported in Table 3. Pearson's product-moment correlations showed no significant associations between demographic variables and SAVRY Total scores. However, correlations with the four items used to define SAVRY Risk Group membership indicated significant gender and ethnic differences in scores on the Attention Problems risk factor. Specifically, boys scored significantly higher on Attention Problems than girls ($r = .129, p < .05$), and Caucasian participants scored higher than African-Americans ($r = -.161, p < .01$). No other significant correlations were found for demographic variables.

Hypothesis 1: Predicting Outcomes with SAVRY Total Scores

The first hypothesis predicted that SAVRY Total scores would be associated with measures of both general offending history and institutional misconduct. Because age, race and gender were not correlated with SAVRY Total scores, no demographic covariates were included in these analyses. Thus, a series of zero-order correlations were performed to evaluate the relationship between SAVRY Total scores and each of the outcome variables. These results are provided in Table 3. Findings indicated that SAVRY Total scores were significantly associated with more petitioned charges ($r = .196, p < .01$), greater offense diversity ($r = .153, p < .01$), and increased likelihood of spending time on secure custody ($r = .160, p < .01$). No significant correlations were found for history of violent offending or violent sex offenses. Regarding institutional adjustment, SAVRY Total scores were significantly correlated with increases in legal status severity ($r = .130, p < .05$).

Table 3

Zero-Order Pearson's Correlations of SAVRY Scores with Demographic and Outcome Variables

	<i>SAVRY Total</i>	<i>SAVRY Impulsivity</i>	<i>SAVRY Emotion Dysregulation</i>	<i>SAVRY CU Traits</i>	<i>SAVRY Attention Problems</i>
Demographic Variables					
Age	.036	-.003	-.047	-.035	-.087
Sex	.086	-.008	-.098	.062	.129*
Race	-.029	.003	.047	.036	-.161**
Outcome Variables					
Total Charges	.169**	.155**	.086	.068	-.051
Violent Offenses	.017	-.039	.044	.002	.036
Violent Sex Offenses	-.102	-.122*	-.149*	-.001	.122*
Diversity	.153**	.097	.049	.068	-.008
Secure Custody	.160**	.151**	.036	.153**	.020
More Serious LS	.130*	.034	.105	.075	.166**

Note. ** $p < .01$; * $p < .05$. SAVRY = Structured Assessment of Violence Risk in Youth; LS = Legal Status; CU Traits = Callous-Unemotional Traits. Relationships were also analyzed using Spearman's correlations, without notable differences in significance.

Hypothesis 2: Evaluating Offender Subtypes with Latent Class Analysis

Identification of SAVRY Risk Groups. Based on research supporting the existence of certain offender subtypes, the second hypothesis posited the presence of several distinct participant profiles. Previous research led to the prediction of three specific groups, defined by severity ratings on four SAVRY risk factors measuring impulsivity, emotion dysregulation, attention problems, and CU traits. The expected groups included one low-risk group, identified by low to moderate scores on all four risk factors, plus two high-risk groups defined as follows: one moderate/high on the first three risk factors, but low on CU traits; the other low/moderate on the first three risk factors, but high on CU traits.

To test for the presence of the hypothesized groups, latent class analysis (LCA) was conducted using the PROC LCA method recently developed as a feature of Statistical Analysis Software (SAS) Version 9.1 for Windows (Lanza, Collins, Lemmon & Schafer,

2007). In this procedure, participants are grouped together using their scores from a set of categorical observed variables. LCA does not require indicators to be normally distributed, a helpful characteristic given the skew often associated with categorical variables. However, LCA does assume local independence, meaning that latent-class membership is expected to account for relationships observed between indicators in the full sample (2007). Thus, in a dataset with two or more categorical variables, this statistical technique can be used to identify groups of individuals who display similar response patterns on the selected measures of interest. In order to determine the latent classes that fit most consistently for a dataset, the specified model is estimated repeatedly until an adequate model is obtained, or until the maximum number of iterations is reached. The expectation-maximization (EM) algorithm is the estimation method used in PROC LCA, which automatically adjusts for missing data with the assumption that incomplete cases are missing at random (2007). The convergence index for PROC LCA is the maximum absolute deviation (MAD) between the parameter estimates calculated in sequential iterations. In other words, if the discrepancy between parameter estimates from one trial to the next becomes negligible, PROC LCA concludes that the model fits well enough with the dataset to be replicated closely in repeated trials.

Using a maximum-likelihood method, PROC LCA produces two sets of parameter estimates to describe the groups identified for each model: latent-class membership probabilities (γ , or gamma parameters) and item-response probabilities (ρ , or rho parameters) based on class membership (Lanza, Collins, Lemmon & Schafer, 2007). Much like other clustering methods, an initial model with a theoretically supported latent-class structure is tested first. Next, a series of other solutions are tested, with sequentially more

and fewer latent-classes specified in each model. The various possible solutions are then compared on a number of model fit indices, as well as qualitative criteria of model usefulness. Model fit indices include the Akaike Information Criterion (AIC; Akaike, 1974) and the Bayesian Information Criterion (BIC; Schwarz, 1978), with smaller values for each indicating an optimal balance between model fit and parsimony. Finally, entropy values relatively close to 1.00 indicate good distinction between the latent-classes in a model (e.g. Silverwood, Nitsch, Pierce, Kuh & Mishra, 2011).

Because LCA is intended for use with categorical indicators, the SAVRY data required some manipulation to become appropriate for this analysis. Specifically, each of the SAVRY risk factors is scored on an ordinal scale that specifies a low (0), moderate (1), or high (2) rating for each item. To convert these scores into categorical indicators, the four selected SAVRY risk factors were adapted into a new set of dichotomous, dummy-coded variables. This was accomplished by recoding every risk factor into three separate variables representing the three scoring options for each SAVRY item (i.e. low, moderate, high). For instance, to represent the impulsivity risk factor, the following three variables were created: Low Impulsivity, Moderate Impulsivity, and High Impulsivity. This resulted in a total of twelve indicators, three for each risk factor, with each new variable coded dichotomously (1 = rating endorsed; 2 = rating not endorsed). For example, if a participant scored low on the impulsivity risk factor, the three dummy-coded impulsivity variables would be entered as follows: Low Impulsivity = 1, Moderate Impulsivity = 2, High Impulsivity = 2. In this manner, each participant's SAVRY ratings for the impulsivity, emotion dysregulation, attention problems and CU traits risk factors were recoded into twelve dichotomous latent-class indicators.

In order to evaluate the 3-group solution proposed in this hypothesis, a total of four models were tested: the hypothesized 3-class model, as well as 2-class, 4-class, and 5-class models for comparison. Entropy for all four models was high, indicating good separation between groups for each solution. BIC decreased from the 2-class to the 3-class model, but increased between the 3- and 4-class models. However, BIC was much lower for the 5-class model than any other solution. Similarly, AIC decreased substantially between the 2- and 3-class models, decreased relatively little between 3- and 4-class models, and was by far the lowest for the 5-class model. Taken together, these results for the information criteria suggest that the 5-class model has the best relative fit. The 3-class solution is still an improvement upon the 2-class model, but specifying a fourth class does not appear to be helpful. Overall, these model fit indices support further consideration of the 3-class and 5-class solutions to compare the two models on additional qualitative criteria. For a summary of model fit results, see Table 4.

Table 4

Comparison of LCA Model Fit Indices

<i>Number of Classes</i>	<i>G²</i>	<i>df</i>	<i>AIC</i>	<i>BIC</i>	<i>Entropy</i>
2	1755.19	4070	1663.10	1755.19	.99
3	1519.60	4057	1595.60	1735.58	.96
4	1458.02	4044	1560.02	1747.89	.99
5	1152.37	4031	1280.37	1516.12	1.00

Note. LCA = Latent Class Analysis. Fit indices are based on LCA using ratings from SAVRY impulsivity, emotion dysregulation, callous-unemotional traits, and attention problems risk factors.

For the 5-class model, latent-class membership probabilities indicated that nearly half the sample would fall into one group (class 1 $\gamma = .4498$, $SE = .0291$), while the other groups were each expected to range in size from approximately ten to fifteen percent of the sample (class 2 $\gamma = .1479$, $SE = .0208$; class 3 $\gamma = .1088$, $SE = .0182$; class 4 $\gamma = .1352$, $SE =$

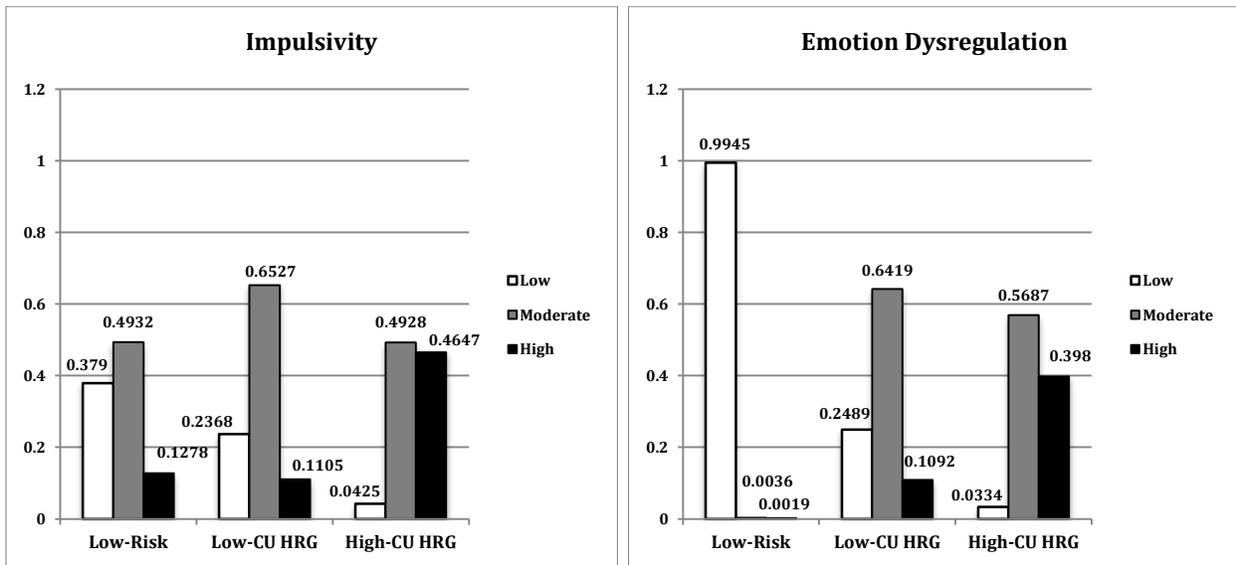
.0200; class 5 $\gamma = .1565$, $SE = .0212$). However, while model fit indices were best for this solution and the sample distribution was acceptable, several of the classes appeared descriptively indistinct based on inspection of the item-response probabilities. Overall, the structure of this solution showed two high-risk groups distinguished by moderate (class 1) versus high (class 2) levels of CU traits, and three very similar low/moderate-risk groups (classes 3-5). The descriptive similarity between the last three groups in this model suggests that a more parsimonious solution with fewer classes may improve the qualitative distinction between response patterns.

For the 3-class model, the latent-class membership probabilities once more showed about half of the sample falling in one group (class 3 $\gamma = .5646$, $SE = .0295$), followed by two groups with smaller, but still adequate, sample distributions (class 1 $\gamma = .1570$, $SE = .02226$; class 2 $\gamma = .2784$, $SE = .0270$). Item-response probabilities for this model succeeded in defining three descriptively discrete latent classes. As previously noted, while fit indices were best for the 5-class model, that solution produced three low-risk groups that could not be distinctly described. This leads to problems with vague and incoherent interpretation of group differences, making the model far less useful for identifying subtypes and differentiating specific patterns of risk among offenders. In other words, the qualitative similarity of the groups identified in the 5-class solution makes that model impractical for addressing the current study hypotheses. Taking into account this weakness, and considering the relative adequacy of model fit indices for both solutions, the 3-class model was selected as the best solution from this series of analyses. The item-response probabilities for the 3-class model, provided in Figure 1, indicated that members of the first group were most likely to score low on emotion dysregulation, CU traits and

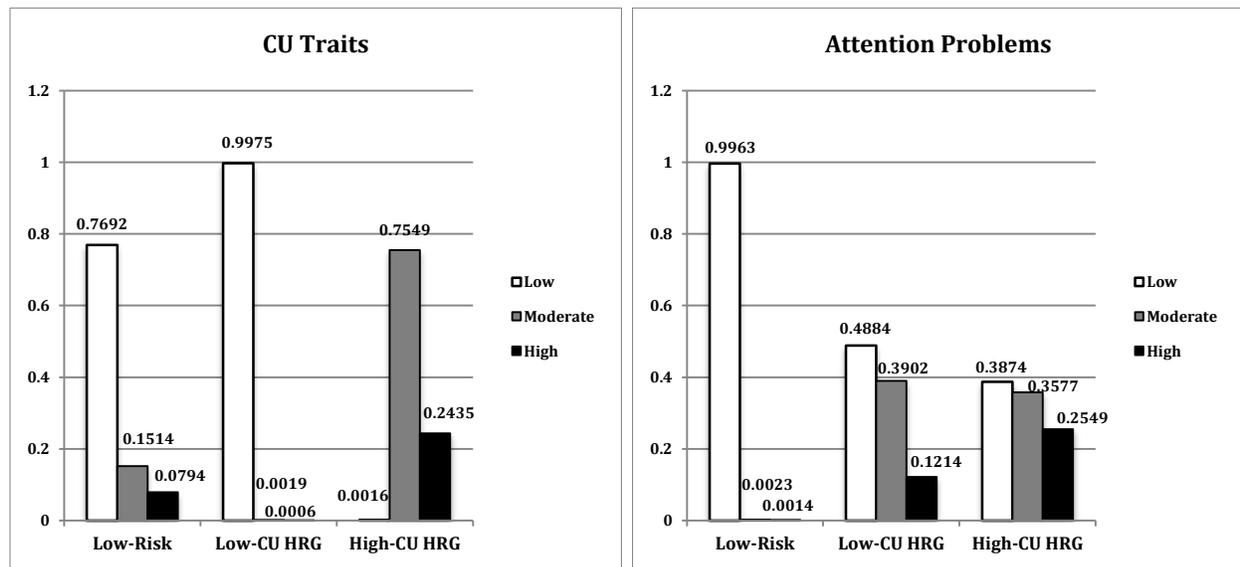
attention problems, and low or moderate on impulsivity. Members of the second group had a high probability of scoring moderate on impulsivity and emotion dysregulation, low/moderate on attention problems, and low on CU traits. Finally, members of the third group were expected to vary on attention problems, but scored moderate on CU traits and moderate/high on impulsivity and emotion dysregulation. In accordance with this pattern of scores, the first group was labeled the low-risk group, the second group was labeled the low-CU high-risk group, and the third group was labeled the high-CU high-risk group.

Figure 1.

LCA Item-Response Probabilities for 3-Class Model.



(Figure 1 continued)



Note. LCA = Latent Class Analysis; CU = Callous-Unemotional; HRG = High-Risk Group; Impulsivity = SAVRY Risk Taking/Impulsivity; Dysregulation = SAVRY Anger Management Problems; CU Traits = SAVRY Low Empathy/Remorse; Attention = SAVRY Attention Deficit/Hyperactivity Difficulties. Graphs display rho parameter estimates from Latent Class Analysis based on ratings from 4 SAVRY risk factors. Estimated parameters represent the probability of endorsing the 3 rating options for each of the risk factors used as LCA indicators.

Demographic Differences across SAVRY Risk Groups. A series of analyses were conducted to evaluate differences in race, gender, and age across the three SAVRY risk groups identified by the LCA. These results are reported in Table 5. Chi-square tests of independence were used to compare the gender and racial compositions of the risk groups. Results indicated a significant overall effect for gender, $\chi^2(2) = 6.39, p < .05$. Follow-up pairwise comparisons indicated a significantly higher proportion of girls in the low-CU high-risk group (28.7% female, 71.2% male) compared to the low-risk group (10.0% female, 90.0% male), although neither differed significantly from the high-CU high-risk group (21.6% female, 78.4% male). No overall effect was found for race, and a one-way analysis of variance (ANOVA) revealed no significant age differences across the risk profile groups.

Table 5

Comparison of SAVRY Risk Groups on Demographic Variables

	<i>Mean (SD)</i>			<i>% within SAVRY Risk Groups</i>			<i>SAVRY RGM Effect</i>
	<i>LRG</i>	<i>Low CU HRG</i>	<i>High CU HRG</i>	<i>LRG</i>	<i>Low CU HRG</i>	<i>High CU HRG</i>	
Age	15.25 (1.47)	15.30 (1.37)	15.10 (1.37)	----	----	----	F(2, 289) = .656
Sex							$\chi^2(2) = 6.39^*$
Female	----	----	----	10.0 ^a	28.7 ^b	21.6 ^{a,b}	
Male	----	----	----	90.0	71.2	78.4	
Race							$\chi^2(2) = 4.64$
White	----	----	----	16.7	26.9	15.5	
Black	----	----	----	83.3	73.1	84.5	

Note. * $p < .05$. SAVRY = Structured Assessment of Violence Risk in Youth; CU = Callous-Unemotional; LRG = Low-Risk Group; HRG = High-Risk Group; RGM = Risk Group Membership. Effects are between SAVRY risk group effects from a one-way ANOVA and χ^2 analyses. Means and percentages with different superscripts differ significantly in pairwise comparisons.

Hypothesis 3: Predicting Outcomes with SAVRY Risk Groups

The third hypothesis predicted that different patterns of offending would be associated with membership in the three SAVRY risk groups identified using LCA. Because of the significant overall and between-groups gender differences across groups, sex was included as a covariate in tests of this hypothesis. Accordingly, a combination of ANCOVAs and binomial logistic regressions were used to evaluate associations between risk group membership and the relevant outcome measures. Results from these analyses are reported in Tables 6 and 7.

Table 6

Comparison of SAVRY Risk Groups on Continuous Outcome Variables Controlling for Sex

	<i>Low-Risk (n = 50)</i>	<i>Low-CU HRG (n = 80)</i>	<i>High-CU HRG (n = 162)</i>	<i>Group Effect</i>	<i>Eta²</i>
SAVRY Total	12.47(6.20) ^a	14.94(6.10) ^a	23.79(6.55) ^b	F(2, 288) = 88.55***	.38
Total Charges	1.84(1.36)	1.87(.173)	2.21(2.20)	F(2, 288) = 1.20	.01
Diversity	.17(.25)	.13(.23)	.20(.27)	F(2, 282) = 1.77	.01

Note. *** $p < .001$. SAVRY = Structured Assessment of Violence Risk in Youth; CU = Callous-Unemotional; HRG = High-Risk Group. Effects are between SAVRY risk group effects from a series of ANCOVAs with sex as a covariate. Means are least square means adjusted for the covariates. Means with different superscripts differ significantly in pairwise comparisons.

Table 7

SAVRY Risk Groups Predicting Categorical Outcome Variables Controlling for Sex

	<i>n (%)</i>	<i>B (SE)</i>	$\chi^2 (df = 2)$	<i>Odds Ratio</i>
<u>Violent Offense</u>				
Female/Male	20(31.7)/103(46.2)	.70 (.31)		2.00*
Overall RGM Effect			3.38	
LRG	16(33.3)	----		----
Low CU HRG	37(46.8)	.70 (.39)		2.01
High CU HRG	70(44.0)	.54 (.35)		1.71
<u>Violent Sex Offenses</u>				
Female/Male	0(0)/15(6.7)	----		----
Overall RGM Effect			.51	
LRG	3(6.2)	----		----
Low CU HRG	5(6.3)	.01 (.75)		1.01
High CU HRG	6(3.8)	-.37 (.71)		.69
<u>Secure Custody</u>				
Female/Male	2(3.2)/16(7.0)	.75 (.77)		2.12
Overall RGM Effect			3.80	
LRG	3(6.0)	----		----
Low CU HRG	1(1.2)	-1.51 (1.17)		.22
High CU HRG	14(8.6)	.46 (.66)		1.59
<u>More Serious LS</u>				
Female/Male	8(12.7)/33(14.4)	.19 (.43)		1.21
Overall RGM Effect			2.57	
LRG	4(8.0)			
Low CU HRG	10(12.5)	.53 (.63)		1.70
High CU HRG	27(16.7)	.86 (.56)		2.35

Note. * $p < .05$; Violent Offense Overall RGM Effect $p = .051$. SAVRY = Structured Assessment of Violence Risk in Youth; RGM = Risk Group Membership; CU = Callous-Unemotional; LRG = Low-Risk Group; HRG = High-Risk Group; LS = Legal Status. Parameters reported are based on Bivariate Logistic Regression analyses using SAVRY risk group membership as the independent variable; the LRG was used as the comparison group for all separate parameters. All reported percentages represent the within-groups proportion of subjects that endorses each outcome variable (e.g. % of females with one or more violent offenses, etc.). Analyses for Violent Sex Offenses were conducted without sex entered as a covariate because 0 females endorsed this outcome, leading to undefined results.

A pair of ANCOVAs was conducted to test hypotheses that the low-risk group would have fewer petitioned charges than either high-risk group, while high-CU high-risk offenders would have higher offense diversity compared to all other subjects. However, in contrast to these expectations, there were no significant differences between the three risk

groups on number of charges or diversity index scores after controlling for sex. For the remaining outcome variables, a series of binomial logistic regressions was used to evaluate the following predicted group differences: first, members of both high-risk groups were expected to have more prevalent histories of violent offending and secure custody placements relative to low-risk participants; in addition, greater likelihood of violent sexual offending was predicted for the high-CU high-risk compared to both other groups; finally, the low-CU high-risk group was expected to show more increases in legal status than the other groups. Again, contrary to predictions, there were no significant differences based on risk group membership for any of these variables after controlling for gender.

Hypothesis 4: SAVRY Risk Group Predictions Controlling for SAVRY Total Scores

The final hypothesis postulated that the group differences anticipated from Hypothesis 3 would remain significant after controlling for SAVRY Total scores. Since the hypothesized differences between groups did not emerge, these analyses were not conducted.

Discussion

Finding the best indicators of risk for negative outcomes among juvenile offenders continues to be an important topic of research. While many studies have demonstrated the predictive value of summed risk scores (e.g. Catchpole & Gretton, 2003; Hoge, 2010; Thompson, 2006), there is also substantial literature asserting the importance of theory-based offender subtypes (e.g. Moffitt, 1993; Odgers et al., 2008). In keeping with prior research, the present study replicated positive associations between summed SAVRY Total risk scores and several pertinent outcome measures. Findings also corroborated the presence of distinct subgroups of juvenile offenders, which included a low-risk group and

two impulsive/dysregulated groups distinguished by differing levels of CU traits. However, contrary to expectations, the subtypes did not differ on measures of criminal severity and institutional adjustment in this dataset. These results have implications for delinquent risk assessment techniques, as well as the practical application of assessment outcomes, including treatment and intervention strategies.

Associations between aggregate SAVRY scores and four out of the six outcome measures examined in this study were consistent with findings from past research. For instance, other authors have reported positive associations between SAVRY Total scores and measures of offender severity, including higher risk for both general and violent recidivism (Meyers & Schmidt, 2008; Penney, Lee & Moretti, 2010; Vincent, Chapman & Cook, 2011). Previous results have supported similar associations between SAVRY scores and various types of institutional misconduct (Borum, Bartel & Forth, 2003; Lodewijks, Doreleijers, de Ruitter & Borum, 2008). Congruent with this literature, SAVRY scores in the current study were positively correlated with measures of general offense severity and institutional adjustment. In contrast, this study found that measures of violent offending were not correlated with SAVRY scores. This incongruous finding may be an artifact of the type of sample used in the current study, which primarily included cases of severe delinquency. Because subjects are selected for OJJ as a result of serious criminal activity, variations in this restricted range may not be distinguished by standard risk assessments. In addition, most of the participants in the current study likely had charges petitioned prior to OJJ referral, but these past charges were not included in OJJ records. Indices of severity drawn from offense histories, including measures of violent offending, were thus based on incomplete criminal records. In sum, the unrepresentative delinquent population and

partial offense histories used in this study may partially account for discrepancies with previous research in terms of finding an association between summed risk scores and past violent offending.

The three risk profiles distinguished in this sample were consistent with the study hypothesis predicting one low-risk and two high-risk groups, a trio of offender subtypes that have also been described in past delinquency literature. For example, one influential theory proposed a separate category of adolescent-onset offenders characterized by relatively less severe criminal behavior and low scores on dispositional risk factors (Moffitt, 1993). Empirical findings have also supported two distinct groups of high-risk offenders, differentiating impulsive/dysregulated from CU subtypes (e.g. Dandreaux & Frick, 2009; Frick, 2009; Moffitt & Caspi, 2001). Although age at onset of delinquency was not assessed in this study, findings were consistent with the literature in identifying a low-risk group, as well as two high-risk groups with characteristically elevated scores on impulsivity/dysregulation and CU measures.

However, contrary to predictions, the high-CU group identified within the present sample was also elevated on impulsive/dysregulated characteristics. While this was not the hypothesized group structure, there is substantive empirical support for this outcome. Specifically, a number of studies have established connections between psychopathic traits and various indicators of impulsivity (e.g. Buckholtz et al., 2010; Colledge & Blair, 2001; Newman, 1987). In addition, research suggests that CU youth display high levels of both proactive and reactive aggression (e.g. Enebrink, Andershed & Långström, 2005; Fanti, Frick & Georgiou, 2009). Because emotion dysregulation is consistently related to elevated reactive aggression scores (see Card & Little, 2006), the pattern of high reactive aggression

among CU youth suggests that this group may also present with associated dysregulation. It is important to note that, while youth high on CU traits may share the behavioral manifestations of emotional dysregulation (e.g. high rates of anger and reactive aggression), there is evidence that measures of autonomic responses to provocation may still differ between youth with and without elevated CU traits (Munoz, Frick, Kimonis & Aucoin, 2007).

In contrast to results from previous studies, no relationships were found between the offender subtypes and any outcome measures in this dataset. Previous research has shown associations linking measures of impulsivity, attention problems, emotion dysregulation and CU traits with rates of general and violent offending, as well as criminal diversity (e.g. Firestone, Nunes, Moulden, Broom & Bradford, 2005; Kaplan & Cornell, 2004; Sibley et al., 2011; Sikorski, 2006). In addition to these indicators of offender severity, CU traits have been implicated as an important risk factor for sexual violence (e.g. Caputo, Frick & Brodsky, 1999; Lawing, Frick & Cruise, 2010). Past findings have also connected impulsivity, attention problems, and emotion dysregulation with poor institutional adjustment (e.g. Dolan & Blackburn, 2006; Walters, 2007). However, none of the six outcomes included in this study differed significantly across groups. The aforementioned limitations in OJJ sample selection and offense history may once again help explain these incongruities with previous work. Yet this rationale is less convincing as an explanation for the consistently negative results failing to support these predictions. This persistent lack of associations between offender subtypes and severity indices suggests that the profiles identified in this sample were simply poor predictors for the selected delinquent outcome measures. In short, the results indicate that aggregate SAVRY scores are more useful than

offender subtypes in predicting overall risk for criminal activity. However, the use of theory-based profiles to facilitate detailed group comparisons in past research (e.g. Moffit, 1993) suggests that subtypes may still be useful for analysis of potential causal factors specific to different profiles, and also for designing intervention strategies to target these developmental risk factors. More research is needed to evaluate these possibilities, however, as they were not tested in the current study.

In addition to the problems with sample selection and incomplete offense histories, there were several other limitations to this study that need to be considered when interpreting the results. Notably, the selection of delinquent severity indicators was restricted by the variables included in Louisiana's OJJ database, the variability of data within the sample, and the quality of data entry (i.e. inaccurate and missing data). This resulted in a restricted number of potential outcome variables, with varying degrees of usefulness. Unfortunately, while research using institutional databases allows convenient access to large samples, such data limitations are often unavoidable. A number of psychometric limitations also affected the current study, including the reliance on single items to define the different offender subgroups. These indicators are likely to be better-assessed using empirically supported, multiple-item measures for each grouping variable (i.e. impulsivity, CU traits, etc.). For example, typical measures include the Inventory of Callous-Unemotional Traits (ICU; Frick, 2004) as an indicator of CU traits, the Behavior Assessment System for Children-Second Edition (BASC-2; Reynolds & Kamphaus, 2004) for attention problems, and so forth. In addition, while past research has supported the measurement properties of the SAVRY Total score, inter-rater reliability could not be confirmed in this sample because only one rating was recorded per subject. Finally, the

predominantly African-American, male composition of this sample is an important limitation to consider before generalizing these results to other delinquent populations.

Bearing in mind the limitations discussed above, the results of this study support several conclusions. First, aggregate risk scores proved to be much better predictors of delinquency outcomes than offender subtypes. Although SAVRY Total scores failed to assess risk for violent (and violent sexual) offending, higher scores did significantly predict four other measures of offender severity. Thus, for purely predictive purposes, aggregate risk assessment tools like the SAVRY appear to be the most effective options.

However, these negative findings do not necessarily nullify the value of the offender subtypes for other purposes, such as determining unique causal pathways to serious offending and identifying important targets for intervention. For instance, research has shown that harsh and coercive parenting is more related to conduct problems in youth with low CU traits, while lack of parental warmth is particularly associated with behavior problems in high-CU subjects (see Frick, Ray, Thornton & Kahn, 2013). This suggests that families with children at high risk for delinquency may benefit from parent-training interventions especially tailored to the individual characteristics of each child. Specifically, treatments could focus on enhancing parental warmth toward children with evidence of elevated CU traits, while treatments for low-CU youth might focus on more fair and consistent parenting practices. To expand treatment recommendations, future studies should investigate differences across high and low CU subtypes in other historical risk factors related to the development of delinquency. Information highlighting additional differences in familial, educational, and social background may be particularly helpful in tailoring treatment and policy decisions to prevent initiation of adolescent offending.

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Appendix A: Frequencies and Descriptive Statistics

Table 1

Frequencies and Descriptive Statistics of Continuous Study Variables

	<i>n</i>	<i>Mean</i>	<i>SD</i>	<i>Skewness</i>	<i>Kurtosis</i>	<i>Min.</i>	<i>Max.</i>
SAVRY Total	292	19.42	8.04	.14	-.46	2	41
# Charges	292	2.05	1.96	3.02	12.59	.00	16
Diversity	286	.18	.26	.89	-1.00	.00	.74

Note. SAVRY = Structured Assessment of Violence Risk in Youth.

Table 2

Frequencies and Descriptive Statistics of Categorical Study Variables

	<i>n</i>	<i>% of Total</i>
Violent Offenses		
No (0)	163	55.8
Yes (1)	123	42.1
Total	286	97.9
Violent Sex Offenses		
No (0)	271	92.8
Yes (1)	14	4.8
Total	286	97.9
Secure Custody		
No (0)	274	93.8
Yes (1)	18	6.2
Total	292	100.0
More Serious LS		
No (0)	251	86.0
Yes (1)	41	14.0
Total	292	100.0

Note. LS = Legal Status.

Vita

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