Use of Structured Professional Judgment by Probation Officers to Assess Risk for Recidivism in Adolescent Offenders

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The current study tested a method of risk assessment for adolescent offenders that relies on structured professional judgment: the Structured Assessment of Violence Risk for Youth (SAVRY; Borum, Bartel, & Forth, 2006). Trained probation officers in 3 jurisdictions administered the SAVRY to 505 adjudicated adolescents (*M* age = 15.43 years, *SD* = 1.62). The results supported the validity of the SAVRY administered in this juvenile justice context. Specifically, scores from the SAVRY differentiated violent from nonviolent offenders and predicted both violent and nonviolent recidivism over a 12-month follow-up period. Violent offenders showed more historical and individual risk factors than nonviolent offenders, and violent sex offenders were rated as more deficient in empathy and remorse. The anger control item was a particularly important indicator of risk for reoffending in the violent offender group. The implications of these findings for weighting risk factors in individual cases when using structured professional judgment are discussed.

Public Significance Statement
The Structured Assessment of Violence Risk for Youth (SAVRY) administered by trained probation officers predicts both violent and nonviolent recidivism over a 12-month follow-up period in adjudicated adolescents. Problems with anger control is a particularly important predictor of reoffending for adolescents arrested for violent crimes.

The use of risk assessment instruments has become increasingly prevalent within the juvenile justice system (Wachter, 2015). These instruments use theoretically and empirically important variables to estimate an offender's level of risk or potential for future involvement in violent or nonviolent behavior. Ideally, juvenile justice agencies use this information to assist with the development of case management plans, supervision decisions, and effective allocation of resources. Studies have shown that the implementation and utilization of risk assessment instruments can lead to reductions in recidivism (Luong & Wormith, 2011), minimize potential racial disparities in decisions (Chapman, Desai, Falzer, & Borum, 2006), and reduce the use of more restrictive dispositions such as out of home placements (Vincent, Guy, Gershenson, & McCabe, 2012). Thus, risk assessment measures have potential for enhancing how the juvenile justice system responds to youthful offenders.

The current study provides data to enhance the use of risk assessment for adolescent offenders in a number of ways. First, the study tested the utility of a structured method for assessing risk in a large sample of adolescent offenders placed on probation. The risk assessment was adopted as part of a statewide effort to implement evidence-based procedures to improve juvenile justice practices. Second, the risk assessment was conducted by trained probation officers who work with youth in the community, rather than by researchers conducting assessments in controlled settings or based on retrospective file data. Thus, the current study tests the validity of a structured professional judgment (SPJ) tool when conducted in a way that approximates standard practice. Third, this study tested whether certain patterns of offending were differentially related to specific types of risk factors, and whether the

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relative importance of these risk factors for estimating risk differed across offender groups (i.e., violent, violent sexual, and nonviolent). These questions are useful for guiding how risk factors can be weighted in risk assessments to optimize use in service referrals and case management. For example, if certain risk factors are more salient than others for predicting poor outcomes for specific groups of adolescent offenders, then these factors may need to be prioritized in treatment plans.

Using SPJ to Assess Risk in Juvenile Justice Settings

Professionals charged with making estimates of one's risk to public safety (or a formal risk assessment) have generally used one of three methods. The first and original method involved unstructured clinical judgments of risk made by professionals in vivo. Although this method has the advantage of allowing great flexibility in its use, decisions based on such assessments proved to be highly unreliable, which reduced their ability to accurately predict outcomes such as violence (Grove & Meehl, 1996; Mossman, 1994). In response to these limitations, actuarial methods were developed. In this approach, risk factors are assessed and then combined using a predetermined formula, such as summing the number of risk factors present, to gauge the likelihood of an individual reoffending or engaging in violence. This method yields good reliability, especially when compared with the use of unstructured clinical judgments, and shows moderate success in predicting reoffending and similar outcomes in the justice system (Latessa & Lowenkamp, 2005; Mulvey, 2005). However, these actuarial approaches often show reduced reliability when used in applied settings, relative to estimates obtained in controlled laboratory settings (Boccaccini et al., 2012; Edens, Penson, Ruchensky, Cox, & Smith, 2016). Also, there is a great deal of structure imposed in the weighting of risk factors, or risk factors are not weighted at all and simply summed. This methodology does not allow for more individualized or customized assessments that account for idiosyncratic factors that may increase or decrease one's likelihood of reoffending (Douglas & Kropp, 2002). Consideration of the relevance of risk factors to the individual could be important for tailoring interventions to the specific needs of individual youth in the juvenile justice system (Borum, 2000; Hoge & Andrews, 2002).

A third approach to risk assessment, SPJ, was designed to combine the best features of both clinical judgment and actuarial tools. The SPJ approach provides detailed definitions for rating the presence of predetermined risk factors, while permitting the examiner to consider the relative importance of each risk factor to the individual before making a final judgment of risk for future behavior (Borum & Douglas, 2003; Douglas & Kropp, 2002). This framework relies on training and standard guidelines for both rating of individual risk items and for weighing them, along with other potential idiosyncratic factors (e.g., trauma-related symptoms, gun accessibility, homicidal ideation) to make final judgments of risk.

The Structured Assessment of Violence Risk for Youth (SAVRY; Borum, Bartel, & Forth, 2006) is an example of the SPJ approach and uses this method to assess risk of violence among adolescents. The SAVRY comprises both static and dynamic risk factors, as well as protective factors, selected for inclusion based on a systematic review of longitudinal studies of adolescent vio-

lence and delinquency (Borum et al., 2006). Items are rated according to detailed item descriptions based on a systematic appraisal of all available information (e.g., youth interviews and collateral information). Consistent with the SPJ approach, the final decision regarding a youth's risk level (low, moderate, or high) is made by the evaluator after consideration of the presence and relevance of risk and protective factors, as well as additional factors that may need to be considered for the particular individual. Initial research on the SAVRY has been promising, with data suggesting that it outperforms unstructured clinical judgment (Borum, Lodewikjs, Bartel, & Forth, 2010), and performs as well as some of the most widely used actuarial methods for both the prediction of nonviolent and violent reoffending (Olver, Stockdale, & Wormith, 2009). However, much of this research has been conducted in controlled settings with trained researchers. Given the degree of professional judgment required for these assessments, it is critical that researchers conduct tests of these methods to determine if juvenile justice professionals (e.g., probation officers) can be trained to use such methods in a way that maintains their reliability and validity. In an examination of the field validity of the SAVRY, Vincent, Chapman, and Cook (2011) reported that the SAVRY scored by juvenile justice professionals predicted recidivism over a 5-year period for youth released from detention. However, this study did not test the relative importance of individual risk items, nor did it test whether or not specific indices predicted reoffending differently across subgroups of young offenders.

Global or Specific Risk Indices

An assumption of the SPJ approach is that certain "critical" risk factors may be more salient than others in estimating risk and, contrary to the actuarial approach, this can vary by individual. This assumption is aligned with a Risk, Needs, Responsivity (RNR) philosophy, which assumes that the most effective strategy for reducing the likelihood of reoffending is to assess the likelihood that an individual will reoffend (risk), assess the needs of the individual (needs), and tailor services (responsivity) to the individual's risk and needs (Andrews, Bonta, & Hoge, 1990). This approach to risk and needs assessment are in contrast to historical approaches that have typically been guided by the assumption that antisocial youth are rather homogeneous and that the same factors increase risk for future antisocial behavior for all youth. As a result, the focus of these cumulative risk approaches is on the *number* of risk factors and not the specific *types* of risk factors present (Farrington, 1997; Henry, Tolan, & Gorman-Smith, 2001; Loeber, Farrington, Stouthamer-Loeber, & White, 2008). This cumulative risk assumption guided the use of many actuarial assessments that largely count the number of risk factors to estimate the probability of future offending (Olver et al., 2009; Schwalbe, 2007).

A growing body of research challenges the validity of these cumulative risk models, and suggests that there may be distinct pathways to adolescent offending that involve different causal processes. For example, adolescents who commit violent offenses are more likely to have an earlier age of onset to their offending, and violent adolescent offending is more strongly related to certain individual risk factors (Moffitt, 2006). In fact, early onset offenders can be separated into those who have difficulties regulating

their behavior and emotions, as evidenced by the presence of attention-deficit hyperactivity disorder (ADHD) and anger control problems, and those who show significant levels of callous-unemotional (CU) traits, as evidenced by deficient guilt and empathy (Frick & Viding, 2009). These individual predispositions result from different causes but both place the youth at greater risk for acting in an aggressive and violent manner (Frick, Ray, Thornton, & Kahn, 2014). In contrast, nonviolent offenders are less likely to show these individual risk characteristics, and their behavior problems appear to be more strongly related to contextual factors (e.g., deviant peers, poor parental supervision; Frick & Viding, 2009; Moffitt, 2006; Nagin & Tremblay, 1999).

Thus, there appear to be differences in the importance of certain risk factors between violent and nonviolent offenders. Even within violent offenders, there have been distinctions made between those who do and do not commit sex offenses (Blaske, Borduin, Henggeler, & Mann, 1989; Ford & Linney, 1995; Stephenson, Woodhams, & Cooke, 2014; van der Put, van Vugt, Stams, Deković, & van der Laan 2013; Worling & Langstrom, 2006). The two violent offender groups appear to share some risk factors, such as cognitive deficits (Spaccarelli, Bowden, Coatsworth, & Kim, 1997) and ADHD difficulties (Caputo, Frick, & Brodsky, 1999; van Wijk et al., 2005). However, sex offenders appear to be more likely to have histories involving physical and sexual abuse (Caldwell, Ziemke, & Vitacco, 2008; Kahn & Chambers, 1991; Righthand & Welch, 2004; Worling & Curwen, 2000) and show lower levels of CU traits (Caputo et al., 1999) compared with other violent offenders.

Current Study

In summary, research suggests that subgroups of adolescent offenders may differ with respect to the types of risk factors leading to their problem behavior. Such differences could inform the RNR approach by helping to tailor interventions to the unique needs of the different groups of adolescents. Further, it is possible, but relatively untested, that these variations in risk profiles also could be differentially predictive of reoffending across offender groups, which could have meaningful implications for SPJ methods for assessing risk. Unlike the typical actuarial assessment instruments (e.g., the Youth Level of Service/Case Management Inventory; Hoge & Andrews, 2002), the SPJ approach does not provide a formula to identify the most meaningful need areas. Instead, the SPJ approach permits examiners to mark factors as critical if the factors are particularly relevant to the current case. As such, the current study attempts to provide some guidance to the identification or prioritization of critical risk factors by comparing the relative importance of the *number* of risk factors (cumulative risk models) with the *types* of risk factors in the evaluation of risk for reoffending across different types of juvenile offenders.

To address this aim, the current study tested the validity of the SAVRY (Borum et al., 2006) when completed by trained juvenile probation officers (JPOs) for a large sample ($n = 505$) of adjudicated adolescents. This study examined the predictive validity for reoffending of both a cumulative risk model (sum of items) and of specific risk factors that were selected based on the emerging developmental research on different causal pathways leading to offending behavior. To examine differences between offender groups, we divided the sample into three groups based on their

official records—nonviolent offenders, violent offenders, and violent sexual offenders—and determined whether they differed on the types of risk factors exhibited. We predicted that the two violent offender groups would be rated higher on individual/clinical risk factors than the nonviolent offender group, but the three groups would not differ on levels of social/contextual risk. We also hypothesized that both violent offender groups would be rated higher than the nonviolent offender group on levels of ADHD difficulties and anger control, but only the violent sexual offender group would be rated higher on childhood maltreatment and deficient guilt/empathy. Next, we compared several ways of estimating risk in the ability to predict any reoffending and violent reoffending over a 12-month period: (a) a global risk index that simply summed across all risk factors, (b) three broad classes of types of risk factors (i.e., historical, social/contextual, individual/clinical), and (c) theoretically meaningful individual risk factors (i.e., anger management problems, ADHD, low empathy/guilt, history of childhood maltreatment). Finally, we tested whether any of the risk factors that differed across offender groups accounted for differences in reoffending for that group.

Method

Participants

The sample included 505 adjudicated adolescents who were placed on juvenile probation in three jurisdictions in a southern state over a 12-month follow-up period.[1] Participants ranged in age from 8 to 18 years ($Mn = 15.43$, $SD = 1.62$). The sample was largely male (95%) and African American (74%), with the remaining sample being Caucasian (24%), biracial (1.4%), and other (0.4%).

Procedures

The lead university's institutional review board approved the archival data collection procedures, which included only deidentified electronic files obtained from the official court records in each jurisdiction. The three jurisdictions were selected to be representative of the state in terms of serving urban, rural, and suburban areas. The data collection was part of each jurisdiction's participation in a broader juvenile justice reform effort to promote evidence-based practices across the state. As part of their involvement in the broader reform effort, use of the SAVRY was made a mandatory part of their probation practices. Probation officers administered the SAVRY to youth after adjudication but prior to or shortly after dispositional hearings. Each JPO completed a 2-day training workshop and follow-up practice cases prior to administering the SAVRY to juveniles on probation. The sample for this study was obtained between 2 and 14 months following the probation officers' training and the implementation of the SAVRY in the three jurisdictions.

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[1] To ensure that differences in the amount of time outside of secure custody (i.e., amount of street time) did not influence the analyses of reoffending, 14 cases were not included in the current analyses due to the adolescent being placed in secure custody during the follow-up period. However, when analyses were repeated including these 14 cases, the significant results were unchanged.

Measures

Offender groups. Offenders were classified into three groups based on any adjudicated offenses included in their court records, which included both the index offense (i.e., the offense that led to their current adjudication) and any previous offenses that led to an adjudication. Violent offenders were those adolescents with at least one violent offense but no history of any sexual offense. Violent offenses included battery, robbery, aggravated and simple assault, and terrorizing. Sex offenders had a history of at least one violent sexual offense that included rape, aggravated rape, and sexual battery. Nonviolent offenders were classified based on a history of only nonviolent offending that included burglary, criminal damage to property, theft of goods, possession of a weapon, criminal trespassing, criminal mischief, disturbing the peace, possession and/or distribution of drugs, status offending, and motor vehicle theft. Of the 505 offenders in the sample, 241 (48%) were in the violent offender group, 25 (5%) were in the violent sex offender group, and 239 (47%) were in the nonviolent offender group.

Structured Assessment of Violence Risk (SAVRY). The SAVRY (Borum et al., 2006) consists of 24 risk items measuring risk factors across three domains (Historical, Social/Contextual, and Individual) and six protective factor items.[2] Items included in the three risk domains are rated as low, moderate, or high based on detailed item descriptions following an interview with the youth, interview with the parent, and all collateral information available to the rater. Examiners mark items that are particularly relevant to an individual's immediate risk as "critical." The Historical domain includes 10 items (e.g., childhood history of maltreatment, history of self-harm), the Social/Contextual risk domain includes six items (e.g., peer rejection; poor parental management), and the Individual domain includes eight items (e.g., anger management problems; low empathy/remorse). Meta-analyses have indicated the SAVRY has strong predictive validity for outcomes related to reoffending using several indices (e.g., positive predictive power, area under the curve; Singh, Grann, & Fazel, 2011) and it has comparable predictive accuracy to actuarial assessments (Olver et al., 2009). The SAVRY's predictive validity has also been demonstrated for both violent and general reoffending among samples of youth placed on probation, in forensic hospitals, in residential treatment, referred for a mental health assessment (see Borum et al., 2010, for a review), and in detention (Vincent et al., 2011).

In its typical use, the SAVRY requires raters to make an overall risk rating (low, moderate, or high) based on their perceived relevance of the various risk factors that were rated as present (moderate or high) and consideration of additional salient risk factors for the individual case. However, because the primary goal of the study was to examine the relative importance of specific risk factors compared with cumulative risk models, total and scale (or domain) scores were determined by assigning numeric values to item ratings (low = 0, moderate = 1, high = 2). The total SAVRY score was the sum of all 24 risk items (α = .89), the Historical risk domain was the sum of 10 risk items (α = .73), the Individual/Clinical risk domain was the sum of eight items (α = .83), and the Social/Contextual risk domain was the sum of six items (α = .71). Four individual risk items were included in analyses based on the research reviewed in the introduction suggesting their importance for differentiating important developmental pathways to juvenile offending. These items were history of childhood maltreatment from the Historical domain, and anger management problems, attention deficit/hyperactivity difficulties, and low empathy/remorse from the Individual/Clinical domain. Descriptive statistics for these eight variables are reported in Table 1.

Field reliability of SAVRY ratings among the JPOs in two of the three participating jurisdictions have been reported previously (Vincent, Guy, Fusco, & Gershenson, 2012). This interrater reliability study was conducted over a period of 6 months that overlapped with the 12-month time frame of gathering SAVRYs for the current study. Vincent et al. (2011) calculated intraclass correlation coefficients (ICCs) using 55 randomly selected youth cases that were interviewed by a JPO while observed by a trained researcher. Both parties reviewed all available collateral information and rated the SAVRY independently. ICC_1s were good to excellent, with an ICC_1 of .86 for the SAVRY total score, and ICC_1s ranging from .67 to .86 for the risk domain scores, and from .73 to .91 for the individual items used in these analyses.

Recidivism. Follow-up data were obtained from each jurisdiction's official court database. Recidivism was defined as any new petition to either juvenile or adult court. All participants had at least 12 months after the initial SAVRY administration to reoffend. If participants had longer than 12 months in which to reoffend, only offenses that occurred within the first 12 months prior to the SAVRY administration were coded. Three variables were created using these data: *any reoffense* during the 12-month follow up period (including violent, sex, and nonviolent offenses), *violent reoffense* (including violent and sex offenses), and the *number of days* from the original petition to the new petition (referred to as time to reoffend). Thirty-five percent of the sample was petitioned for a new offense within one year, and 12% of the sample was petitioned for a violent offense specifically. Because there were only a small number of new sexual offenses ($n = 3$) during the follow-up period, sexual reoffending was not examined.

Data Analyses

Before addressing the primary study goals, the three offender groups were compared on major demographic variables, including age, race, and gender. Age and gender did not significantly differ. However, there was a significant difference in race across offender groups, $\chi^2(2, N = 505) = 21.95$, $p < .001$, with the violent sex offender group having a lower percentage of African American youth (48%) than either the violent (84%) or the nonviolent offender (71%) groups. Therefore, race was used as a covariate in all subsequent analyses.[3]

Analysis of covariance (ANCOVA) was used to examine mean differences in the SAVRY ratings of interest across the three groups while controlling for race. These analyses were followed by Cox regression analyses to (a) compare the various SAVRY risk indices of interest in their association with recidivism overall, (b) test whether the offender groups differed in their time to recidi-

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[2] The Protective Factor scale was not used in analyses because this study focused on risk factors. However, there were no significant differences between offender groups on the protective factor domain.

[3] All analyses were rerun without race in the models. The results did not substantively change. Therefore, we chose to leave race in the models as a covariate, given the significant differences in the racial composition of the offender groups.

Table 1

Description of SAVRY Risk Measures (n = 505)

Risk scale/Item	Mean	Standard deviation	Range
Total SAVRY rating	13.9	8.9	0–42
Risk domains			
Historical	5.2	3.4	0–19
Individual/Clinical	4.9	3.9	0–16
Social/Contextual	3.3	2.5	0–11
Risk factors			
ADHD	.6	.8	0–2
Anger management	.8	.8	0–2
Empathy/remorse	.5	.7	0–2
Child maltreatment	.3	.5	0–2

Note. SAVRY = Structured Assessment of Violence Risk for Youth; ADHD = attention-deficit hyperactivity disorder.

vism, and (c) test whether these differences in time to reoffending across groups were accounted for by any SAVRY risk ratings that differed across groups. Cox regression is a semiparametric technique that examines the relationship between predictor variables (i.e., offender groups, risk factors) and an event (i.e., reoffense). However, unlike logistic regression analyses with a binary outcome, Cox regression also considers the length of time to the event (i.e., survival time or time "at risk"), while including those who did not "yet" reoffend (censored cases) in the model.

Because there were three offender groups included in our analyses, contrast effects were used to compare differences in time to recidivism across each of the groups. In all analyses, the nonviolent offender group was selected as the reference group. In the first step, pairwise comparisons (i.e., contrast effects) between offender groups were tested to determine if the groups differed in time to recidivism, after controlling for race. In the second step, total SAVRY scores were added to determine if a measure of global risk accounted for differences between offender groups in their time to recidivism. Next, the SAVRY total score was replaced with the SAVRY domain scores to test whether specific domains accounted for differences in recidivism across the offender groups. Finally, the domain scores were replaced with ratings on the risk items of

interest. For each SAVRY score entered at this step, we tested whether the risk for reoffending across offender groups was accounted for by the SAVRY score. All analyses were conducted using time to any reoffense as the dependent variable, and then repeated after restricting the dependent measure to time to any violent reoffense.

Results

Differences Across Offender Groups on SAVRY Measures

The results of the ANCOVA analyses comparing the three offender groups on the SAVRY risk ratings of interest, while controlling for race, are provided in Table 2. There were significant group differences on the SAVRY total score and for the Historical and Individual domains. The same pattern of scores emerged for all three variables. That is, the violent offender group was consistently higher than the nonviolent offender group in pairwise comparisons. As predicted, the one domain in which the nonviolent group showed comparable levels of risk to the violent offender group was in the Social/Contextual domain. Across total risk score and the three risk domains, the violent sex offender scores did not differ significantly from either group in the pairwise comparisons.

With respect to the individual risk factors of interest, the same pattern of results was found for two of the four items, with the violent offender group scoring higher than the nonviolent group on anger management and ADHD difficulties (see Table 2). The violent sex offender group did not significantly differ from the other groups on these two risk items. However, a different pattern was found for the empathy/remorse risk factor. As predicted, the violent sex offender group had significantly higher ratings on this item than the other two groups. Contrary to predictions, however, there was no significant difference across groups for the history of childhood maltreatment risk item.

Table 2

Comparison of Offender Groups on SAVRY Risk Measures

Risk scale/Item	Violent offender Mean (SD)	Violent sex offender Mean (SD)	Nonviolent offender Mean (SD)	Overall group effect F (df)	η^2
Total risk score	15.1 (9.5)[a]	13.6 (8.6)[a,b]	12.8 (8.9)[b]	4.3 (2, 499)*	.017
Risk domains					
Historical	5.6 (3.6)[a]	5.4 (3.0)[a,b]	4.8 (3.1)[b]	5.0 (2, 497)**	.020
Individual	5.4 (4.1)[a]	4.5 (3.5)[a,b]	4.5 (3.7)[b]	3.8 (2, 500)*	.015
Social/Contextual	3.5 (2.7)	3.5 (3.1)	3.1 (2.3)	.9 (2, 500)	.004
Risk factors					
ADHD	.6 (.79)[a]	.8 (.90)[a,b]	.4 (.70)[b]	5.7 (2, 496)**	.024
Anger management	.9 (.78)[a]	.7 (.76)[a,b]	.6 (.69)[b]	7.8 (2, 496)**	.033
Empathy/remorse	.5 (.64)[a]	.8 (.80)[b]	.4 (.62)[a]	6.7 (2, 497)**	.022
Child maltreatment	.3 (.55)	.3 (.63)	.3 (.54)	.1 (2, 497)	.001

Note. Effects are the between-group effects from a one-way ANCOVA, covarying race; means reported are least squares means adjusted for the covariate. Superscripts indicate significant differences between groups through pairwise comparisons using Tukey's procedure such that a groups are significantly different from b. SAVRY = Structured Assessment of Violence Risk for Youth; df = degrees of freedom; ADHD = attention-deficit hyperactivity disorder.
* $p < .05$. ** $p < .01$.

Risk Factors for Reoffending

Table 3 summarizes the results of the Cox regression analyses testing the association of each variable from the SAVRY with reoffending, controlling for race. For predicting any new offense, the only variable that was not associated with reoffending was history of childhood maltreatment. Results indicated that for each unit increase in SAVRY total risk, the hazard of general recidivism increased by 1.04. That is, each unit increase in SAVRY total risk resulted in a 4% increase in the likelihood of recidivism. In regard to the three SAVRY risk domains, each unit increase in the Historical domain led to an 8% increase, in the Individual/Clinical domain led to a 10% increase, and in the Social/Contextual domain led to a 12% increase in the likelihood of a new offense. The three individual risk items that were statistically significant revealed a strong relationship to recidivism. Each increase in the rating on the ADHD item led to a 44% increase in the likelihood of general recidivism, increases in ratings on anger management led to a 69% increase, and increases in low empathy/remorse led to a 49% increase in the likelihood of general recidivism. It is important to note that these percentages are influenced by the scale of measurement for each item. That is, the individual risk items include only three risk levels, whereas the continuous composite measures range from 12 to 43 (see Table 1).

The results for violent reoffenses were relatively similar to the results for any reoffense. For example, we found that each unit increase in SAVRY total risk increased the likelihood of violent recidivism by 4%. In regard to the SAVRY risk domains, each unit increase in the Historical domain led to an 11% increase, and each unit increase in the Individual/Clinical domain led to a 9% increase, in the likelihood of violent reoffending. Each unit increase in ratings of ADHD difficulties led to a 53% increase in the likelihood of violent reoffending, anger management led to a 90% increase, and low empathy/remorse led to a 44% increase in the likelihood of violent reoffending. The Social/Contextual domain and the history of childhood maltreatment item were not significantly related to violent reoffending. Because these two indices also failed to differentiate across the groups (see Table 2), they were not included in the subsequent Cox regression analyses.

Table 3
SAVRY Risk Measures Predicting Recidivism Over 12 Months

SAVRY risk scores	Any new offense		Any new violent offense	
	Exp(B)	SE	Exp(B)	SE
Total risk score	1.04**	.01	1.04**	.01
Risk domains				
Historical	1.08**	.02	1.11**	.04
Individual	1.10**	.02	1.09**	.03
Social/Contextual	1.12**	.03	1.10	.05
Specific risk factors				
ADHD	1.44**	.09	1.53**	.16
Anger management	1.69**	.10	1.90**	.17
Empathy/remorse	1.49**	.11	1.44*	.19
Child maltreatment	.94	.14	1.09	.23

Note. Parameters reported were based on Cox regression analyses using days to any reoffense as the dependent variable and controlling for ethnicity. SAVRY = Structured Assessment of Violence Risk for Youth; SE = standard error; ADHD = attention-deficit hyperactivity disorder.
* $p < .05$. ** $p < .01$.

Offender Type and SAVRY Risk Measures Assessing Reoffending

The hierarchical Cox regression analyses examining whether the offender groups differed in their time to recidivism and testing whether these differences in reoffending across groups were accounted for by the SAVRY risk measures are reported in Tables 4 and 5. As noted in Table 4, contrast effects in the Cox regression analyses indicated that the odds of recidivism were 1.5 times higher for the violent offender group compared with the nonviolent offender group. The parameter for the contrast comparing the violent sex offenders and nonviolent offenders on risk for reoffending was not significant (hazard ratio = 1.05). When the SAVRY total risk score was added to the Cox regression (Model 2), it also significantly predicted time to reoffending. Results indicated that each unit increase in SAVRY total risk score resulted in a 4% decrease in the time to general recidivism. Further, although the contrast effect for violent offending predicting recidivism relative to the nonviolent group remained significant, it was significantly reduced ($z = 1.71$, $p < .05$) when the total risk score was included as a predictor (Sobel, 1982). When the Individual/Clinical and Historical domains were entered instead of the total score, only the Individual/Clinical domain accounted for a significant amount of unique variance in reoffending. A one unit increase in the Individual/Clinical domain led to a 9% decrease in the time to general recidivism. The inclusion of these risk scores did partially account for the differences in the likelihood of reoffending among the violent and nonviolent offender groups ($z = 1.71$, $p < 05$). Finally, when the three SAVRY risk factors (i.e., anger management, ADHD, low empathy/remorse) were entered instead of the total score, the only predictor that remained significant was the anger management risk factor item. That is, when the anger management risk factor was included as a predictor, the contrast effect for violent offender predicting reoffending relative to the nonviolent group was no longer significant. Results indicated that each increase in ratings for anger management problems led to a 39% reduction in the time to any recidivism.

Analogous Cox regression analyses were conducted predicting time to violent reoffense (see Table 5). In Block 1, the contrast effects indicated that the violent reoffending hazard for the violent offender group was 1.77 times that of the nonviolent offender group. This parameter was no longer significant at each of the later steps when SAVRY risk indices were added as predictors. However, the change in this association was not significant (zs ranged from 1.06 to .120, $p = ns$). Similar to the findings for any reoffending, the total risk score and the anger management rating were significant predictors of violent reoffending.[4] In Model 2, our results showed that each unit increase in SAVRY total risk decreased the time to violent reoffending by 3%. In Model 4, our results showed that each unit increase in risk level for anger management problems decreased the time to violent reoffending by 61%.

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[4] We repeated the Cox regression analyses predicting reoffending in which the contrast effect used the violent offending group as the comparison group. In these analyses, the parameters testing the relative risk for reoffending and relative risk for violent reoffending between the violent offender group and the violent sex offender groups were not significant.

Table 4

Offender Type and SAVRY Risk Measures Predicting Time to Any Reoffense

Predictors	Model 1 Exp(B) (*SE*)	Model 2 Exp(B) (*SE*)	Model 3 Exp(B) (*SE*)	Model 4 Exp(B) (*SE*)
Violent offender group	1.54 (.16)**	1.42 (.16)*	1.43 (.16)*	1.34 (.16)
Sex offender group	1.05 (.38)	1.00 (.37)	1.03 (.38)	.91 (.38)
Race	.91 (.18)	.95 (.18)	.97 (.18)	.94 (.18)
Total SAVRY score	—	1.04 (.01)**	—	—
Individual SAVRY domain	—	—	1.09 (.02)**	—
Historical SAVRY domain	—	—	1.01 (.03)	—
Anger management	—	—	—	1.39 (.12)**
ADHD	—	—	—	1.16 (.10)
Low empathy/remorse	—	—	—	1.18 (.13)
	$\chi^2(3) = 7.93^*$	$\chi^2(4) = 30.16^{**}$	$\chi^2(5) = 36.84^{**}$	$\chi^2(6) = 36.89^{**}$

Note. Parameters reported were based on Cox regression analyses using days to any reoffense as the dependent variable; the nonviolent offender group was the comparison group; missing values ranged from zero to eight cases. SAVRY = Structured Assessment of Violence Risk for Youth; *SE* = standard error; ADHD = attention-deficit hyperactivity disorder.

$^* p < .05.$ $^{**} p < .01.$

Survival Graphs Illustrating the SAVRY's Predictive Association With Recidivism

Across the analyses summarized in Tables 4 and 5, SAVRY total risk and the anger management item were found to be statistically significant predictors of both types of recidivism and the Individual/Clinical domain was predictive of any recidivism. Survival graphs are provided to visually display the effects of these SAVRY measures on time to general and violent recidivism. Because SAVRY total risk and the Individual/Clinical domain are continuous measures (and used continuously for the Cox regression analyses), quartiles were created to represent different levels of total risk for these graphs only. For the anger management item, the three rating levels (i.e., low, moderate, high) were used for the plotting of the survival graph.

Figure 1 displays the survival graph for SAVRY total risk (Figure 1a), Individual/Clinical (Figure 1b), and anger management (Figure 1c) for predicting time to any reoffense. For the SAVRY total score, time to any reoffense was relatively similar across Quartiles 1 and 2 and Quartiles 3 and 4. However, the third

and fourth quartiles (i.e., higher total risk) showed substantially shorter times to reoffending compared with the first two quartiles (i.e., lower total risk scores). For the Individual/Clinical risk domain, Quartiles 1 and 2 again showed similar trends in reoffending and there were clear differences between these two quartiles and the third and fourth quartiles. However, Quartile 4, which represents offenders with the highest individual risk scores, showed a much quicker time to recidivism among this group of offenders. Finally, the survival functions for anger management indicated that youth rated high on anger management problems had a much shorter average time to reoffend compared with youth rated moderate and low for anger management problems.

Figure 2 displays the survival functions for the total SAVRY score (Figure 2a) and anger management (Figure 2b) for predicting time to violent reoffending. For the SAVRY total score, Quartiles 3 and 4 showed relatively similar survival functions, although Quartile 3 showed a slightly shorter average time to violent recidivism compared with Quartile 4. In addition, Quartile 2 of SAVRY total risk showed a shorter average time to violent reoffending

Table 5

Offender Type and SAVRY Risk Measures Predicting Time to Violent Reoffense

Predictors	Model 1 Exp(B) (*SE*)	Model 2 Exp(B) (*SE*)	Model 3 Exp(B) (*SE*)	Model 4 Exp(B) (*SE*)
Violent offender group	1.77 (.28)*	1.62 (.28)	1.60 (.28)	1.43 (.29)
Sex offender group	1.58 (.62)	1.51 (.62)	1.53 (.62)	1.46 (.63)
Race	1.46 (.36)	1.51 (.35)	1.63 (.36)	1.48 (.36)
Total SAVRY score	—	1.03 (.01)*	—	—
Historical SAVRY domain	—	—	1.06 (.05)	—
Individual SAVRY domain	—	—	1.06 (.04)	—
Anger management	—	—	—	1.61 (.21)*
ADHD	—	—	—	1.18 (.18)
Empathy/remorse	—	—	—	1.00 (.22)
	$\chi^2(3) = 6.15$	$\chi^2(4) = 12.56^*$	$\chi^2(5) = 15.53^{**}$	$\chi^2(7) = 16.76^*$

Note. Parameters reported were based on Cox regression analyses using days to any reoffense as the dependent variable; the nonviolent offender group was the comparison group; missing values ranged from zero to eight cases. SAVRY = Structured Assessment of Violence Risk for Youth; *SE* = standard error; ADHD = attention-deficit hyperactivity disorder.
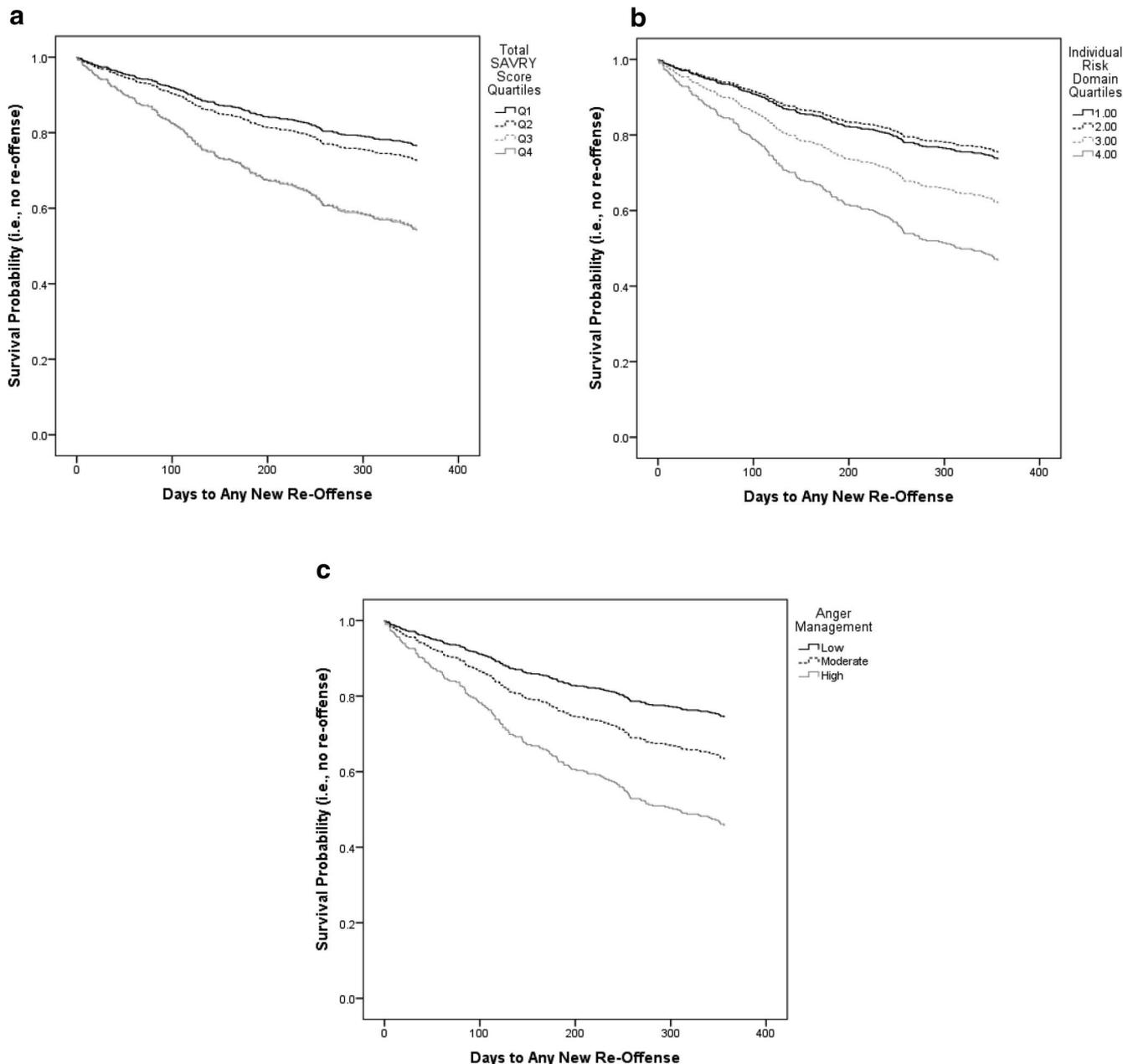
$^* p < .05.$ $^{**} p < .01.$

Figure 1. SAVRY scores predicting time to any new offense. (a) Total SAVRY score. (b) SAVRY Individual/Clinical risk domain. (c) SAVRY anger management risk item.

compared with Quartile 1. For anger management, youth rated high on anger management problems revealed a shorter time to violent reoffending compared with youth rated moderate, who had a shorter average time to reoffending compared with youth rated low.

Discussion

The current study addressed several issues that could enhance the use of SPJ in general, and the use of the SAVRY in particular, to assess risk for reoffending in adolescents in the juvenile justice system. First, we found that SAVRY ratings administered by trained

probation officers predicted both violent and any reoffending over a 12-month follow-up period. These findings are consistent with past research indicating that the SAVRY has strong predictive validity for general and violent recidivism (Olver et al., 2009; Singh et al., 2011) and that this is also true when it is conducted by juvenile justice staff in the field (Vincent et al., 2011).

Second, we found that certain SAVRY scores differed across types of young offenders. That is, although violent offenders showed overall higher levels of risk factors on the SAVRY, this was largely due to more historical and individual risk factors. We
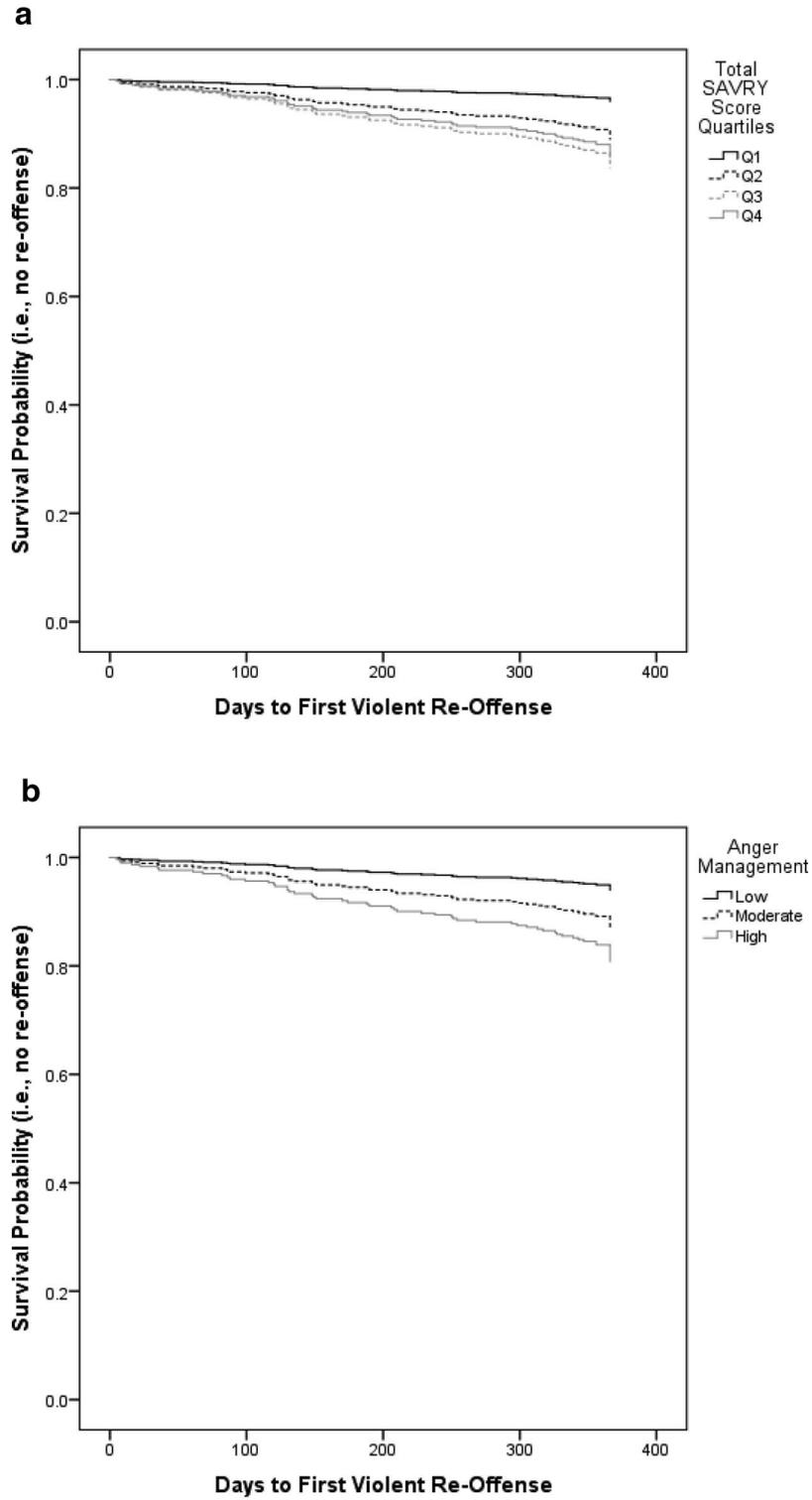
Figure 2. SAVRY scores predicting time to new violent offense. (a) SAVRY total score. (b) SAVRY anger management risk item.

also found that violent offenders (compared with nonviolent offenders) were rated significantly higher on two of the three individual risk items investigated: anger management and ADHD. These findings support previous work suggesting that adolescents who are aggressive and violent are more likely to follow a developmental trajectory characterized by an earlier onset to their antisocial behavior (which was included in the historical risk factors), and by the presence of a larger number of psychological or clinical risk factors that negatively influence their ability to regulate their emotions and behavior across developmental stages (Frick & Viding, 2009; Moffitt, 2006). Importantly, although these findings fit this literature on different subgroups of youth who show delinquent behavior, it is important to also note that individuals within nonviolent or violent offender groups can still vary with respect to these risk factors, and such variation should still be considered when planning case management.

Interestingly, violent sex offenders did not significantly differ from the other two groups on most of the risk indicators. The only specific risk factor on which the violent sex offender group differed from the other groups was low empathy/remorse, for which the violent sex offender group was rated as more deficient on these traits. This finding is consistent with the results reported by Caputo et al. (1999), who found that violent sex offenders self-reported more CU traits (characterized by a lack of guilt and empathy) than other violent and nonviolent juvenile offenders. Thus, it appears that a lack of empathy and guilt may be a particularly important risk factor and potential target for treatment for youth who commit violent sex offenses (Boxer & Frick, 2008; Frick, 2012).

Third, in addition to differences in SAVRY domain scores across offender groups, there were also differences in which SAVRY risk items were more associated with reoffending. Higher scores on total risk, the Historical domain, and the Individual/Clinical domain predicted shorter time to both general and violent reoffending. Further, the same three individual-level risk items that were found to be significantly different across offender types (i.e., higher among violent offenders) were also found to predict short time to both general and violent recidivism. Attentional problems and hyperactivity (as assessed by the ADHD risk item), poor anger control (as assessed by the anger management risk item), and low empathy/remorse also significantly predicted shorter time to both general reoffending and violent reoffending (ADHD and anger management only). The survival functions provided in Figure 2 illustrate the practical implications of these findings for using the SAVRY by juvenile justice personnel. That is, survival graphs showed that, on average, youth in the higher quartiles for composite risk indices or higher risk levels on the individual items were more likely to reoffend and to recidivate quicker.

Fourth, our findings suggest that anger control issues in particular may be a critical risk factor for future offending, and thus should be prioritized in treatments designed to reduce the risk for reoffending (Borum, 2000). There are a number of evidence-based intervention programs designed to teach adolescents anger-control strategies, social skills, and moral reasoning (e.g., aggression replacement training, promoting alternative thinking strategies, cognitive behavioral therapy). These types of programs have been shown to be effective among juvenile offenders (see Boxer & Frick, 2008) and could serve as a great resource for juvenile justice decision makers. In particular, jurisdictions that use the SAVRY as a guide during case management and intervention planning may

consider the potential role that anger management issues play in future offending and use the SAVRY to determine which youth might be most likely to benefit from these interventions.

Finally, our findings emphasize one of the key benefits of the SPJ framework of the SAVRY, which is the ability of raters to assign relevance to specific risk items and their potential importance for determining risk for reoffending. That is, the SPJ framework allows administrators to consider the severity of particular risk factors when determining an overall level of risk. These results are fairly consistent with findings from actuarial risk assessments, namely, the Youth Level of Service/Case Management Inventory (YLS/CMI), indicating that items from the Personality/Behavior domain are some of strongest predictors of reoffending (Peterson-Badali, Skilling, & Haqanee, 2015). The anger control and ADHD items of the SAVRY mirror some of the characteristics within the Personality/Behavior domain of the YLS/CMI. This lends further support for the need to prioritize these characteristics in case planning.

Our results should be interpreted in light of a number of limitations. First, although the sample was relatively large, it was mostly male. Although this is representative of the gender makeup of adolescents in the juvenile justice system, it limits the generalizability of our results to justice-involved girls. Second, our measure of reoffending was limited to official records, and, as a result, it may not have captured offenses that did not come to the attention of the juvenile justice system. Third, our sample included a relatively small number of violent sex offenders ($n = 25$), and, as a result, our comparisons involving this group were underpowered for finding significant results. Fourth, the SAVRY risk rating for a childhood history of maltreatment includes only physical abuse and neglect. Thus, a child who was sexually abused in the absence of physical abuse or neglect would not be coded as experiencing abuse on the SAVRY. The rating criteria for this item, in addition to the lack of variability within this sample (i.e., 80% were rated low risk on this item), may explain why this variable did not show the predicted associations with violent sex offending. Finally, in our analyses using individual risk items, we chose specific items based on past research identifying important characteristics that differentiate distinct developmental pathways to delinquent behavior (Frick & Viding, 2009; Moffitt, 2006). Because not all items were tested, it is possible that other individual risk factors that were not examined in this study may also have accounted for the difference in recidivism.

Within the context of these limitations, our findings suggest that probation officers can be trained to rate the SAVRY to assess risk for reoffending over a 12-month period with young offenders. Further, their ratings on certain individual risk factors can be important for guiding the identification of critical risk items to consider when making their overall SPJ ratings of one's risk level. Moreover, this study provides some guidance for the prioritization of "needs" to target in a treatment plan that may maximize the likelihood of reducing risk. According to the RNR philosophy, the most effective strategy for reducing the likelihood of reoffending is to tailor services to the individual's risk and needs (Andrews et al., 1990). Thus, our findings suggest that such tailored treatment programs should be designed with a particular emphasis on targeting individual-level risk factors, particularly anger control problems and ADHD for violent offenders, and low empathy and guilt for violent sex offenders. Future research should seek to expand

upon these findings by directly testing whether or not use of risk assessments, such as the SAVRY, results in assigning intervention programs that are more effective in reducing reoffending.

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