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From Risk Assessment to Risk Management: Matching Interventions to Adolescent Offenders' Strengths and Vulnerabilities

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Abstract

Though considerable research has examined the validity of risk assessment tools in predicting adverse outcomes in justice-involved adolescents, the extent to which risk assessments are translated into risk management strategies and, importantly, the association between this link and adverse outcomes has gone largely unexamined. To address these shortcomings, the Risk-Need-Responsivity (RNR) model was used to examine associations between identified strengths and vulnerabilities, interventions, and institutional outcomes for justice-involved youth. Data were collected from risk assessments completed using the Short-Term Assessment of Risk and Treatability: Adolescent Version (START:AV) for 120 adolescent offenders (96 boys and 24 girls). Interventions and outcomes were extracted from institutional records. Mixed evidence of adherence to RNR principles was found. Accordant to the risk principle, adolescent offenders judged to have more strengths had more strength-based interventions in their service plans, though adolescent offenders with more vulnerabilities did not have more interventions targeting their vulnerabilities. With respect to the need and responsivity principles, vulnerabilities and strengths identified as particularly relevant to the individual youth's risk of adverse outcomes were addressed in the service plans about half and a quarter of the time, respectively. Greater adherence to the risk and need principles was found to predict significantly the likelihood of externalizing

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Conflict of Interest

The second author is a co-author of the START:AV.

outcomes. Findings suggest some gaps between risk assessment and risk management and highlight the potential usefulness of strength-based approaches to intervention.

Keywords

risk assessment; risk management; adolescent offenders; protective factors; START:AV

1. Introduction

Though the overall prevalence of youth crime in the United States has decreased somewhat in recent years, it nonetheless remains a serious social problem (Slowikowski, 2009; CDC, 2008; Satcher, 2001). In 2008, for example, there were 2.11 million arrests of youth aged 18 years and younger, representing 16% of all violent crime arrests in the United States (Puzzanchera, 2009). Moreover, recent estimates show that more than 81,000 young offenders reside in more than 2,400 juvenile justice facilities in the United States (Hockenberry, Sickmund, & Sladky, 2011). Consistent with trends seen in adult corrections, many courts in the United States now require the use of risk assessment tools in secure facilities serving justice-involved youth (e.g., Annie E. Casey Foundation, 2000; Austin, Johnson, & Weitzer, 2005; Juvenile Justice and Delinquency Prevention Act, 2002; Memorandum of Agreement, 2008; *U.S. v. Georgia*, 1998), and the use of risk assessment instruments in state juvenile correctional facilities has increased dramatically in recent years (Griffin & Bozynski, 2003). Consequently, the assessment of risk for adverse outcomes (e.g., recidivism, violence) in adolescent offenders has become a part of routine practice, and many instruments are available for this purpose.

1.1 Adolescent Risk Assessment Instruments

Risk assessment instruments developed for assessing adolescent offenders can be classified as representing one of two general approaches: actuarial assessment or structured professional judgment (SPJ). Actuarial tools produce probabilistic estimates of the risk of future adverse outcomes based on a statistical algorithm. SPJ tools, in contrast, guide assessors in developing risk formulations (including categorical judgments of risk) based on professional experience and intuition. Though there has been much debate in the violence risk assessment field regarding the superiority of one approach over the other, recent meta-analyses (Singh, Grann, & Fazel, 2011; Guy, 2008) have clearly established the predictive validity of both approaches, as well as the superiority of structured approaches to risk assessment over unstructured ones (Grove, Zald, Lebow, Snitz, & Nelson, 2000).

The Short-Term Assessment of Risk and Treatability: Adolescent Version (START:AV; Nicholls, Viljoen, Cruise, & Desmarais, 2010) is a new SPJ instrument that guides the assessment of risk of violence to others, self-harm, suicide, unauthorized leave, substance abuse, self-neglect, being victimized, and general offending in adolescents between 12 and 18 years of age. It may be distinguished from other risk assessment tools designed for such populations in several ways (Viljoen, Cruise, Nicholls, Desmarais, & Webster, 2012). First, the START:AV guides the assessment of vulnerabilities (i.e., characteristics of the youth and their environment that may increase risk, either directly or indirectly) *and* strengths (i.e.,

characteristics of the youth and their environment that may reduce risk, either directly or indirectly) for *every* item. Second, the START:AV allows assessors to identify critical vulnerabilities (i.e., factors that may be particularly relevant to the individual youth's increased risk of adverse outcomes) as well as key strengths (i.e., factors that may be particularly relevant to the individual youth's decreased risk of adverse outcomes) to assist in the development of risk management plans. Third, *all* START:AV items are potentially dynamic in nature and thus, of increased relevance to treatment and intervention compared to static factors, although historical information is used as the foundation of every START:AV assessment. Fourth, although most instruments focus on identifying factors associated with risk for violence or recidivism, the START:AV guides a comprehensive assessment of risk for multiple adverse outcomes of concern among adolescent offenders, including violence, suicide, self-harm, victimization, substance use, unauthorized leave, self-neglect, and general offending. Fifth and finally, the START:AV focuses on risk for adverse outcomes over shorter periods of time (i.e., weeks to months) compared to other youth risk assessment tools.

Results of studies examining the psychometric properties of START:AV assessments provide support for the approach (Desmarais et al., 2012; Viljoen, Beneteau, et al., 2012). For example, Desmarais and colleagues (2012) examined the descriptive characteristics and psychometric properties of START:AV assessments completed by case managers on 291 adolescent offenders (250 boys and 41 girls) at the time of admission to secure juvenile correctional facilities. Results provided evidence of the structural reliability of START:AV assessments, including good internal consistency, item homogeneity, and associations between item scores and specific risk estimates. Viljoen and colleagues (2012) examined the inter-rater reliability and predictive validity of START:AV assessments completed on 90 adolescent offenders (62 boys and 28 girls). START:AV assessments demonstrated good to excellent inter-rater reliability and internal consistency, as well as strong concurrent validity with assessments completed using the Structured Assessment of Violence Risk in Youth (Borum, Bartel, & Forth, 2006). START:AV total scores and specific risk estimates predicted violence towards others, offending, victimization, suicide ideation, and substance abuse in the 3-month, prospective follow-up period.

Despite these promising findings, no studies have examined whether risk assessments completed using the START:AV inform risk management strategies. Moreover, there has been limited research on whether use of structured risk assessment tools – START:AV or otherwise – reduces the prevalence of adverse outcomes among justice-involved adolescents. This remains a critical knowledge gap in the youth risk assessment literature. The Risk-Need-Responsivity model (Bonta & Andrews, 2006) of offender rehabilitation provides a useful framework for operationalizing and understanding the importance of this link between risk assessment and risk management.

1.2 The Risk-Need-Responsivity Model

The Risk-Need-Responsivity (RNR) model is a best practice approach for assessing and treating both adolescent and adult offenders (Crime and Justice Institute at Community Resources for Justice, 2009). The model is based on three core principles: risk, need, and

responsivity. The *risk principle* states that individuals at highest risk of future adverse outcomes should be identified and resources allocated accordingly. Specifically, those at higher risk should receive more resources and those at lower risk should receive fewer. Research suggests that over-intervening can increase the likelihood of adverse outcomes by inadvertently increasing risk factors and reducing protective factors (Lowenkamp, Latessa, & Holsinger, 2006). The *need principle* asserts that interventions should target each youth's criminogenic needs; that is, factors related directly to the risk of adverse outcomes for the individual offender. For example, even though substance use is a well-documented predictor of criminal behavior and violence, this may not increase risk for criminal behavior and violence in *this* particular youth. Thus, substance use treatment may not reduce his/her risk for future offending. Matching interventions with those strengths and vulnerabilities identified through the risk assessment process will be referred to in this paper as *treatment match*. Finally, the *responsivity principle* affirms that intervention strategies should be sensitive to identified risk levels and needs, while also being delivered in such a way that takes into account individual factors that can affect treatment outcomes, such as intellectual functioning, maturity, mental health problems, and learning style. Of particular relevance to the current investigation, the responsivity principle emphasizes not only consideration of adolescents' limitations, but also their individual strengths that may be built upon in treatment and intervention. We return to this issue of strengths later.

Taken together, the RNR model recognizes that sanctions alone are inadequate when it comes to accomplishing the goal of reducing recidivism (Andrews, & Bonta, 2010). The model reinforces the perspective that risk assessment is an ongoing dynamic process that informs appropriate rehabilitative interventions, which are essential to addressing the target needs of those exhibiting the highest risks for reoffending (Andrews & Bonta, 2007; Ogloff & Davis, 2004). Thus, the model serves as a useful framework for identifying and managing risk, while utilizing evidence-based best practices.

1.3 Link between Risk Assessment and Risk Management in Adolescent Offenders

There are now several meta-analyses demonstrating the effectiveness of the RNR model in reducing general and violent recidivism (e.g., Andrews, Bonta, & Wormith, 2006) and its specific applicability to adolescent offenders (Dowden & Andrews, 1999; Koehler, Lösel, Akoensi, & Humphreys, 2012). Despite this empirical support and the widespread acceptance of the model, only a small number of studies have investigated the link between risk assessment and risk management, and to our knowledge, none have considered the role of strengths. In the following section, we briefly review findings of three studies that have examined the link between risk assessment and risk management plans in adolescent offenders.

One study by Haqanee, Peterson-Badali, and Skilling (2012) investigated the frequency of matching adolescents on probation with appropriate interventions using the Youth Level of Service/Case Management Inventory (YLS/CMI; Hoge, Andrews, & Leschied, 2012). Their sample consisted of 291 adolescent probationers whose risk was assessed by probation officers. Semi-structured interviews revealed that probation officers did not focus on the criminogenic needs of the adolescents, especially in regard to family involvement, negative

peer associations, and antisocial attitudes, and the majority of needs were not being matched to treatment.

Following the RNR model, successfully matching appropriate interventions to identified vulnerabilities may lead to decreases in recidivism in adolescents assessed using risk assessment tools. To that end, Vieira, Skilling, and Peterson-Badali (2009) explored the relationship between treatment match and community recidivism in a sample of 122 adolescent offenders referred to a court-ordered assessment at a mental health agency in Ontario, Canada. Clinicians used the YLS/CMI and found that when more criminogenic needs were matched with appropriate therapeutic services, the adolescents were less likely to recidivate. Similar to previous findings, family problems, peer relationships, and antisocial attitudes were least likely to be matched with interventions. A third study by Luong and Wormith (2011) also explored the influence of treatment match using a sample of 192 adolescent offenders on probation from two cities in Saskatchewan, Canada. They found that the more criminogenic needs went untreated, the higher the likelihood of recidivism.

1.4 The Present Study

The few studies that have investigated the prevalence of matching risk assessments with interventions support the risk and need principles. However, none have tested whether adolescents judged to be at higher risk by adolescent risk assessment instruments have more interventions in their service plans, an underpinning of the risk principle of the RNR model. In addition, it has not been explored whether individual offender's key strengths are taken into consideration in treatment and intervention, an important index of responsivity (Taxman, Cropsey, Young, & Wexler, 2007). Finally, despite the high rate of adolescent incarceration in the United States and the wide range of institutional outcomes of concern in juvenile justice facilities (e.g., self-harm, unauthorized leave, substance use), evaluations of the impact of adherence to RNR principles have focused on community outcomes.

To begin to address these limitations, the present study examined correlational links between risk assessments completed using the START:AV and individualized service plans for 120 youth in secure correction facilities. First, we examined on a group-level the association between the number of interventions and both START:AV total scores and risk estimates to evaluate adherence to the risk principle. We also examined on the individual level the ratio of the number of interventions to the number of strengths and vulnerabilities identified as being present. Second, to examine adherence to the need principle, we explored whether identified critical vulnerabilities were matched with interventions. Third, we explored whether key strengths were taken into consideration in risk management plans to investigate adherence to the responsivity principle. Fourth and finally, we investigated the extent to which the likelihood of institutional adverse outcomes is moderated by adherence to these principles.

2. Methods

2.1 Participants

The extent to which START:AV assessments influenced the development of treatment plans was investigated using a sample of 120 adolescent offenders ranging in age from 13 to 20 years ($M = 16.24$, $SD = 1.42$). These 96 (80.0%) boys and 24 (20.0%) girls were admitted to one of three residential correctional facilities located in a southern state during the period of November 2008 through September 2011. The adolescents were incarcerated for predominantly violent offenses ($n = 82$, 68.3%) followed by non-violent offenses ($n = 30$, 25.0%), and finally, drug-related offenses ($n = 8$, 6.7%). In the sample, 77 (64.2%) committed felony index offenses, 23 (19.2%) had committed misdemeanors, and 20 (16.7%) had violated their parole.

Institutional outcome information was coded for a random sample of approximately 50% of youth ($n = 56$) and used to conduct a follow-up analysis investigating the extent to which the association between START:AV assessments and adverse outcomes was moderated by adherence to the risk, need, and responsivity principles. The subsample consisted of 45 (80.4%) boys and 11 (19.6%) girls with a mean age of 16.40 years ($SD = 1.49$). Aside from there being fewer violent offenders in the total sample ($\chi^2[1, N = 120] = 31.89, p < .01$), the criminal history composition of the follow-up subsample did not differ significantly from the full sample ($\chi^2[1, N = 120] < 2.50, p > .10$).

2.2 Materials and Procedures

Risk assessments—The START:AV was used to assess adolescents' strengths, vulnerabilities and overall risk of adverse outcomes. As described earlier, the START:AV is a SPJ guide for the assessment of risk of violence to others, self-harm, suicide, unauthorized leave, substance abuse, self-neglect, being victimized, and general offending in adolescents between 13 and 18 years of age. Its dynamic factors are coded for both strengths and vulnerabilities evidenced in the past two to three months on a 3-point ordinal scale from 0 (*minimally present*) to 2 (*maximally present*). For each item, strength and vulnerability is rated independently of one another; that is, an adolescent may be scored high (or low) on strength and vulnerability for any particular item. Assessors estimate risk over the next three months as low, moderate, or high for each of the eight START:AV domains. These specific risk estimates reflect structured professional judgments based on the strength and vulnerability ratings for each item, as well as the presence of key items and critical items, physical health problems, and other historical factors (e.g., history of perpetrating violence or of being victimized by others). For analyses, we calculated strength and vulnerability total scores by summing the item ratings.

In the present study, START:AV assessments were completed by case managers based upon all available information, including interviews with the adolescents and collaterals and clinical-legal records. All assessors completed a one-day training workshop presented by one of the START:AV authors (SLD) and participated in half-day booster training workshops delivered by the same trainer every three to six months. Details of the study sites, implementation and training are provided in Desmarais et al. (2012).

Assessments may have occurred at one of four different times: 1) within 21 days of admission (with the exception of new admissions to an intensive treatment unit) to inform the development of the service plan; 2) every three months during each adolescent's quarterly case management review to monitor their progress and to inform amendments to the service plan, if necessary; 3) when there was a request for or anticipated change in restriction level (e.g., in preparation for release or transfer to a different unit); and 4) if there was an important change in an adolescent's well-being or circumstances (e.g., death in the family). The average time from facility entry to assessment was 3.64 weeks ($SD = 15.44$; Range = 1.57-108.29).

Interventions—Service plans were collected for each adolescent for the period after the START:AV assessment. Service plans were completed by case managers and detail the risk management and treatment plan to be implemented towards both short- and long-term treatment goals. These plans specified both strength-based (e.g., educational planning) and problem-based interventions (e.g., substance abuse treatment), allowing for an investigation of the degree to which identified vulnerabilities were being addressed in interventions (*need principle*) as well as the degree treatment plans were being tailored to adolescents' individual strengths (*responsivity principle*). A test of inter-rater reliability was conducted by two authors (BS and MT) as a measure of quality control for the extraction of information from START:AV coding sheets and service plans. Substantial levels of inter-rater agreement were found across each of the items using 12 (10.0%) randomly selected cases ($\kappa > .67$; Landis & Koch, 1977).

Institutional adverse outcomes—Finally, progress reports were collected for a subsample of 56 adolescents. These progress reports were used to extract information regarding the occurrence of institutional adverse outcomes using an adapted version of the START Outcomes Scale (SOS; Nicholls et al., 2007). The SOS is itself a modified version of the Overt Aggression Scale (OAS; Yudofsky, Silver, Jackson, Endicott, & Williams, 1986), which measures verbal aggression, physical aggression against objects, physical aggression against self, and physical aggression against others in institutional settings (Silver & Yudofsky, 1991; Yudofsky et al., 1986). Behaviors in each category are rated according to severity on a 4-point scale (1 = *least severe*, 4 = *most severe*). Nicholls et al. (2007) created the SOS by supplementing the OAS with the remaining START risk domains as well as including an assessment of inappropriate sexual behaviors. In consultation with colleagues and based on a review of the literature and institutional policies, we added the outcome category of general institutional infractions (e.g., horseplay or smoking in room) for the current study. Data reported herein reflect dichotomous coding of whether the outcome occurred during follow-up.

Because of low base rates, the categories of verbal aggression, property aggression, physical nonsexual aggression, physical sexual aggression, unauthorized leave, and institutional incidents were combined into an “externalizing” category.¹ Suicide ideation and planning, suicidal behaviors, and self-harm were combined into an “internalizing” category. Finally,

¹All adolescent offenders who engaged in an adverse outcome committed at least one act of externalizing behavior.

being victimized and substance abuse were combined into an “other” category. The adapted SOS was coded for each offender by two authors (JPS and TH). An inter-rater reliability check using six (10.7%) randomly selected cases from the follow-up sample indicated almost perfect agreement ($\kappa = .97$).

2.3 Data Analysis

To examine adherence to the risk principle we conducted both group-based and case-based analyses. To conduct group-based analyses, product-moment correlation coefficients were used to examine the association between START:AV strength and vulnerability total scores and the number of interventions indicated in the service plans. Tau-b correlation coefficients were used to examine the association between START:AV risk estimates and number of interventions. To conduct the case-based analyses, we calculated the ratio of START:AV identified vulnerabilities and strengths to the number of problem-based and strength-based interventions (respectively) in each youth's service plan. In this context, a ratio of 1.00 would represent perfect adherence to the risk principle with each assessed vulnerability or strength being complemented by a planned problem- or strength-based intervention. To measure the magnitude of deviation from this perfect adherence, ratios above 1.00 were transformed using the following equation: $(Ratio \times -1) + 2$. These transformed values were then standardized into z-scores. Adherence to the need principle was examined by calculating the proportion of adolescents judged to have each START:AV critical vulnerability attended to by an intervention. Adherence to the responsiveness principle was examined by calculating the proportion of adolescents judged to have each START:AV key strength attended to by an intervention. For each RNR principle, a subgroup analysis was conducted by sex to test for differences in adherence for boys and girls.

Finally, Cox regression analyses were conducted to assess the impact of adherence to the RNR principles on the likelihood of institutional adverse outcomes. To evaluate the effect of adherence to the risk principle on the likelihood of the three categories of adverse outcome (externalizing, internalizing, and other), we used the z-scores described above as the independent variables. To evaluate the effect of adherence to the need and responsiveness principles, we used the percentage of critical vulnerabilities and key strengths matched to interventions, respectively. The risk, need, and responsiveness variables was modeled with each institutional outcome of interest (externalizing, internalizing, other) using univariate Cox analyses for the follow-up sample overall and for boys and girls, separately.

A priori one-way analysis of variance tests confirmed no differences by site in the number of vulnerabilities, critical vulnerabilities, strengths, and key strengths endorsed ($F[2,53] = 1.69$, $p = .20$), the proportion of critical vulnerabilities matched ($F[2,36] = .88$, $p = .43$), or the proportion of key strengths matched ($F[2,20] = .83$, $p = .45$). All analyses were conducted using SPSS 17.0.1 for Windows (SPSS Inc, 2009) and a standard significance level of $\alpha = .05$.

3. Results

3.1 Adherence to the Risk Principle

We examined associations between strength and vulnerability total scores and risk estimates with the number interventions specified in the service plans. Significant associations demonstrated adherence to the risk principle. Adolescents with higher strength total scores had significantly more strength-based interventions in their service plans ($r[118] = .25, p < .01$) (Table 1). This said, adolescents with higher vulnerability total scores did not have more problem-based interventions in their service plans ($r[118] = -.10, p > .05$). Boys with higher strength total scores also had significantly more strength-based interventions documented in their service plans ($r[93] = .28, p < .01$). Girls with higher vulnerability scores, on the other hand, had more problem-based interventions ($r[22] = .44, p < .01$), as well as more interventions planned overall (i.e., both strength-based and problem-based interventions) ($r[22] = .61, p < .05$).

In terms of the specific risk estimates, more problem-based interventions were planned for adolescents judged to be at higher risk of unauthorized leave ($r[118] = .19, p < .05$) and general offending ($r[118] = .21, p < .05$), whereas fewer strength-based interventions were planned for those at higher risk of being victimized ($r[118] = -.21, p < .05$) (Table 2). More strength-based interventions were planned for girls judged to be at higher risk of self-neglect ($r[8] = .73, p < .05$), and girls estimated to be at higher risk of general offending had more problem-based interventions in their service plans ($r[14] = .58, p < .05$). In contrast, there was limited evidence of adherence to the risk principle based on the specific risk estimates for boys (see Table 2).

Table 3 displays descriptive statistics for the ratio of identified vulnerabilities and strengths and problem- and strength-based interventions, respectively. The general trend in z -scores deviating from the mean of the z distribution (i.e., 0.00) suggests a pattern of non-adherence to the risk principle both in the overall sample as well as the follow-up sample, implying potential over- or under-intervention.

3.2 Adherence to the Need Principle

Adherence to the need principle was measured by examining how frequently START:AV critical vulnerabilities (i.e., factors that are particularly relevant to the individual youth's increased risk of adverse outcomes) were matched to appropriate interventions in service plans. Critical vulnerabilities in the areas of substance use (94.6%), mental state (92.9% match), relationships (80.0% match), impulse control (62.9% match), school/work (60.0% match), and social support (50.0% match) had the highest proportion of matched interventions (Table 4). The proportion of treatment match fell below 50% for the remaining vulnerabilities. Overall, the average proportion treatment match across critical vulnerabilities for each youth was 52.4% ($SD = 33.6\%$; range = 0-100%); for boys, the average was 50.7% ($SD = 33.3\%$; range = 0-100%), and for girls, the average was 59.8% ($SD = 34.9\%$; range = 0-100%). The proportion of critical vulnerabilities matched did not differ significantly for boys and girls ($t_{\text{independent}}[90] = 1.01, p = .32$).

3.3 Adherence to the Responsivity Principle

We evaluated adherence to the responsivity principle using the proportion of key strengths (i.e., factors that are particularly relevant to the individual youth's decreased risk of adverse outcomes) matched to prescribed interventions. Adolescents judged to have the key strength of engagement in recreational activities were most commonly matched with an appropriate strength-based intervention (66.7% match), followed by school/work (50.0% match) and plans (50.0% match). The proportion of treatment match fell below 50% for the remaining strengths. Overall, the average proportion treatment match across key strengths for each youth was 27.7% ($SD = 41.1\%$; range = 0-100%); for boys, the average was 30.8% ($SD = 42.8\%$; range = 0-100%), and for girls, the average was 4.5% ($SD = 6.9\%$; range = 0-14.3%). No differences were found in the proportion of key strengths matched for boys and girls, ($t_{\text{independent}}[48] = 1.49, p = .14$).

3.4 Outcome Prevalence

The prevalence of institutional outcomes was investigated in a subsample of 56 adolescents for whom outcome data were available. As shown in Table 5, the majority of youth committed at least one institutional infraction ($n = 44, 78.6\%$) and engaged in at least one incident of non-sexual aggression ($n = 31, 55.4\%$) over the average institutional follow-up of 33.87 weeks ($SD = 29.48$, range = 4.14-129.29). Physical sexual aggression ($n = 5, 8.9\%$), self-harm ($n = 3, 5.4\%$), being victimized ($n = 2, 3.6\%$), suicidal behaviors ($n = 1, 1.8\%$), substance abuse ($n = 1, 1.8\%$), and self-neglect ($n = 0, 0\%$) were more rare. As no incidents of self-neglect were noted in the institutional records, this outcome was excluded from further analysis.

3.5 Survival Analysis

The extent to which the hazard of adverse institutional outcomes in the follow-up sample was moderated by adherence to RNR principles was explored using Cox regression analyses (Table 6). Regarding the impact of adherence to the risk principle on the likelihood of adverse outcomes, results showed that the likelihood of externalizing behavior in the overall sample decreased significantly as the match between the number of identified strengths and the number of strength-based interventions increased (Hazard ratio [HR] = 0.58, 95% CI = 0.38-0.89, $p < .05$). The same pattern of results were found in boys, specifically (HR = 0.69, 95% CI = 0.49-0.98, $p < .05$), but was not quite significant for girls (HR = 0.40, 95% CI = 0.15-1.03, $p = .06$). In contrast, the match between number of identified vulnerabilities and the number of problem-based interventions was not found to significantly impact the likelihood of any category of adverse outcomes overall, or for boys and girls, separately (see Table 6).

Concerning adherence to need principle, overall results showed that the higher the percentage of critical vulnerabilities matched to interventions, the lower the likelihood of externalizing behaviors (HR = 0.36, 95% CI = 0.13-0.99, $p < .05$). Greater adherence to the principle in boys, specifically, was associated with a reduced likelihood of externalizing behavior (HR = 0.29, 95% CI = 0.09-0.89, $p < .05$). This externalizing model was not significant for girls, however (HR = 0.67, 95% CI = 0.01-38.11, $p = .84$).

Finally, greater adherence to the responsivity principle in boys, as indicated by an increased match between key items and interventions was found to significantly increase the likelihood of externalizing behaviors ($HR = 8.02$, $95\% CI = 1.12-57.28$, $p < .05$). This significant finding did not extend to the overall sample ($HR = 4.40$, $95\% CI = 0.73-26.44$, $p = .11$). There were insufficient cases of matched key strengths to test this in girls (see Table 6).

4. Discussion

The present study investigated the extent to which risk assessments are translated into risk management strategies and associations with adverse outcomes. Specifically, we used the RNR model of offender rehabilitation to examine associations between strengths and vulnerabilities identified using a new youth risk assessment tool, the START:AV, interventions and institutional outcomes for 120 adolescent offenders (96 boys and 24 girls) in three secure juvenile correctional facilities.

4.1 Summary of Findings

The results of our investigation revealed mixed evidence of adherence to the RNR principles. To explore adherence to the risk principle, we first examined group-level associations between strength and vulnerability total scores and risk estimates with the number interventions specified in service plans. Results showed inconsistent adherence to the risk principle. For example, adolescents with higher strength total scores had significantly more strength-based interventions in their service plans, though adolescents with higher vulnerability total scores did not have more problem-based interventions in their service plans. Findings also suggested case managers' prioritization of some adverse outcomes over others. For instance, more problem-based interventions were planned for adolescents judged to be at higher risk of unauthorized leave and general offending, but not those at elevated risk for the other adverse outcomes. Some outcomes also appeared to be more salient for girls compared to boys. In particular, more strength-based interventions were planned for girls (but not boys) judged to be higher risk of self-neglect. This finding may reflect case managers' awareness of base rates; specifically, studies show higher risk ratings for self-injurious behavior among female compared to male justice-involved youths (e.g., Gammelgård et al., 2012). Second, we examined the ratio of identified vulnerabilities and strengths to the number of problem-based and strength-based interventions, respectively, in each youth's service plan. Results showed limited adherence to the risk principle on a case-by-case basis and provided evidence of both over- and under-intervention. Thus, even though case managers allocated more resources to higher risk adolescents and fewer resources to lower risk adolescents in aggregate, the number of interventions prescribed for any individual youth was not commensurate to the number of strengths and vulnerabilities s/he presented with at the time of the START:AV assessment.

Given the above, it is not surprising that treatment match was relatively modest overall and varied considerably. Indeed, our analysis of adherence to the need principle showed that vulnerabilities identified as being particularly relevant to a youth's risk for adverse outcomes (i.e., critical vulnerabilities) were addressed in the service plans about half of the time. Our

analysis of adherence to the responsivity principle showed that strengths identified as being particularly relevant to a youth's risk for adverse outcomes (i.e., key strengths) were addressed in service plans less frequently: only about a quarter of the time. The increased adherence to the need compared to responsivity principle is likely reflective of the study context; that is, the increased focus on vulnerabilities and risks is consistent with the ethos of correctional settings. Further examination of the treatment match data reveals variation across youth. To demonstrate, treatment match for both critical vulnerabilities and key strengths ranged from 0% to 100%, indicating a complete lack of treatment match in some cases and perfect treatment match in others. Also, mean treatment match proportions were similar for boys and girls in terms of critical vulnerabilities (52.4% vs. 50.7%), but differed considerably in terms of key strengths (30.8% vs. 4.5%). Treatment match differed across individual items as well.

Overall, our outcome analyses supported that adherence to the RNR model is associated with reductions in adverse outcomes among justice-involved youth, though findings regarding adherence to each individual principle were mixed. Specifically, match between the number of identified vulnerabilities and the number of problem-based interventions was not associated with likelihood of adverse outcomes. This runs contrary to the risk principle and is inconsistent with previous research on community recidivism (Luong & Wormith 2011; Vieira et al., 2009). Thus, it may be that treatment match moderates the likelihood of community but not institutional outcomes. In contrast, the likelihood of externalizing behavior *did* decrease significantly as the match between the number of identified strengths and the number of strength-based intervention increased. To our knowledge, this is the first study to demonstrate the positive impact on outcomes associated with treatments that target justice-involved adolescents' strengths (as opposed to risks or needs). Finally, consistent with prior research (e.g., Luong & Wormith, 2011; Vieira et al., 2009), likelihood of externalizing behavior in boys decreased as adherence to the need and responsivity principles increased. The lack of significant findings regarding the impact of adherence to these two principles for girls may be attributed to the low rate of matched cases and outcome behaviors.

4.2 Implications

These findings have important implications for research, policy and practice regarding the assessment and management of justice-involved adolescents. First, there has been considerable debate in the field regarding the degree to which protective factors are separate and distinct from risk factors (Stouthamer, Wei, Farrington, & Wikström, 2002) and their role in violence risk assessment. Our findings, like those of studies examining assessments completed using the original, adult version of START (e.g., Desmarais, Nicholls, Wilson, & Brink, 2012) support the unique contribution of strengths to the risk assessment process. They also provide direct evidence of the benefit of considering strengths in the development of treatment and risk management plans. Second, the mixed adherence to the risk principle suggests the need for policies and practices that support the development and implementation of case management plans on a case-by-case basis (Andrews & Bonta, 2010). Doing so would help avoid a "one-size-fits-all" case management approach and, consequently, the pitfalls of over- and under-intervention, including increased likelihood of

adverse outcomes, as demonstrated herein, as well as time and resources. Third, some of the least frequently matched items, emotional state and attitudes in particular, we know to be robust predictors of adverse outcomes in justice-involved youth (e.g., Herrenkohl et al., 2000; Ritakallio et al., 2008; van der Put et al., 2012). Matching of these particular critical vulnerabilities more frequently with interventions likely would have increased the impact of adherence to the need principle even further (*cf.* Vieira et al., 2009). It is imperative that juvenile correction facilities increase treatment options available to address these issues. Fourth, findings also show that the SPJ approach is compatible with the RNR model, and that SPJ tools generally, and the START:AV specifically, can be used to inform the development of case management plans that adhere to the RNR principles. That said, evidence supporting the impact of adherence to the risk principle in terms of the categorical risk estimates was limited and further research is needed to explore whether the total scores or risk estimates are more useful – and valid – indicators of the degree of intervention required.

4.3 Limitations and Future Directions

Conclusions based on the results of the current study should be drawn with several design issues in mind. In particular, the study was conducted within the context of a real world implementation. Though this represents a strength of the study in terms of generalizability of findings from research to practice, it also limits our ability to implement some features of an ideal research design. For example, it was not possible to complete an analysis of inter-rater reliability because we did not have the time or resources to have multiple case managers conduct START:AV assessments and service plans for the same youth at the same time. We also are limited to assessments and service plans completed in three facilities within one state and under one oversight agency; generalizability of our findings to other jurisdictions and populations will need to be tested. That said, the multi-site nature of the study does represent an improvement over prior studies of treatment match that have been conducted in one facility (e.g., Vieira et al., 2009).

Adolescents were not randomly assigned to case managers. Given our interest in exploring how case managers used the information derived during the risk assessment process to inform risk, management strategies, this is an important limitation. Future research should examine how assessor characteristics (e.g., demographics, training, professional background, level of experience, etc.) affect the relationship between risk assessment and risk management, analyses which were not possible in the present study due to the relatively small sample size.

As noted above, our sample was relatively small. Consequently, we could not test some potentially important factors as predictors of adherence to the RNR principles nor as moderators of the impact of adherence on outcomes, such as assessor and youth characteristics. In terms of the latter, we did conduct some subgroup analyses as a function of offender sex; however, our sample of girls was very small. Though representative of the population, power to detect differences in adherence to the RNR principles between boys and girls was limited, as was power to compare impact of adherence to the RNR principles on institutional outcomes across these groups. Moreover, outcome data was available for

only a subsample of participants and data were limited to incidents that were documented in progress reports.

In addition to addressing these design limitations, there are several important avenues to be pursued in future research. For instance, herein we report findings vis-à-vis treatment match, but did not have information on type, timing, intensity or fidelity of treatment, length of time in treatment, or treatment completion in matched and unmatched treatment cases. Future research should investigate whether these treatment characteristics mediate or moderate the links between assessment, treatment and rates of adverse outcomes. Finally, we examined the impact of adherence RNR principles in separate, univariate models, but future research should test whether there are additive or interactive effects of adherence to the RNR principles. For example, does adherence to the responsivity principle moderate the impact of adherence to the risk or need principles on the likelihood of adverse outcomes? Indeed, prior research shows that treatment effectiveness increases as the number of RNR principles adhered to increases (Andrews & Bonta, 2010).

Our analysis of the responsivity principle merits some discussion. Consistent with the work of Taxman and colleagues (2007), we operationalized responsivity in terms of the matching of strength-based interventions to youth's individual strengths; however, this is quite a broad interpretation of the responsivity principle. The responsivity principle does stress the importance of considering of adolescents' individual strengths in the development of treatment and intervention strategies, but it also more specifically states that intervention strategies should be delivered in a way that takes into account individual factors that can affect treatment outcomes, as well as recognizing the importance of the therapeutic relationship (Andrews & Bonta, 2010). We did not have any information in the current investigation regarding whether and/or how implemented treatment and intervention strategies may have been adapted or modified on a case-by-case basis to account for such individual differences. This is an important limitation of the current study, but also of the field overall (Kennedy, 2000).

4.4 Conclusion

Limitations notwithstanding, the present study is one of the first evaluations of the link between risk assessments and interventions in justice-involved youth and the only study to examine the extent to which START:AV assessments inform the development of service plans. To our knowledge, it is also the only investigation of treatment match to focus on institutional outcomes. These findings add essential new information to the emerging body of research supporting the START:AV as a case assessment and management approach for justice-involved youth (e.g., Desmarais et al., 2012; Viljoen, Beneteau, et al., 2012), and of the benefits of strength-based risk assessment and intervention approaches more generally (e.g., Cosden, Panteleakos, Gutierrez, Barazani, & Gottheil, 2004; Cox, 2006; Rawana & Brownlee, 2009). They also contribute to the well-established empirical literature supporting the effectiveness of the RNR model in reducing the likelihood of adverse outcomes in adolescent offenders (e.g., Dowden & Andrews, 1999; Koehler et al., 2012). However, findings also suggest some gaps between the risk assessment process and risk management strategies. As a result, there is a need for continued work exploring how to implement risk

assessment tools such that they come to directly inform risk management and treatment efforts, rather than risk assessment being viewed as a task separate and independent from case management. Finally, there also exists the need for the *sustainable* implementation of *high quality* programs *with integrity* (Andrews & Bonta, 2010) to address the strengths and vulnerabilities of justice-involved adolescents that are identified during the risk assessment process.

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Highlights

- Youth offenders judged to have more strengths had more strength-based interventions
- Critical vulnerabilities were addressed in only half of service plans
- Key strengths were addressed in only a quarter of service plans
- Adherence to the risk and need principles predicted risk of externalizing outcomes
- Findings highlight potential usefulness of strength-based approaches to intervention

Product-Moment Correlations between START:AV Total Scores and Number of Interventions in the Full and Follow-up Samples

Table 1

START:AV Total Scores		Number of Interventions					
		<i>r</i> Strength-Based			<i>r</i> Problem-Based		
		Overall	Boys	Girls	Overall	Boys	Girls
Full Sample (<i>N</i> = 120)							
Strength	.25**	.28**	.13	-.12	-.17	.13	-.02
Vulnerability	-.10	-.08	-.08	.17	.03	.61**	-.01
Follow-up Sample (<i>n</i> = 56)							
Strength	.21	.16	.34	-.33*	-.35*	-.47*	-.12
Vulnerability	.05	.09	.04	.17	.20	.34	-.15

*

p < .05

**

p < .01

Table 2

Tau-b Correlations between START:AV Specific Risk Estimates and Number of Interventions in the Full and Follow-up Samples

START:AV Specific Risk Estimate	Number of Interventions							
	τ Strength-Based				τ Problem-Based			
	Overall	Boys	Girls		Overall	Boys	Girls	τ Total
Full Sample ($N = 120$)								
Violence	.01	.02	-.18		.02	-.01	.36	.02
Self-Harm	-.07	.04	.01		.17	.09	.18	.17
Suicide	-.23	-.03	-.33		.16	.08	.39	.11
Unauthorized Leave	-.14	-.16	-.07		.19*	.07	.06	.16
Substance Abuse	-.02	-.11	.35		.08	-.04	.26	.05
Self-Neglect	-.01	-.12	.73*		-.01	-.06	.49	-.05
Being Victimized	-.21*	-.19	-.19		-.03	-.04	-.35	-.12
General Offending	.01	-.04	.21		.21*	.13	.58*	.22*
Follow-up Sample ($n = 56$)								
Violence	.04	.08	-.07		.11	.22	-.28	-.02
Self-Harm	-.17	.06	-.38		-.11	.26*	.31	.38***
Suicide	-.26	.07	-		-.09	.24*	.89***	.29**
Unauthorized Leave	.01	.02	.05		.24	.37***	.01	.10
Substance Abuse	.14	.04	.50**		.14	.11	.34	-.08**
Self-Neglect	.06	-.08	1.00***		.09	.15	-.38	-.03
Being Victimized	.11	.17	-.25		.27**	.30**	.38	-.09
General Offending	.11	.09	.26		.20	.36*	.16	.20***

Note. n = number of participants; - = Cell Count Too Low for Analysis.*
 $p < .05$ **
 $p < .01$ ***
 $p < .001$

Table 3
Descriptive Statistics for Transformed Ratio Measurements of Adherence to the Risk Principle

	z-scores							
	Boys				Girls			
	Mean (SD)	Median (IQR)	Range		Mean (SD)	Median (IQR)	Range	
Full Sample (N = 120)								
Ratio of Number of Vulnerabilities to Number of Problem-Based Interventions	0.00 (1.00)	0.22 (-0.68-0.60)	-3.07-2.01	0.05 (1.03)	0.22 (-0.51-0.61)	-3.07-2.01	0.19 (0.89)	0.35 (0.20-0.60)
Ratio of Number of Strengths to Number of Strength-Based Interventions	0.00 (1.00)	0.19 (-0.32-0.73)	-2.41-1.40	0.07 (0.98)	0.19 (-0.32-0.79)	-2.41-1.40	-0.27 (1.04)	0.25 (-1.13-0.35)
Follow-up Sample (n = 56)								
Ratio of Number of Vulnerabilities to Number of Problem-Based Interventions	-0.01 (0.99)	0.38 (-0.71-0.77)	-3.24-1.29	-0.18 (1.03)	0.11 (-0.71-0.50)	-3.24-1.29	0.72 (0.30)	0.77 (0.44-0.98)
Ratio of Number of Strengths to Number of Strength-Based Interventions	0.00 (1.00)	0.22 (-0.34-0.67)	-2.35-1.48	-0.07 (1.00)	0.06 (-0.34-0.67)	-2.35-1.38	0.28 (0.99)	0.47 (0.07-0.94)

Note. n = number of participants; SD = standard deviation; IQR = interquartile range.

Table 4

Frequency of START:AV Critical Vulnerabilities and Key Strengths and Percentage Matched with Interventions

START:AV Item	Full Sample (<i>N</i> = 120)				Follow-up Sample (<i>n</i> = 56)			
	Critical Items		Key Items		Critical Items		Key Items	
	<i>n</i>	% Matched	<i>n</i>	% Matched	<i>n</i>	% Matched	<i>n</i>	% Matched
1. Social Skills	11	27.3	13	15.4	5	0.0	5	20.0
2. Relationships	5	80.0	3	33.3	3	66.7	2	50.0
3. School/Work	20	60.0	14	50.0	10	50.0	3	0.0
4. Recreational	2	0.0	12	66.7	0	n/a	4	50.0
5. Self-Care	0	0.0	7	0.0	0	n/a	4	0.0
6. Mental State	14	92.9	2	0.0	9	100.0	0	n/a
7. Emotional State	20	10.0	5	0.0	7	14.3	3	0.0
8. Substance Use	56	94.6	4	25.0	22	100.0	2	0.0
9. Impulse Control	35	62.9	3	0.0	14	78.6	1	0.0
10. External Triggers	26	3.8	0	0.0	9	0.0	0	n/a
11. Social Support	2	50.0	3	0.0	2	50.0	1	0.0
12. Material Resources	1	0.0	4	0.0	0	n/a	1	0.0
13. Attitudes	14	14.3	9	11.1	5	20.0	4	0.0
14. Medication Adherence	6	0.0	7	14.3	1	0.0	3	33.3
15. Rule Adherence	21	47.6	5	0.0	9	77.8	3	0.0
16. Conduct	16	43.8	6	0.0	4	25.0	3	0.0
17. Insight	13	38.5	4	0.0	4	25.0	2	0.0
18. Plans	9	33.3	10	50.0	3	33.3	3	33.3
19. Coping	11	0.0	4	0.0	6	0.0	2	0.0
20. Treatability	5	0.0	7	0.0	3	0.0	3	0.0
21. Parenting/Home Environment	10	20.0	2	0.0	5	0.0	1	0.0

Notes. *n* = number of youth for whom this item was identified as a critical or key, respectively; n/a = not applicable.

Table 5

Prevalence of Intra-Institutional Adverse Outcomes

Adverse Outcomes	<i>n</i> Youth (% of <i>n</i> = 56)
Any externalizing behaviors	45 (80.4%)
Nonsexual aggression ^a	31 (55.4%)
Physical sexual aggression	5 (8.9%)
Unauthorized leave	6 (10.7%)
Institutional infraction ^b	44 (78.6%)
Any internalizing behaviors	3 (5.3%)
Self-harm	3 (5.4%)
Suicide ^c	1 (1.8%)
Self-neglect	0 (0%)
Other	3 (5.3%)
Substance abuse	1 (1.8%)
Victimization	2 (3.6%)

^aIncludes verbal, property, and physical (nonsexual) aggression.

^bIncidents penalized within the facility not corresponding to another outcome category (e.g., horseplay or smoking in room).

^cIncludes suicide ideation/planning and suicidal behaviors.

Table 6

Moderating Role of RNR Principle Adherence on the Likelihood of Adverse Outcomes

RNR Principle Adherence	Adverse Outcome Hazard Ratio (95% CI)							
	Externalizing			Internalizing			Other	
	Overall	Boys	Girls	Overall	Boys	Girls	Overall	Boys
Risk Principle								
Ratio of Number of Vulnerabilities to Number of Problem-Based Interventions	1.36 (0.98-1.89)	1.24 (0.88-1.76)	0.22 (0.02-3.09)	3.84 (0.58-25.47)	7.73 (0.42-142.98)	–	3.87 (0.54-27.47)	2.97 (0.41-21.79)
Ratio of Number of Strengths to Number of Strength-Based Interventions	0.58 (0.38-0.89)*	0.69 (0.49-0.98)*	0.40 (0.15-1.03)	3.23 (0.34-31.12)	–	0.23 (0.01-3.78)	11.52 (0.83-159.17)	16.89 (0.56-506.78)
Need Principle								
Proportion of Critical Items Matched	0.36 (0.13-0.99)*	0.29 (0.01-38.11)*	0.67 (0.01-38.11)	0.19 (0.01-4.79)	0.09 (0.01-5.60)	0.07 (<0.01-910.36)	–	–
Responsivity Principle								
Proportion of Key Items Matched	4.40 (0.73-26.44)	8.02 (1.12-57.28)*	–	–	–	–	–	–

Note: RNR = Risk-Needs-Responsivity; – = Cell Count Too Low for Analysis; CI = Confidence Interval; Externalizing = Verbal Violence, Property Violence, Physical Nonsexual Violence, Physical Sexual Violence, Unauthorized Leave, and Institutional Incidents; Internalizing = Suicide Ideation and Planning, Suicide Behaviors, and Self-Harm; Other = Being Victimized and Substance Abuse.

* $p < .05$