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What is This?

RELIABILITY AND VALIDITY ANALYSES OF THE YOUTH LEVEL OF SERVICE/CASE MANAGEMENT INVENTORY

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The Youth Level of Service/Case Management Inventory (YLS/CMI) is a structured assessment tool designed to facilitate the effective intervention and rehabilitation of juvenile offenders by assessing each youth's risk level and criminogenic needs. The present study examined the YLS/CMI's reliability and validity in a sample of 107 juvenile offenders who were court-referred for mental health assessments. Results demonstrated the YLS/CMI's internal consistency and interrater reliability. Moreover, the instrument's predictive validity was substantiated on a number of recidivism measures for both males and females. Limitations of the current findings are discussed.

Keywords: Youth Level of Service/Case Management Inventory; juvenile offenders; predictive validity; recidivism

According to Andrews, Bonta, and Hoge (1990), effective offender rehabilitation requires the appropriate classification of an individual's criminogenic risk level and needs. The assessment of risk is important for making informed decisions about levels of super-

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vision and the intensity of treatment interventions. Offenders who have been classified as higher risk to reoffend tend to respond more favorably to intensive treatment, whereas a similar level of high intervention may actually be detrimental for lower-risk offenders. Thus, the accurate classification of risk level not only allows for a more efficient use of limited resources but also enhances the accuracy of making clinical decisions regarding the quantity of treatment provided for all levels of offenders. In addition, the accurate assessment of specific criminogenic needs enhances the effectiveness of the interventions provided to an individual (Andrews & Bonta, 2002).

Historically, the assessment of offender risk level and need have been based largely on unstructured clinical judgements. However, standardized assessments, using instruments that are structured and empirically based, have been found to provide a more valid and consistent assessment of criminogenic risk and need (Hoge, 2002a, 2002b). Standardized instruments designed to assess criminogenic risk and need in adult offenders continues to be actively studied (Douglas & Kropp, 2002; Gendreau, Little, & Goggin, 1996), but less attention has been paid to the development of such instruments for juvenile offenders (Hoge, 2002a, 2002b; Hoge & Andrews, 1996; Krysik & LeCroy, 2002; Le Blanc, 1998). One such effort is represented in the Youth Level of Service/Case Management Inventory (YLS/CMI), developed from an adult instrument referred to as the Level of Service Inventory-Revised (LSI-R; Andrews & Bonta, 1995). The current LSI-R is used with adult offenders in several Canadian provinces as well as parts of the United States. It consists of a 54-item scale that spans 10 dimensions (criminal history, education/employment, financial situation, family/marital relationships, accommodation, leisure and recreation, companions, alcohol and drug use, emotional/mental health, and attitudes/orientations). The instrument is completed on the basis of a semistructured interview and the use of file and other relevant collateral information. The measure has been validated as a predictor of recidivism in both males and females (Andrews & Bonta, 1995).

The YLS/CMI (Hoge & Andrews, 2002; Hoge, Andrews, & Leschied, 2002) is based on the LSI-R and is designed to assess risk and need factors in youths 12 to 18 years of age. It is also designed to assist in case planning and management. Part I of the YLS/CMI pro-

vides for the assessment of risks and needs. Similar to the adult form, it was designed as a checklist to be used by professionals following the collection of a broad range of information about a youth. This section consists of 42 items divided into eight subscales (prior/current offenses/dispositions, family circumstances/parenting, education/ employment, peer relations, substance abuse, leisure/recreation, personality/behavior, and attitudes/orientation). The items were selected to reflect the full range of factors identified in the literature as related to youth crime (Cottle, Lee, & Heilbrun, 2001; Hoge, 2002a; Lipsey & Derzon, 1998; Loeber & Hay, 1996). An opportunity to indicate areas of strength relevant to each youth is also provided. Other parts of the YLS/CMI allow for recording information about other considerations relevant to the case, the specification of goals of service, and the means for achieving those goals. A professional override feature is also built into the instrument. The current research focuses on Part I of the measure.

Psychometric support for the YLS/CMI is presented in the manual (Hoge & Andrews, 2002), with initial validation established in a recent study conducted by Jung and Rawana (1999) using a sample of 263 juvenile offenders. Recidivism was defined as any conviction for an offense committed up to 6 months after the assessment or, for youths in custody at the time of assessment, any conviction for an offense committed up to 6 months after release. The results demonstrated that the total risk/need score and each of the eight risk/need factors discriminated between recidivists and non-recidivists. In addition, the results supported the YLS/CMI as a robust risk/need instrument in terms of ethnicity and gender. It was useful for predicting recidivism in both males and females as well as Canadian native and non-native youth. A sample of juveniles never involved in the juvenile justice system was also included in the study, and the results showed that YLS/CMI total and subscores significantly discriminated between the offender and non-offender groups (Jung, 1996). Costigan and Rawana (1999) followed the same sample of juvenile offenders during a 2-year period and substantiated sound predictive validity.

Although this recent research was a positive addition to the literature, there were several important limitations to these studies. The length of follow-up for these youth was relatively short (6 months and 2 years), used only one outcome measure, and did not evaluate the

YLS/CMI's reliability. The current study extends the follow-up period to 3.5 years, evaluates interrater agreement, and explores the YLS/CMI's concurrent validity with reference to alternative measures of behavioral adjustment. Cottle et al. (2001) have emphasized the importance of evaluating classification instruments against multiple follow-up measures. Thus, the current study used a number of different recidivism outcome measures, including the occurrence of serious reoffenses, time to a new offense, and number of new offenses.

METHOD

PARTICIPANTS

In the present study, 107 juvenile offenders with a mean age of 14.6 years (SD = 1.0, range = 12.0 to 16.8 years) served as participants. These youth were taken from a total sample of 119 consecutively court-referred juvenile offenders in northwestern Ontario, Canada. They were evaluated by a specialized multidisciplinary mental health assessment team between March 1996 and October 2000 to assist the court in disposition. The YLS/CMI could not be obtained on 5 participants from this sample, and another 7 were excluded because the most recent available YLS/CMI was completed either 12 months before or after the date of the original court-ordered assessment.

This sample consisted of 67 (62.6%) males and 40 (37.4%) females, with 49 (45.8%) and 28 (26.2%) of these youth having committed a previous offense or serious offense, respectively. Seventeen (15.9%) of these youth had also previously received a custodial disposition. Reflecting the nature of the ethnic composition in the local community, 31 (29.0%) of the sample were Canadian Native, and the remaining 76 (71.0%) youth were Caucasian.

MEASURES

YLS/CMI. The YLS/CMI, a 42-item checklist, is divided into eight subscales: offense history, family circumstances/parenting, education, peer relations, substance abuse, leisure/recreation, personality/behavior, and attitudes/orientation. It was completed by a mental

health professional or probation officer based on interviews with the youth, a review of clinical records, and information gathered from various collateral sources. Each item on the YLS/CMI was coded as either present or absent, with present items summed to give a total score ranging from 0 to 42. Examples of YLS/CMI items included "disruptive classroom behavior" and "substance use interferes with life." Based on the total score, youth were categorized into four levels of risk for continued criminal activity of low, moderate, high, or very high. This measure provides a broad and detailed survey of risk, need, protective, and responsivity factors relevant to delinquent youth (Hoge & Andrews, 2002) and has been adapted from the LSI-R, a tool used within the adult criminal justice and correctional systems (Andrews & Bonta, 1995).

Child Behavior Checklist. The Child Behavior Checklist (CBCL; Achenbach, 1991a) and Child Behavior Checklist–Youth Self-Report (CBCL-YSR; Achenbach, 1991b), completed by the parent and youth, respectively, were used as alternative measures of behavior disorder. These widely used checklists consisted of 112 items, each rated on a 0- to 2-point scale. Problem scales consisted of eight narrowband subscales and three broadband factors of externalizing, internalizing, and total problem scales. Both were well-established measures with considerable psychometric support (Achenbach, 1999). The parent form, for example, has demonstrated 1-week test-retest reliabilities of .93 for total problem and externalizing scales (Achenbach, 1991a).

Recidivism data. The Royal Canadian Military Police (RCMP) national police registry was accessed to obtain each youth's complete criminal records. Recidivism for each youth was measured through two outcome variables: (a) any reoffending (AR) and (b) serious reoffending (SR). The classification of an offense as serious was based on a serious offense list used by Hoge, Andrews, and Leschied (1995) and originally developed by McDermott (1983). Serious offenses included murder, manslaughter, attempted murder, wounding/assault, common assault, assault-bodily harm/aggravated assault, assault with weapon, sexual assault, robbery, armed robbery, robbery with violence, assault/intent to rob, assault to resist arrest, assault of a

police officer, break and enter with intent, break/enter/theft, theft of more than $5,000, auto theft, arson, and drug trafficking. Any other offense was considered non-serious.

PROCEDURE

Data were collected for each juvenile offender as part of a standardized assessment procedure conducted by a specialized multidisciplinary mental health team (including disciplines of social work, psychology, and psychiatry) to assist the court in disposition. Juvenile offenders referred for such assessments tended to be youth who were at higher risk for antisocial behavior and/or presented more complex mental health needs than the general population of juvenile offenders (Jack & Ogloff, 1997). Although accurate information was not available on the percentage of youths referred for mental health assessments, past research would suggest that such court-referred youth represent approximately 2% to 10% of all juvenile offenders (Jack & Ogloff, 1997; Jaffe, Leschied, Sas, & Hustin, 1985). Psychometric data, demographic information, and social history for each youth were collected as part of these regular comprehensive clinical services.

For the purpose of this study, completed YLS/CMI ratings were obtained for each youth from their respective probation officers who had completed this assessment tool. To ensure that probation-completed YLS/CMIs were finished within the same time period as the data collected for the multidisciplinary mental health assessment, a decision was made to include only those youths whose YLS/CMI had been completed within a 12-month period either before or after the date of the court-ordered assessment. In total, 7 youth were excluded from the sample for this reason. The average length of time between completion of the YLS/CMI and the court-ordered assessment for this revised sample was 1.2 months (SD = 3.2 months, range = –9 to 11 months). Also, each youth's criminal record was obtained from the RCMP national police registry to assess for AR and SR. Criminal records could not be obtained for 3 youth, leaving the total number of youths for follow-up analysis at 104. The mean length of follow-up time for predictive validity analysis was 35.8 months (SD = 14.9 months, range = 7 to 61 months).

To address interrater reliability, the multidisciplinary mental health assessment team independently and concurrently completed the YLS/CMI on 29 youth based on the information collected as part of the court-ordered assessment. These YLS/CMIs were contrasted with those obtained from the probation officers, who completed the YLS/CMI through their own assessment procedures, to evaluate consistency across different raters on the same youth.

RESULTS

DESCRIPTIVE STATISTICS

Descriptive statistics for YLS/CMI subscores and total scores, as well as the reoffending indices, are presented in Table 1 for males, females, and the total sample. YLS/CMI total scores ranged from 0 to 35 (out of a possible range of 0 to 42). The overall MANOVA for YLS/CMI total and all subscale scores between males and females was nonsignificant, $F(9, 97) = 1.24$, $p = .28$. Males exhibited a significantly higher number of new offenses than females, $t(101.40) = 1.90$, $p < .05$, and a higher percentage were convicted of an SR, $\chi^2(1, n = 104) = 5.62$, $p < .05$. Gender differences in months to new offense, $t(102) = -.13, p > .05$, or presence of AR, $\chi^2(1, n = 104) = 1.78, p > .05$, were not significant.

RELIABILITY

Interrater reliability estimates were calculated for each of the YLS/CMI subscales except for subscale 1 (offense history). This subscale was excluded from interrater reliability analysis because the multidisciplinary assessment team rated each youth's offense history using a different index offense. It was not possible to retroactively contact probation officers to confirm the index offense they used. Intraclass correlations ($n = 29$), used to assess the interrater reliability of all other subscales, ranged from .71 for attitudes/orientation to .85 for education/employment, except for one subscale, peer relations, which fell to .61. All were statistically significant. The internal consistency estimates (Cronbach's alpha), using the full sample ($N = 107$),

TABLE 1: Descriptive Statistics for YLS/CMI Subscales, Any Reoffense, Serious Reoffense, Mean Number of New Offenses, and Months to New Offense by Total Sample and Gender

	Total (N = 107)	Males (n = 67)	Females (n = 40)
Offense history	1.2 (1.5)	1.1 (1.5)	1.4 (1.4)
Family	2.5 (1.7)	2.3 (1.7)	2.8 (1.6)
Education	3.3 (2.0)	3.2 (2.1)	3.6 (2.0)
Substance abuse	1.8 (1.3)	1.7 (1.3)	2.1 (1.4)
Leisure/recreation	1.4 (1.1)	1.3 (1.1)	1.6 (1.1)
Peer relations	1.2 (1.4)	1.1 (1.5)	1.4 (1.4)
Personality/behavior	3.7 (2.0)	3.5 (2.1)	4.1 (1.8)
Attitudes/orientation	1.7 (1.7)	1.7 (1.6)	1.9 (1.8)
Total score	16.9 (9.3)	15.7 (9.5)	19.1 (8.7)
Any reoffense (%)[a]	46.3	51.5	37.5
Serious reoffense (%)[a]	28.7	37.9	15.9
Mean number of new offenses*	1.9 (3.0)	2.3 (3.4)	1.1 (1.8)
Mean time to new offense (months)*	21.3 (16.5)	21.1 (16.9)	21.6 (16.0)

Note. SD shown in parentheses.
a. *n* = 104.

were sound, ranging from .56 for substance abuse to .77 for attitudes/ orientation.

CONCURRENT VALIDITY

The concurrent validity of the YLS/CMI total score was evaluated against scores from the parent and youth self-report versions of the CBCL. Table 2 shows that the total YLS/CMI score correlated significantly with both broad (internalizing disorder, externalizing disorder, and total) and narrow-band (delinquency) domains on the parent and youth CBCL measures across gender. All correlations were significant except for parent-rated behavior problems on female internalizing and total problem scales.

PREDICTIVE VALIDITY

Four indices of reoffending were used to evaluate the predictive validity of YLS/CMI scores: AR, SR, number of new offenses, and

TABLE 2:   **Correlations Between Selected Subscales of the Parent and Youth Self-Report Forms of the CBCL and YLS/CMI Total Score by Gender**

	YLS/CMI Total Score		
	Male (n = 50)	Female (n = 27)	Total (n = 77)
Parent CBCL			
Externalizing	.46**	.43*	.46**
Internalizing	.30**	.06	.24*
Delinquent	.51**	.55**	.54**
Total score	.39**	.26	.37**
	Male (n = 59)	Female (n = 34)	Total (n = 93)
Youth Self-Report			
Externalizing	.42**	.52**	.47**
Internalizing	.27*	.35*	.32**
Delinquent	.52**	.45**	.52**
Total score	.36**	.48**	.43**

$*p < .05. **p < .01.$

time to new offense (months). Table 3 presents correlations between the total score of the YLS/CMI and the reoffending indices by total sample and gender. For the total sample, higher YLS/CMI scores were significantly associated with increased SR, increased number of new offenses, and a decreased time to reoffend. All recidivism indices were significant for the subsample of males. Significant correlations were obtained between the YLS/CMI total score, SR, and months to a new offense for the female sample but were nonsignificant for AR and number of new offenses.

An additional means of examining predictive validity involved looking at differential recidivism rates across the YLS/CMI risk levels. Each category of higher-risk classification should be associated with a higher level of recidivism. Table 4 presents the results for mean number of new offenses, mean time to new offense, and incidence of serious offending across three risk levels by total sample and gender. Due to the small number in the very high-risk group, the high- and very high-risk groups were combined for this analysis.

A significant effect was observed across risk levels for mean number of new offenses, $F(2, 98) = 4.54$, $p < .01$, with a significant effect for gender, $F(1, 98) = 4.07$, $p < .05$, but no gender by risk level interac-

TABLE 3: Correlations Between YLS/CMI Total Score and Any Reoffense, Serious Reoffense, Months to New Offense, and Number of New Offenses by Gender and Total Sample

	Total (n = 104)	Males (n = 66)	Females (n = 38)
Any reoffense	.19	.25*	.14
Serious reoffense	.26**	.31**	.35*
Number of new offenses	.30**	.36**	.20
Months to new offense	−.42**	−.53**	−.34**

*$p < .05$. **$p < .01$.

tion, $F(2, 98) = 1.58$, $p = .21$. Post hoc analysis for risk level using Tukey's HSD revealed significant effects across all comparisons except between the low and moderate risk groups. Also, males ($M = 2.51$; $SD = .37$) committed more reoffenses than females ($M = 1.22$; $SD = .52$).

A main effect for risk level was also obtained for mean time to a new offense, $F(2, 98) = 5.33$, $p < .01$, but no effect was found for gender, $F(1, 98) = .14$, $p = .71$, or gender by risk-level interaction, $F(2, 98) = 2.07$, $p = .13$. Post hoc analysis for risk level resulted in significant group differences for all comparisons except between the moderate and high groups. Youth at higher risk were found to commit reoffenses in a much shorter period of time than their lower-risk counterparts. Chi-square analysis by risk level was significant for SR, $\chi^2(2, n = 104) = 7.85$, $p < .05$, with youth in the higher YLS/CMI risk classification committing more SR. Examination of gender across risk levels for SRs revealed a significant effect for females, $\chi^2(2, n = 38) = 6.28$, $p < .05$, and a trend in this direction for males, $\chi^2(2, n = 66) = 5.23$, $p = .07$.

Receiver operating characteristics (ROCs) were used to assess the YLS/CMI's predictive validity. Rice and Harris (1995) argued that, in contrast to other methods of analyses, ROCs are relatively independent of base rates and selection ratios and have become an increasingly more common and useful method for determining the strength of predictive validity. The ROC curve plots the ratio of true positives to false positives, with a straight diagonal line from the bottom left corner to the top right corner reflecting an area under the curve (AUC) of 50%. The larger the AUC, the better the prediction.

TABLE 4: Reoffense Measures by Risk Level (Manual Guidelines) and Gender

Outcome Measure	Low (0-8)			Moderate (9-22)			High (23-42)		
	Male (n = 17)	Female (n = 6)	Total (n = 23)	Male (n = 35)	Female (n = 22)	Total (n = 57)	Male (n = 14)	Female (n = 10)	Total (n = 24)
Mean number of new offenses	0.9	1.0	0.91	1.9	0.86	1.5	4.7	1.8	3.5
Mean time to new offense (months)	33.1	23.5	30.8	18.4	25.4	21.9	13.5	12.1	14.3
Serious reoffense (%)	18	0	13	40	9	28	57	40	50

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The AUC for the overall YLS/CMI total score resulted in a value of .67 for SR, a larger value than the .61 obtained on AR. A similar pattern was observed on the YLS/CMI ratings of low, moderate, high, and very high risk categories. AUC results for this latter risk classification resulted in values of .65 for SR and .56 for AR. Standard error for all AUC results was .06. A further accuracy analysis was calculated through sensitivity and specificity values for total, male, and female groups, using median cutoffs. Sensitivity values for AR and SR outcome measures across all groups ranged from 56% to 71%, and specificity values ranged from 54% to 68%. The values for relative improvement over chance ranged from 9% to 24%.

DISCUSSION

Given the consistent finding that a minority of high-risk juvenile offenders commit a disproportionate number of offenses, it is critical that tools to identify and target these high-need youth be developed. The current study examined the reliability and validity of one such tool, the YLS/CMI. In this particular sample, the YLS/CMI demonstrated sound psychometric properties within a juvenile offender population. This study also included several strengths, when compared to past research, such as the use of diverse recidivism outcome measures (AR and SR) and a longer follow-up time period (approximately 3.5 years) than is usually found in the juvenile offender literature (see Cottle et al., 2001).

Two forms of reliability were assessed for the YLS/CMI. Examination of each subscale revealed that all but one possessed moderate to strong levels of internal consistency. Only substance use fell marginally below the benchmark cutoff of .60 for this form of reliability. Equally important, given the widespread use of this measure by many different professionals, is the ability to demonstrate the YLS/CMI's interrater reliability. In this analysis, probation-completed YLS/CMIs were compared with those independently completed by mental health professionals. In each case, separate interviews and data were collected for the YLS/CMI. The results for all subscales were significant, with all but one subscale (peer relations) landing above an interrater reliability score of .70. When taken together, these reliability results

suggest that the YLS/CMI is a reliable instrument that can provide a consistent risk/need profile for juvenile offender evaluations.

Central to the effectiveness of the YLS/CMI is its ability to discriminate between high- and low-risk youth. As outlined by Andrews et al. (1990), the ability to identify high-risk youth and then target and change their criminogenic needs through more specific and intensive treatment efforts is the most effective means of reducing the juvenile offenders' likelihood to reoffend. Thus, a key aspect of the YLS/CMI is to accurately classify risk level in youths and, in turn, aid clinical decision making regarding the type and quantity of treatment. Several analyses were conducted to evaluate this important aspect of YLS/CMI validity.

First, concurrent validity was investigated through correlations between the YLS/CMI total score and other behavioral measures of pathology. A strong relationship was demonstrated between the YLS/CMI total score and parent and youth CBCL broad and narrow-band scores. Second, predictive validity was evaluated through ROC analyses, resulting in values of .61 for AR and .67 for SR. Rice and Harris (1995) suggested that ROC curves of .60 and .66 should be considered moderate and large, respectively. This would place the predictive power of the YLS/CMI in the moderate to large range.

Total scores on the YLS/CMI were significantly correlated with a number of outcome measures, including SR, number of new offenses, and time to reoffense. Although positive correlations were obtained between YLS/CMI total score and AR, this was only significant for males. The range of these correlations, as displayed in Table 3, is similar to that found in other outcome studies. For example, in a recent study comparing the predictive validity of five different adult risk measures over a 2-year period, Kroner and Mills (2001) found a range of .22 to .34 among all recidivism and risk levels obtained on these measures and a range of .11 to .19 for violent recidivism and risk level. The results from this young offender sample compared similarly to this past research with correlations ranging from .14 to .25 for AR, .26 to .35 for SR, and –.34 to –.53 for time to reoffend.

Insight into the nature of these correlations can be seen in the pattern of recidivism by YLS/CMI risk levels as displayed in Table 4. Support for the ability of the YLS/CMI to discriminate between high-risk and low-risk youth was noted on the risk level main effects across

SRs, time to a new offense, and number of new offenses. Higher-risk youth, regardless of gender, were found to commit more reoffenses, take a shorter time to reoffend, and were more likely to commit a SR. The absence of a gender interaction effect suggests that the YLS/CMI is sound and valid in predicting reoffending patterns across gender. This latter finding is consistent with the results obtained by Jung and Rawana (1999) and is crucial if the YLS/CMI is to be used across the entire juvenile offender population.

A number of limitations of the current sample and study should be noted. First, a relatively small sample of select juvenile offenders was used. They represented youth consecutively referred by the court to a multidisciplinary mental health assessment team, likely due to concerns about each youth's tendency to be violent, the presence of serious psychiatric problems, or some combination of both. Thus, they likely represent a subgroup of more disturbed and serious juvenile offenders. Even within the parameters of this restricted population of juvenile offenders, the YLS/CMI was able to demonstrate sound reliability and predictive validity. However, it is likely that these sample characteristics could have limited the robustness of the findings obtained when compared to the previous validity study by Jung and Rawana (1999), who used a much larger sample ($N = 263$) of lower-risk youth.

It is also important to note that for the purpose of predictive validity, only official criminal records were used to establish recidivism. Although commonly used in the literature, this outcome measure represents the criminal behavior that a youth has been found to commit rather than being an accurate reflection of all the crimes actually committed. This has the potential to skew results, as has been noted in the recent results on the prediction of violence in adult psychiatric patients (Monahan et al., 2001), in which the rate of violence was much higher than that noted in official criminal records.

Finally, although the length of follow-up is a strength, it is important to note that the YLS/CMI is designed to be revised every 6 months. This is particularly important for juvenile offenders who have only recently entered the legal system and may still have considerable developmental changes ahead of them. Given these developmental changes, the YLS/CMI may not accurately reflect the risk level of

youth after 1 or 2 years, especially when these youths are receiving intervention appropriate to their risk level and criminogenic needs.

Not withstanding the limitations mentioned above, the YLS/CMI was found to possess sound reliability and adequate concurrent and predictive validity for use within the general juvenile offender population. Each youth's risk and criminogenic needs can be reliably identified across different professional raters, and the risk levels on the YLS/CMI can adequately discriminate between high- and low-risk youth across a number of recidivism outcome measures. Moreover, the limited information available on the psychometric properties of this and other juvenile offender risk assessment tools clearly highlights the need and importance of pursuing further research in this area.

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