

# A Cross-Validation of the Youth Level of Service/Case Management Inventory (YLS/CMI) Among Japanese Juvenile Offenders

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The main purpose of the current research is to examine the applicability of the Youth Level of Service/Case Management Inventory (YLS/CMI) in a Japanese juvenile offender population. Three hundred eighty-nine youths who were released from the five Juvenile Classification Homes were followed for approximately one and half years. Results show that the YLS/CMI total score significantly predict recidivism. Survival time analysis demonstrates that the YLS/CMI total score also significantly predicted faster time to recidivism. The overall findings support adequate predictive validity of the YLS/CMI total score, but subscales lacked content representativeness and predictive validity in this sample. Canadian and Japanese cultural differences in criminal history and substance abuse are contributors to the lack of content representativeness.

**Keywords:** risk assessment, YLS/CMI, juvenile offender, recidivism

A great deal of research has supported the validity and reliability of risk assessment instruments for adult offenders (Andrews, Bonta, & Wormith, 2004; Bonta, 2002; Epperson et al., 1998; Hanson, 1997; Hanson & Thornton, 1999; Hare, 2003; Nafekh & Motiuk, 2002; Quinsey, Harris, Rice, & Cormier, 1998; Webster, Douglas, Eaves, & Hart, 1997). By contrast, the literature examining the psychometric properties of juvenile risk measures is considerably smaller (Bechtel, Lowenkamp, & Latessa, 2007). In addition, there has been even less published research on cross-cultural validation of such instruments. More specifically, risk assessment instruments for offenders were predominantly developed in North America, drawing into question applicability in other regions (Dolan & Doyle, 2000; Lodewijks, Doreleijers, & de Ruiter, 2008; Olver, Stockdale, & Wormith, 2009). Exploring the basic nature of these risk measures in diverse ethnic and cultural backgrounds is essential for the application of such instruments. Understanding the nature of risk instruments will help criminal justice researchers and practitioners to appropriately apply instruments for the purposes of risk assessment and risk management. Knowing the risk instrument's parameters in a diverse sample (i.e., mean, range of scores, effective outcomes) will speak to an instru-

ment's applicability across varied clients. With this basic understanding, predictive validity of an instrument and its risk factors will have greater utility in its application.

In the Japanese criminal justice system, an actuarial risk assessment instrument for adult sex offenders has been introduced and put into practice. However, this instrument was developed by modifying Static-99 from the United Kingdom and Canada. Therefore, strictly speaking, it is not yet validated using Japanese offender sample although the predictive validity of this tool will be examined after collecting and accumulating sufficient data (Hashimoto, 2006). In sum, at this point, there is no previous empirical research for cross-validating the actuarial risk assessment instrument constructed by North American samples among Japanese juvenile and adult offenders. The benefit of structured risk instruments is to reduce the personal prejudices and biases in the process of decision making within juvenile justice systems (Hoge, 2002). In addition, early interventions based on accurate assessment lead to the rehabilitation of juveniles and protect the public from further victimizations. Having an effective instrument can make value-added contributions to the administration of Japanese juvenile system.

One of the most widely used juvenile risk assessment instruments in North America is the Youth Level of Service/Case Management Inventory (YLS/CMI; Hoge & Andrews, 2002). The YLS/CMI was originally developed in Canada. Predictive validity of the YLS/CMI has been examined in a variety of samples such as probationers (Onifade et al., 2008), youths sentenced in community or to correctional institutions (Bechtel et al., 2007), youths referred to mental health assessment by courts (Schmidt, Hoge, & Gomes, 2005), juvenile violent offenders (Catchpole & Gretton, 2003), and juvenile sex offenders (Caldwell & Dickinson, 2009). The area under the curve (AUC) statistics for the YLS/CMI total

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score ranged from .60 (Bechtel et al., 2007) to .74 (Catchpole & Gretton, 2003) for general recidivism, indicating a moderate to strong predictive ability of the instrument. Some studies reported the AUCs targeting the subtypes of recidivism such as violent reoffending (AUC = .73 in Catchpole & Gretton, 2003; AUC = .64 in Welsh, Schmidt, McKinnon, Chattha, & Meyers, 2008; AUC = .64 in Caldwell & Dickinson, 2009), serious reoffending (AUC = .67 in Schmidt et al., 2005), and sexual reoffending (AUC = .62 in Caldwell & Dickinson, 2009). Although one research reported that the YLS/CMI showed chance level in predicting nonviolent recidivism (AUC = .50 in Welsh et al., 2008), Olver et al.'s (2009) recent meta-analysis demonstrated that the YLS/CMI significantly predicted general, nonviolent, and violent recidivism (mean  $r = .32, .29$ , and  $.26$ , respectively). One study examined the predictive validity of the YLS/CMI for institutional misconduct (Holsinger, Lowenkamp, & Latessa, 2006), and their findings also supported the ability of the YLS/CMI as a significant predictor of both the total number and seriousness of institutional misconducts. Overall, the YLS/CMI showed moderate predictive validity across the studies that differed in sample composition, recidivism base rate, and follow-up terms. However, there are two limitations with the previous research.

First, there are a limited number of cross-cultural validation studies. Interpretation of an instrument in settings different from the original may be limited because of the reliance on the developmental sample, which might have unique biases. Several researchers examined the cross-cultural validation of the YLS/CMI conducted in Australia (Thompson & Pope, 2005) and England and Wales (Rennie & Dolan, 2010), but apart from one study with sexual offenders (Chu, Ng, Fong, & Teoh, 2012), there are no published validation studies of the YLS/CMI for non-English regions. The YLS/CMI was developed and normed on Canadian samples, relying much on these data to demonstrate predictive validity. For instance, Olver et al. (2009) examined the predictive accuracy of the YLS/CMI for Canadian and non-Canadian studies. They found that the predictive accuracy of the YLS/CMI among Canadian studies was significantly greater than non-Canadian studies although the instrument demonstrated significant predictive accuracy for both samples. In cross-cultural validation, two issues are central. First is domain sampling/content saturation of the risk factors across cultures. If similar content represents a risk domain, then risk assessment instruments can be applied to other cultures with minimal modifications. If the content of the risk factors vary from culture to culture, alterations may be necessary to adequately represent the domains. Second, even if risk factors have predictive qualities across cultures, the prevalence and threshold of each risk domain could be different from culture to culture. For instance, a number of risk assessment instruments include substance misuse items. More specifically, substance misuse is viewed to increase risk of reoffending or future violent behavior. However, compared with North American population, the lifetime prevalence rate of substance misuse is typically low in the Japanese population. Thus, substance misuse items may not work as a significant predictor due to a low base rate. In this way, optimal cutoff scores in a certain risk domain may differ across cultures. Cross-cultural validation study is important for examining the assumption of invariant risk factors across cultures, as well as the practical application of an instrument.

The second limitation with the previous research is the sample selection procedures. Using restricted samples (i.e., offense type, severity of offense, or other demographic characteristics) may unduly affect the instrument validity results. Some previous research on the validity of the YLS/CMI relied on data from only one site (Holsinger et al., 2006; Onifade et al., 2008; Schmidt et al., 2005; Welsh et al., 2008). The fact that subjects are obtained from a limited geographic site might raise a question about the representativeness of the sample and threaten the generalizability of the findings. For instance, in the study of Schmidt et al. (2005), juveniles who had been referred to a mental health evaluation by a specialized assessment team were taken as the sample. Because their subjects were considered to be from a restricted population of serious and pathological offenders, the sample might not represent the typical juvenile offenders. Gathering data from multiple sites, including diverse juvenile offenders who range from low to high risk will increase the confidence of cross-validation results.

The main purpose of the present study is to examine the predictive validity of the YLS/CMI in a sample of Japanese juvenile offenders. Using prospective cohort data, with recidivism as the outcome, juvenile offenders are followed up after release from several correctional institutions. It is anticipated that higher YLS/CMI scores will be associated with higher rates of recidivism than lower scores (Hypothesis 1). It is also expected that higher total scores will predict a faster time to recidivism than lower scores (Hypothesis 2). In addition to the total score, the ability of the original and newly constructed risk categories to predict recidivism will be examined.

## Method

### Settings

The Juvenile Classification Home (JCH) accommodates diverse types of juvenile offenders whose offenses range from larceny to homicide. The JCH is a juvenile correctional institution under the supervision of the Correction Bureau, Ministry of Justice in Japan. The JCH's main purpose is to assess and classify juvenile offenders who have been placed by the Family Court and to assist the decision making for a court hearing. Therefore, the JCH functions both as a prehearing assessment center and detention institution for those awaiting a hearing.

Generally, the JCH has 3 to 4 weeks to conduct the assessment. The result of the assessment along with the disposition recommendation is integrated in a Classification Report and sent to a Family Court for the hearing. The purpose of the Family Court hearing is to determine appropriate disposition. A family court hearing is closed to the public and takes place in a cordial manner to encourage the juvenile to think introspectively about his or her behaviors. Normally, the guardians of the juvenile are summoned on the date of the court hearing. A judge decides the final disposition of the case mainly based on the Family Court probation officer's report and a Classification report (by psychologist) from the JCH. The principal final dispositions are as follows: (1) dismissal without or after a hearing; (2) probationary supervision; (3) tentative supervision by a Family Court probation officer (suspended disposition); (4) commitment to a residential institution (e.g., several types of Juvenile Training School); or (5) referral to a public prosecutor (waiver of jurisdiction).

## Participants

The initial sample included 405 male juveniles who had been admitted into five JCHs between June 2004 and September 2008. All of the participants in the current research came from Kanto and Tohoku region, which are located in the Eastern part of Japan, including Tokyo and Sendai, and are consisted of ethnically homogeneous group. The participants were under protective detention at the JCHs and were assessed by psychologists to assist the Family Court in making a disposition. From the initial sample, 16 were excluded because of the following reasons: (a) five were ordered to a Juvenile Training School (JTS) and still in custody during the study period, (b) eight were sent into a JTS and reached the age of 20 (adulthood) during the stay in the JTS, and (c) three were ordered to residential institutions other than JTS and could not be traced. Therefore, the final sample was composed of 389 juveniles.

In Japan, a juvenile is a youth between the ages of 14 and 19. The average age of the participants was 16.91 years ( $SD = 1.50$ ) at the time of assessment at the JCHs. With regard to the disposition by Family Court, 299 juveniles were sent to community, whereas 90 were sent to institutions. The breakdown is as follows: 207 (53.2%) for probationary supervision, 72 (18.5%) for tentative supervision by a Family Court probation officer, 47 (12.1%) for the JTS (short-term course), 41 (10.5%) for the JTS (long-term course), two (0.5%) for Support Facility for Development of Self-sustaining Capacity, and 20 (5.2%) for other dispositions such as referral to a public prosecutor for further adult criminal procedure.

## Measures

**YLS/CMI.** The YLS/CMI, a 42-item checklist, is divided into eight subscales: Prior and Current Offenses/Dispositions (four items), Family Circumstances/Parenting (six items), Education/Employment (seven items), Peer Relations (four items), Substance Abuse (four items), Leisure/Recreation (three items), Personality/Behavior (seven items), and Attitudes/Orientation (five items). These items and domains are identified as most predictive of criminal recidivism in youth in the previous studies.

The guidelines for the administrating the YLS/CMI recommend completion by a mental health professional or a probation officer based on interviews with the juvenile, a review of clinical records, and information gathered from various collateral sources (Schmidt et al., 2005). Each item on the YLS/CMI is coded as either present or absent and then summed for a total score, ranging from 0 to 42. According to the YLS/CMI manual, based on the total score, juveniles are categorized into four levels of risk for continued criminal activity: low (0–8), moderate (9–22), high (23–34), or very high (35–42). These categories were determined by the differences of recidivism rates on the original sample of the YLS/CMI.

In the current study, all the original item descriptions and the rating guide were translated into Japanese for research purposes. Because of the differences in the juvenile justice systems between Canada and Japan, two items in the Prior and Current Offenses/Dispositions scale were altered to adapt to the Japanese juvenile justice procedures. More specifically, the item “three or more prior convictions” and “three or more current convictions” were re-

placed with “three or more prior Family Court referrals” and “three or more cases are currently referred to Family Court,” respectively.

**Recidivism.** Recidivism was operationally defined as any re-admission into the JCHs after discharge from an institution. This outcome variable was coded as either 0 (*no readmission*) or 1 (*readmission*) during the follow-up period. In addition to the information about whether to recidivate or not, days of opportunity after release and reoffense type were recorded. The two types of recidivism were violent and nonviolent recidivism. In the present study, violent recidivism was defined as either attempted or accomplished assault, robbery, or murder, whereas nonviolent recidivism included reoffenses other than the abovementioned offending.

The length of follow-up term for each juvenile differs in the current sample because of two reasons. First, the timing of the enrollment into the study was different. Data for some juveniles were collected at the earlier part of the study period, whereas others were enrolled into the study at a later point. Second, the author could not access and obtain the participants' rearrest or reconviction data after the age of 20 (adulthood). Thus, censored cases occurred because of the study follow-up period ended or the participant reached age 20.

The follow-up period began at the date of discharge from the JCH for those who had been received community-based dispositions such as probationary supervision. For juveniles who were ordered a commitment to the correctional institution, the follow-up period started at the time of release from the institution to society. That is, if incarceration occurred as a result of a Family Court hearing, time spent in a correctional institution was deducted so that the follow-up term would reflect only time spent in the community.

**Control variables.** Two variables, age at the time of assessment and disposition type (community vs. correctional institution), were entered as control variables in the models. Although the YLS/CMI is supposed to apply to all youth regardless of age according to the rating manual (Hoge & Andrews, 2002), this assumption might not be applied to Japanese juvenile offenders because of differences in culture or juvenile justice system.

Disposition type was also entered into the models as a possible confounder because not every juvenile was revealed to be at risk in the community immediately after the rating of the YLS/CMI as described in the above section. Because of differences in timing of exposure to community (at risk), treatment and/or maturation might confound with YLS/CMI. Regarding the disposition type, each juvenile was categorized into 0 (*community-based disposition*) or 1 (*institution-based disposition*).

## Data Collection Procedure

Six psychologists from the five JCH coded the YLS/CMI by using the Japanese translated version of rating manual. After the juvenile was discharged from the JCH, psychologists who were in charge of each juvenile coded the YLS/CMI by referring to the rating manual. The coding of the YLS/CMI was based on the information gleaned from the individual interviews and file information. All six raters in the research were master's-level psychologists and had received at least the 2-year on-site training of forensic assessment at the JCH.

In the current study, the YLS/CMI was not available at the time of the final case conference because the YLS/CMI was administered after the juvenile had been discharged from the JCH. Thus, the YLS/CMI was gathered solely for research purposes. Therefore, a total score of the YLS/CMI on youth did not affect the decision making in a recommended disposition at the JCH. Similarly, a recommended disposition did not influence the coding of the YLS/CMI because each rater administered the YLS/CMI based on the rating manual.

All the information on recidivism was collected from the national correctional database for juvenile delinquents in Japan. All raters who used the YLS/CMI were blind to the actual recidivism of the participants at the time of coding.

## Data Analysis

**Research question 1.** To examine the first research question of the YLS/CMI predicting recidivism, receiver operating characteristics (ROC) analyses (Mossman, 1994; Rice & Harris, 1995) were used to evaluate the predictive validity of the YLS/CMI for recidivism for any, violent, and nonviolent recidivism. By plotting the true positive rate (sensitivity) of an instrument against its false positive rate (1 - specificity) for every possible cutoff score, the ROC analysis yields an AUC statistic that presents how accurately the instrument predicts the outcome.

**Research question 2.** The second research question examines the relationship between the YLS/CMI scores and the time to recidivism. Survival time analyses were conducted to estimate the time to recidivism and the rate of occurrence of recidivism while controlling for loss of participants due to nonrecidivism factors (censored cases). Survival curves illustrate the offending patterns over time, demonstrating not only whether certain risk groups reoffend in greater proportions than other risk groups but whether they recidivate more quickly.

Each participant was categorized into three risk categories of low, moderate, or high. The first set of categories was based on the original cutoff scores of the YLS/CMI. Because no participant had a score in the "very high" category, this category was collapsed into the "high" category. Second, because the original cutoff scores were derived from the North American sample, another set of low, moderate, and high categories were constructed using the percentile rank of the YLS/CMI total score, providing relatively balanced groups. The Kaplan-Meier procedure was performed to obtain survival curves for the original three risk groups (high,

moderate, and low) and percentile-based risk groups for any recidivism outcome.

The Cox proportional hazard model was used to determine if the YLS/CMI predicts readmission into a JCH after the group differences in control variables (age and disposition type) are taken into account. When using a Cox proportional hazard model, a key assumption is proportional hazards. This assumption requires that changes in levels of the independent variables will produce proportionate changes in the hazard function, independent of time. The proportionality assumption was tested graphically through checking the log-minus-log plots.

## Results

### Descriptive Statistics

Table 1 contains the descriptive statistics for the total and eight subscale scores. The mean total score was 10.75 ( $SD = 5.46$ ) ranging from 0 to 30. As shown in Table 1, some of the subscale distributions were skewed. In Scale 1 (Prior and Current Offenses/Dispositions), Scale 5 (Substance Abuse), and Scale 8 (Attitudes/Orientations), the average score of all the participants approached zero. For the sake of comparison, descriptive statistics of the YLS/CMI in the previous North American research are presented in Table 2. Overall, the mean total score of the YLS/CMI was relatively low compared with the previous research in North America.

Next, Table 3 shows the correlations of the subscale scores of the YLS/CMI. As can be seen, most subscales were positively and significantly correlated with one another. The lowest correlation was obtained between Scale 1 (Prior and Current Offenses/Dispositions) and Scale 5 (Substance Abuse) ( $r = .03$ ,  $ns$ ), whereas the highest correlation was obtained between Scale 2 (Family Circumstances/Parenting) and Scale 8 (Attitudes/Orientation) ( $r = .53$ ,  $p < .01$ ).

Finally, regarding the relationship between the YLS/CMI and Family Court dispositions, significant difference was found between juveniles disposed to community and institutions. The mean total scores were 9.58 ( $SD = 5.07$ ) for community-disposed group and 14.64 ( $SD = 4.89$ ) for institution-disposed group,  $t(387) = 8.38$ ,  $p < .01$ . As mentioned before, the administration of the YLS/CMI and Family Court decision making were independent in this study. Therefore, a disposition for each juvenile was not

Table 1  
Descriptive Statistics for the YLS/CMI (N = 389)

Scale	M	SD	Minimum	Maximum
YLS/CMI total score (0-42)	10.75	5.46	0	30
1. Prior and Current Offenses/Dispositions	0.58	1.02	0	5
2. Family Circumstances/Parenting	1.62	1.47	0	6
3. Education/Employment	2.16	1.59	0	7
4. Peer Relations	2.18	1.09	0	4
5. Substance Abuse	0.07	0.34	0	3
6. Leisure/Recreation	1.90	1.01	0	3
7. Personality/Behavior	1.73	1.63	0	7
8. Attitudes/Orientation	0.51	0.83	0	5

Note. YSL/CMI = Youth Level of Service/Case Management Inventory.



Table 2  
Descriptive Statistics for the YLS/CMI in the Previous North American Studies

Authors/year	N	M	SD	BRR (%)
Bechtel et al. (2007)	4,482	21.48	7.23	51.2
Institutionalized sample	3,376	23.08	6.29	53.1
Community sample	1,106	16.60	7.70	35.5
Caldwell & Dickinson (2008)	172	—	—	59.3
Registered sample <sup>a</sup>	106	30.03	7.54	—
Nonregistered sample <sup>b</sup>	66	33.73	5.40	—
Catchpole & Gretton (2003)	74 (11)	—	—	58.0
Holsinger et al. (2006)	80	21.84	7.02	—
Olver et al. (2012)	167	25.50	7.70	73.9
Onifade et al. (2008)	328 (90)	16.30	—	26.0
Schmidt et al. (2005)	107 (40)	16.90	9.30	46.3
Welsh et al. (2008)	105 (38)	16.81	9.24	45.7

Note. Values in parentheses are the number of female subjects. N = number of subjects; YSL/CMI = Youth Level of Service/Case Management Inventory; BRR = base rate of any recidivism.

<sup>a</sup> Included in the sex offender registry. <sup>b</sup> Not included in the sex offender registry.

influenced by the results of the YLS/CMI. This result is reasonable because those who were sent to an institution must be regarded as higher risk by Family Court judge, whereas the community-disposed group must be regarded as lower risk.

To assess interrater reliability, two raters coded the YLS/CMI independently on 29 randomly selected cases. The first rater interviewed the youths, conducted psychological tests, and wrote a predisposition report. The second rater coded the YLS/CMI based on the file information. The second one was blind to the first one's coding. The interclass correlation coefficient was .86.

### Risk Classification and Recidivism

Based on the original cutoff scores (Hoge & Andrews, 2002), no participant fell under the category of "very high," so this category was collapsed into high-risk group. With regard to the base rate of recidivism, 73 (18.8%) juveniles were readmitted into the JCHs within the research period. Among the recidivists, 22 (30.1%) were for violent recidivism, and 51 (69.9%) were for nonviolent recidivism.

Table 4 shows the mean total score of the YLS/CMI in each risk category by original cutoff score as well as percentile rank groups in the current sample. Based on the original cutoff scores (Hoge & Andrews, 2002), participants were classified into three risk categories: 154 (39.6%) for low-risk, 223 (57.3%) for moderate risk,

and 12 (3.1%) for high risk. Based on the percentile rank of the current sample, the participants were categorized into three risk categories: 120 (30.8%) for low risk, 142 (36.5%) for moderate risk, and 127 (32.6%) for high risk.

Table 5 presents the percent of recidivists in each risk category group. Recidivism for each juvenile was measured through three outcome variables: any (all), violent, and nonviolent reoffending. As shown in Table 5, low-risk group (based on the original cutoff scores of the YLS/CMI) included less than 10% of recidivists. In contrast, of the juveniles who were classified as high risk based on the original cutoff score, more than half recidivated. Similar trends were observed using violent and nonviolent recidivism as outcome variable. Chi-square analyses by original risk level were also significant for any recidivism,  $\chi^2(2) = 29.98$ ,  $p < .01$ , violent recidivism,  $\chi^2(2) = 10.65$ ,  $p < .01$ , and nonviolent recidivism,  $\chi^2(2) = 18.72$ ,  $p < .01$ . Chi-square analyses by percentile-based risk level were also significant for any recidivism,  $\chi^2(2) = 28.04$ ,  $p < .01$ , violent recidivism,  $\chi^2(2) = 10.22$ ,  $p < .01$ , and nonviolent recidivism,  $\chi^2(2) = 16.23$ ,  $p < .01$ .

Table 6 presents zero-order correlations between the total score of the YLS/CMI and the recidivism measures by overall sample and disposition type. For the total sample, higher YLS/CMI scores were significantly associated with increased recidivisms. Similarly, significant correlations were found between the YLS/CMI

Table 3  
Zero-Order Correlation Matrix for the YLS/CMI Subscales (N = 389)

	1	2	3	4	5	6	7	8
1. Prior dispositions	—							
2. Family/parenting	.18**	—						
3. Education/employment	.19**	.32**	—					
4. Peer relations	.26**	.20**	.32**	—				
5. Substance abuse	.03	.20**	.11*	.10	—			
6. Leisure/recreation	.14**	.15**	.17**	.33**	.06	—		
7. Personality/behavior	.18**	.46**	.42**	.26**	.11*	.11*	—	
8. Attitudes/orientation	.24**	.53**	.33**	.29**	.27**	.07	.49**	—

Note. YSL/CMI = Youth Level of Service/Case Management Inventory.

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

Table 4

*Mean Total Score of the YLS/CMI in Each Risk Category by Original Cutoff-Based Groups and Percentile Rank-Based Groups (N = 389)*

Variable	N	%	M	SD	Min	Max
Original cutoff-based groups						
Low (0–8)	154	39.6	5.74	1.95	0	8
Moderate (9–22)	223	57.3	13.39	3.51	9	22
High (23–42) <sup>a</sup>	12	3.1	25.92	2.47	23	30
Percentile-based groups						
Low (0–7)	120	30.8	5.10	1.73	0	7
Moderate (8–12)	142	36.5	9.85	1.44	8	12
High (13–42)	127	32.6	17.10	3.83	13	30

Note. YLS/CMI = Youth Level of Service/Case Management Inventory.

<sup>a</sup> The “very high” category on the original cutoff version is collapsed into “high” risk category.

total score and all types of dichotomized recidivism measures for the community-disposed sample. For the juveniles who were disposed to institution, the YLS/CMI total score and any recidivism were significantly correlated in the positive direction, but significant correlations of the YLS/CMI and other dichotomized outcome measures were not obtained. Finally, across all the groups, a total score of the YLS/CMI and days to recidivism were negatively correlated, indicating that a higher YLS/CMI score was associated with a decreased time to recidivism.

### ROC Analyses

ROC analyses were used to evaluate the overall predictive accuracy and the accuracy during specific follow-up time frames. As shown in Table 7, for the total follow-up time frame, the AUC values are .72 for any recidivism and .70 for violent and nonviolent recidivism. For the total follow-up time frame, the community disposed group had AUC values of .76, .76, and .72 for any, violent, and nonviolent recidivism, respectively. Weaker AUC values were noted for the institution disposed group. Accounting for all the times frames, the majority of the AUCs were within a large effect size category (AUC > .714, Rice & Harris, 1995).

### Survival Time Analyses

According to the second research question, it is anticipated that the YLS/CMI total score will be inversely related with time till recidivism. In the current study, cases were censored when the

participant was (a) at the end point of the data collection or (b) reached age 20. Before conducting the analysis, the proportional hazard assumption was examined using the log-minus-log survival plots (Kleinbaum & Klein, 2005, p.140). Based on the log-minus-log plot, the hazard lines for separate three risk-level groups did not crossed each other. Therefore, the basic assumption for survival analysis was satisfied.

The Kaplan-Meier survival curves for any recidivism by each risk category on the YLS/CMI are presented in Figures 1 and 2. The medium survival time was 1,467 days, with the mean time at risk 518.3 (SD = 307) days. For every follow-up period, the survival rate was higher for participants in the lower risk group compared with the higher risk group. Log rank tests revealed significant differences between possible combination of comparison of three original risk groups and recidivism,  $\chi^2(1) = 13.06$ ,  $p < .01$  for low and moderate;  $\chi^2(1) = 66.78$ ,  $p < .01$  for low and high; and  $\chi^2(1) = 21.29$ ,  $p < .01$  for moderate and high. Log rank tests were also performed based on the percentile-based risk groups. The percentile-based high-risk group was significantly different from both the low-risk group,  $\chi^2(1) = 26.46$ ,  $p < .01$ , and the moderate-risk group,  $\chi^2(1) = 16.34$ ,  $p < .01$ . However, the low and moderate groups did not differ significantly,  $\chi^2(1) = 2.75$ ,  $p = .097$ . Table 8 contains the Kaplan-Meier cumulative proportion surviving at 6-, 12-, and 18-month intervals. The benefit of the Kaplan-Meier rates over base rates is that the Kaplan-Meier rates control for censored cases. For the 12-month follow-up, the confidence interval (CI) for the estimator of the survival function for

Table 5

*Percent of Recidivists in Each Risk Category by Original Cutoff-Based Groups and Percentile Rank-Based Groups (N = 389)*

	Low	Moderate	High
Original cutoff groups <sup>a</sup>			
% of any recidivists	9.1 (14/154)	22.9 (51/223)	66.7 (8/12)
% of violent recidivists	1.3 (2/154)	8.1 (18/223)	16.7 (2/12)
% of nonviolent recidivists	7.8 (12/154)	14.8 (33/223)	50.0 (6/12)
Percentile rank groups <sup>b</sup>			
% of any recidivists	7.5 (9/120)	15.5 (22/142)	33.1 (42/127)
% of violent recidivists	0.8 (1/119)	5.6 (8/142)	10.2 (13/127)
% of nonviolent recidivists	6.7 (8/120)	9.9 (14/142)	22.8 (29/127)

Note. The number of recidivists and total persons in each category are shown in parentheses.

<sup>a</sup> Low (0–8), moderate (9–22), and high (23–42). <sup>b</sup> Low (0–7), moderate (8–12), and high (13–42).

Table 6

*Zero-Order Correlations Between the YLS/CMI Total Score and Any Recidivism, Violent Recidivism, Nonviolent Recidivism, and Days To Recidivism by Overall Sample and Disposition Type (N = 389)*

	Total	Community <sup>a</sup>	Institution <sup>b</sup>
Any recidivism	.34**	.42**	.21*
Violent recidivism	.16**	.22**	.06
Nonviolent recidivism	.28**	.33**	.20
Days to recidivism <sup>c</sup>	-.42**	-.38**	-.62**

*Note.* YLS/CMI = Youth Level of Service/Case Management Inventory. <sup>a</sup> *n* = 299. <sup>b</sup> *n* = 90. <sup>c</sup> Correlations between days to recidivism and the YLS/CMI were calculated for recidivists in each category (*n* = 73, 56, and 17 for total, community, and institution samples, respectively.)

\* *p* < .05. \*\* *p* < .01.

the high group (est. = 343.8, CI = [337.1, 350.6]) did not overlap with the low group (est. = 362.6, CI = [358.9, 366.1]), but did overlap with the moderate groups (est. = 354.2, CI = [346.4, 362.1]). For the 18-month follow-up, the CI interval for the estimator of the survival function for the high group (est. = 443.5, CI = [413.3, 473.7]) did not overlap with the low (est. = 539.9, CI = [530.6, 549.2]) or moderate groups (est. = 518.3, CI = [502.3, 534.2]). For the 6-month analysis the estimator could not be calculated because of no recidivism in the low groups.

Next, Cox proportional hazard analyses were performed to examine whether the YLS/CMI could predict any offense sooner, after adjusting for control variables (age at the time of assessment and disposition type). In a series of analyses, the risk category of the YLS/CMI was entered as the independent variable to predict readmission into the JCH for any offense. As expected, significant impact of the YLS/CMI on any recidivism was found even after taking into account for controls (Wald = 55.7, *p* < .001, Exp(B) =

1.17). Without any controls (unadjusted analysis), similar results were found (Wald = 58.9, *p* < .001, Exp(B) = 1.17). Thus, both adjusted and unadjusted analyses were significant, indicating that higher YLS/CMI scores could predict recidivism more quickly than lower scores.

## Discussion

### Overall Predictive Validity of the YLS/CMI

The purpose of this study is to examine the predictive validity of the YLS/CMI in a sample of Japanese juvenile offenders. Overall, the results suggest that a total score of the YLS/CMI is able to predict any readmission into the JCH after controlling for possible confounds. The total follow-up time AUC (0.75) of the YLS/CMI is in the typical range for the prediction of general recidivism (0.65 to 0.75; Hanson, 2009). Specific to juveniles, previous research reported that the AUC values of the YLS/CMI ranged from 0.60 (Bechtel et al., 2007; Welsh et al., 2008) to 0.74 (Catchpole & Gretton, 2003) for any recidivism. In addition, short-term prediction was in the AUC .80 range, comparable to the Olver et al. (2012; Males, Table 4), even though the Olver study had base rates well above 50%. Based on this literature, it is concluded that the Japanese translated version of the YLS/CMI has a sufficient predictive utility in determining future offenses among juvenile offenders.

Another important aspect for risk assessment tools is to predict time till offense. Among recidivists, the YLS/CMI total score and days to recidivism were moderately correlated in the negative directions. In addition to correlations, survival models, incorporating the time to recidivism and the rate of occurrence of recidivism while controlling for loss of participants due to nonrecidivism factors (i.e., censored cases that could not be followed due to reaching the age of 20) were used. As expected in the second research question, the YLS/CMI could discriminate individuals

Table 7

*AUC Analysis of the YLS/CMI Predicting Any, Violent, and Nonviolent Recidivism for Each Sample*

Target recidivism	AUC		
	Overall (N = 389)	Community-disposed (N = 299)	Institution-disposed (N = 90)
Any			
6 months	.82 [.74,.90]	.87 [.79,.95]	.70 [.40,.99]
12 months	.77 [.70,.84]	.80 [.73,.88]	.76 [.58,.95]
18 months	.78 [.72,.84]	.82 [.75,.88]	.68 [.52,.83]
Total time	.72 [.66,.78]	.76 [.69,.83]	.61 [.45,.77]
Violent			
6 months	.72 [.67,.79]	.82 [.76,.87]	— <sup>a</sup>
12 months	.80 [.70,.90]	.85 [.76,.93]	— <sup>b</sup>
18 months	.80 [.71,.88]	.85 [.77,.93]	.64 [.34,.94]
Total time	.70 [.60,.79]	.76 [.66,.86]	.50 [.18,.83]
Nonviolent			
6 months	.85 [.75,.94]	.87 [.79,.96]	.85 [.65,.99]
12 months	.76 [.67,.84]	.77 [.68,.87]	.73 [.53,.92]
18 months	.74 [.66,.81]	.76 [.67,.85]	.67 [.50,.85]
Total time	.70 [.62,.78]	.72 [.63,.81]	.64 [.46,.82]

*Note.* Values in parentheses are 95% confidence intervals. AUC = area under the curve.

<sup>a</sup> No failed cases. <sup>b</sup> One failed case.

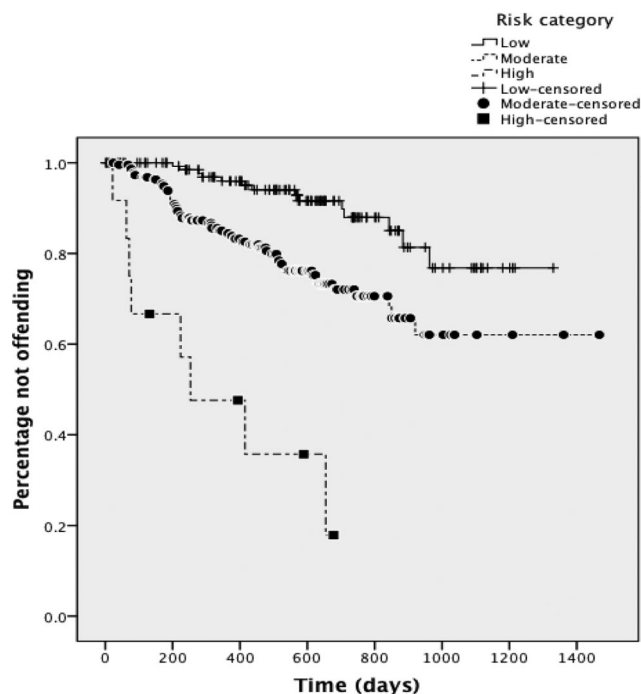


Figure 1. Survival curves for original cutoff-based risk groups.

who were more likely to recidivate and do so more quickly. Higher scores on the YLS/CMI will predict a shorter time to recidivism even after controlling for age of the offender and disposition (community vs. institution) type.

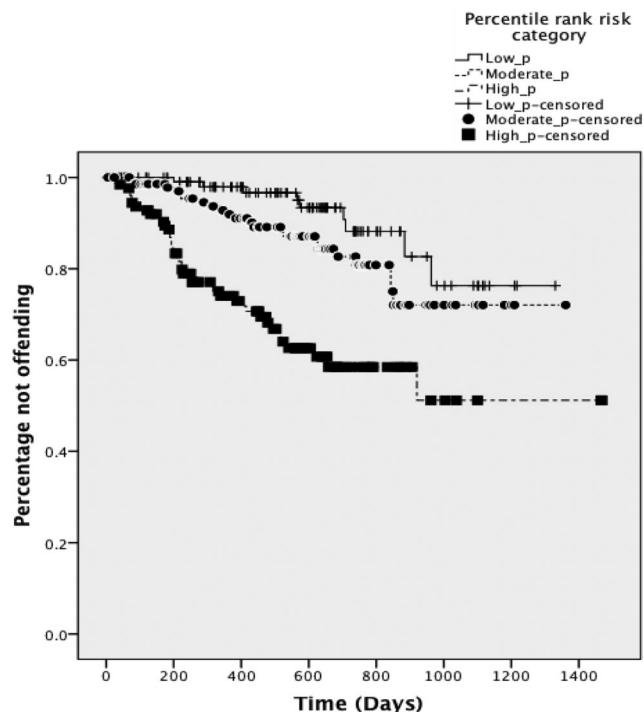


Figure 2. Survival curves for percentile-based risk groups.

Table 8

*Kaplan-Meier Cumulative Proportion Surviving at 6-, 12-, and 18-Months for Original and Percentile Cutoff-Based Risk Groups*

	Cutoff-based risk groups	
	Original	Percentile
Any recidivism		
6 months		
Low	— <sup>a</sup>	— <sup>a</sup>
Moderate	.938 (.017)	.978 (.013)
High	.667 (.136)	.886 (.029)
12 months		
Low	.951 (.020)	.979 (.015)
Moderate	.838 (.026)	.900 (.027)
High	.476 (.150)	.741 (.041)
18 months		
Low	.940 (.022)	.966 (.019)
Moderate	.775 (.032)	.881 (.030)
High	.357 (.152)	.637 (.049)

Note. Values in parentheses are standard error.

<sup>a</sup> There was no recidivism within the first 6 months for the low groups.

In sum, the utility of the YLS/CMI in predicting recidivism has been well established in previous studies using the North American samples. However, the YLS/CMI has been less applied outside the North America. Actuarial risk instruments are often criticized “for their lack of generalizability outside the original sample used to construct them” (Huss, 2009, p.112). When attempting to apply actuarial instruments for offenders with different cultural backgrounds, cross-validation procedure become especially necessary. Despite the cultural differences between Canada and Japan, this study reveals that the YLS/CMI is able to predict various types of recidivism among Japanese juvenile offenders. The present study also presents evidence that supports the wide applicability of the YLS/CMI total score, regardless of situation and context.

### Differences in Predictive Accuracy by Disposition Type

One of the interesting findings in the present study is the differential predictive utility of the YLS/CMI across samples. The ROC analyses revealed stronger AUCs for the YLS/CMI total score predicting any recidivism for individuals sent to community, but lower AUCs for individuals sent to institution as a result of Family Court hearing.

Possible contributors to this result are the interventions and developmental changes that take place with each juvenile. Given that the YLS/CMI contains many dynamic risk factors that can be changed over time, it can be expected the YLS/CMI score received entering the institution might not accurately reflect the risk level of juveniles after receiving intensive institutional treatment programs. In this study, the follow-up period began at the date of release from the JCH for the community-disposed sample. In contrast, for the institution-disposed sample, the follow-up period began at the institutional release date. The purpose of this procedure is to make the follow-up term reflect only time spent in the community. The overall risk levels of juveniles who had been sent to correctional institutions may have been addressed and reduced through treatment before their release. Needless to



say, it is also possible that mere maturation might have an influence for reducing risk of recidivism because the institution-disposed group spent 6 to 12 months on average in secure custody. The risk assessment administered further away from release may provide a less accurate measure of the juveniles' functioning then at the actual point of release (Andrews, Bonta, & Wormith, 2006; Caldwell & Dickinson, 2009; Dolan & Rennie, 2008). The initial design of the YLS/CMI was to have the instrument readministered every 6 months (Schmidt et al., 2005). The present results echo regular risk assessment, given that youths are more likely to experience change through development and transition in comparison with adults (Olver et al., 2009; Welsh et al., 2008).

### Comparison With Previous North American Studies

Overall, the YLS/CMI is found to have relatively robust predictive validity in a sample of Japanese juvenile offenders. However, there are some differences between the current results and previous studies. The most significant difference is that the mean total score of the YLS/CMI was remarkably lower than those reported in North America (Bechtel et al., 2007; Caldwell & Dickinson, 2009; Catchpole & Gretton, 2003; Holsinger et al., 2006; Olver, Stockdale, & Wong, 2012; Onifade et al., 2008; Schmidt et al., 2005; Welsh et al., 2008). Specifically, the mean total score in the present study was 10.75, ranging from 0 to 30, whereas the highest possible score is 42. Previous North American samples showed the mean total score ranging from 16.3 (Onifade et al., 2008) for youths who were on probation to 33.73 (Caldwell & Dickinson, 2009) for nonregistered juvenile sex offenders who were incarcerated in a secured setting. In comparison to the studies shown in Table 2, the present mean is the lowest among the listed studies and is at least 5 points below North American samples. This finding indicates that the current participants have low scores, suggesting a low-risk sample. There are several possible interpretations for this result.

First, it is possible that the present sample may be a relatively low-risk group even among Japanese juvenile offenders. This discrepancy suggests that the current sample represents juvenile offenders who commit minor offenses. However, this is unlikely because the current sample consists of juveniles who met criteria to be admitted into the JCH. Most arrested juveniles are dismissed without referring juveniles to the JCH. According to the *White Paper on Crime in 2008* (Research and Training Institute of the Ministry of Justice, 2008), the number of newly admitted juveniles into the JCHs nationwide in 2007 was approximately less than 10% of the juveniles who were referred to Family Court in the same year. Given this selection procedure prior to admission into the JCH, it is not likely that the participants in the present study are an unduly low-risk group, even among the Japanese juvenile offender population.

Alternatively, it is possible that the lower mean total score presents the fact that their risk of recidivism is systematically lower than those of the North American samples in the first place. Systematic differences between the North American and Japanese samples might produce the disparity. The base rate of any recidivism on the current sample was approximately 18%. This value is fairly low compared with previous studies using the North American samples, in which the base rates of any recidivism ranged from 26% (Onifade et al., 2008) to 74% (Olver et al., 2012).

However, it is difficult to draw a definite conclusion on the overall differences in the base rates of recidivism between countries because we do not know how much the two base rates may underestimate the true recidivism.

Another possible explanation for the lower mean total score of the YLS/CMI is that the content areas of the YLS/CMI do not adequately assess relevant content among a sample of Japanese juvenile offenders. As presented in Table 1, several subscale means in the current sample were near zero. There are cultural differences and/or crime trends that maybe responsible for some lower scale scores. Two examples suggest this conclusion. First, the average score of the Substance Abuse scale was near zero. Vega et al. (2002) reported that the lifetime prevalence of any substance use is 32.5% for the United States ( $N = 5,872$ ) and 25.9% for Canada ( $N = 6,902$ ). In their research, cannabis, stimulants, cocaine, anxiolytics, opioids, psychedelics, and inhalants were included. Even when excluding cannabis, they still found high lifetime prevalence rates (19.4% for the United States and 10.4% for Canada). In contrast, Wada, Shimane, and Tachimori (2009) conducted a similar research for Japanese general population ( $N = 3,191$ ). They reported the lifetime prevalence rates among the population aged 15 and above in Japan as follows: 2.9% for any drugs, 1.9% for organic solvent (inhalants), 1.4% for cannabis, 0.3% for stimulant drugs, 0.2% for MDMA, and 0.0% (within the range of statistical error) for cocaine and heroin. With regard to substance misuse diagnoses, Kawakami et al. (2005) examined the prevalence of Japanese community populations with the *Diagnostic and Statistical Manual of Mental Disorders* (4th ed.; *DSM-IV*). They reported that the 1-year prevalence of drug abuse or dependence was 0.1%, which was much lower in comparison with previous North American research. In contrast, the lifetime prevalence estimates for drug abuse and drug dependence in the United States were 7.9% and 3.0% using the same *DSM-IV* criteria (Kessler et al., 2005). The exact international comparison of the prevalence of drug misuse is difficult to make (Greberman & Wada, 1994), but it is plausible to believe that the lifetime prevalence rate of drug misuse in Japan is extremely low, compared with North American populations. It is also likely that the onset of substance misuse occurs at a later age in Japan than North American populations. Therefore, if the original YLS/CMI items for substance abuse are applied to Japanese juvenile offenders, it may not show sufficient predictive ability for Japanese juvenile offenders because of the items having a high threshold to signal occurrence. One of the solutions to improve the predictive validity of Substance Abuse scale among Japanese juvenile offenders is to replace some of the items with the other items to reflect the Japanese situation and make the threshold lower. For instance, the item asking "occasional drug use" for juveniles could be replaced by "any drug use" to improve the hit rate among Japanese juvenile offenders. The lack of predictive validity does not suggest the substance use is unimportant, but that appropriate and adequate content sampling needs to occur.

Another possible cause of the lower total score with Japanese juvenile offenders is the content and nature of the items in the first scale, Prior and Current Offenses/Dispositions. Criminal history has been consistently reported as one of the most significant predictors of recidivism (Bonta, Law, & Hanson, 1998; Gendreau, Little, & Goggin, 1996; Hanson & Bussière, 1998; Hanson & Morton-Bourgon, 2004). Considering the exceedingly low mean

score of this scale, it is concluded that the items failed to capture the prior offense history of the Japanese juvenile offenders. It was possible that high threshold of some items on this scale (e.g., three convictions or more) restricted variability in the subscale score, which in turn decreased the predictive ability of the Japanese translated version of the YLS/CMI. As mentioned in the Method section, the authors modified two items of the Prior and Current Offenses/Dispositions scale in order to attempt to reflect the Japanese juvenile justice system more accurately. More specifically, the items "three or more prior convictions" and "three or more current convictions" were replaced with "three or more prior Family Court referrals" and "three or more cases currently referred to Family Court," respectively. However, this modification seemed to have limited impact. Lowering the threshold of some items (e.g., "one or more" prior Family Court referrals instead of "three or more" prior Family Court referrals) may increase the utility of this scale in predicting further offenses.

The content coverage issues may contribute to inadequate thresholds and potential lack of content relevance. Inadequate content has implications for measuring risk change and face validity. One of the benefits of dynamic risk assessment instruments is that they can indicate a reduction of risk through interventions. However, if a content area cannot be adequately sampled, then the ability of the instrument to indicate change is limited. For face validity, if the items are known not to be relevant, then the efforts in scoring could be reduced and the subsequent usage could be dismissed. Thus, the total scale score may have adequate predictive validities, but its utility can be greatly curtailed by inadequate content coverage. Others have argued that in selecting risk assessment instruments, the first two considerations should be the type of client being assessed and then the nature of the outcomes (Kroner, Mills, Gray, & Talbert, 2011). In deciding among instruments, the type of client included how the client is represented in the data. Thus, adequate means and standard deviations are necessary. The second consideration is the predictive validity of the outcomes. In the present study, the YLS/CMI has adequate predictive validity, both in terms of the occurrence of recidivism (Research Question 1) and time till failure (Research Question 2), but inadequate content representation may limit its potential use (dynamic change measurement, treatment outcome reductions, level of supervision recommendations), compared with North American applications.

### Applied Implications

The current results have policy implications for improving the juvenile classification/assessment system in Japan. First, an actuarial risk assessment instrument can be introduced into the regular assessment procedure at the JCH, producing valid results. As mentioned earlier, the risk and need assessment practice at the JCH has been solely based on the absence of a structured assessment process. Risk assessment practice using a comprehensive and consistent instrument of risk and need items is not typical in Japan. The integration of instruments into a disposition recommendation depends on each psychologist. A systematic use of a risk assessment instrument will assist the consistency of the decision process and to facilitate an effective treatment plan, although considerable changes to the YLS/CMI subscales are needed before the instrument can be used for needs assessments.

From a practical point of view, there are two approaches to introduce an actuarial risk assessment instrument into the Japanese juvenile classification system. The first approach is to use the translated version of an existing risk instrument. The advantage of using well-established instruments is that they are based on sound empirical research. Common risk assessment instruments are confirmed in their predictive validity using various samples in different forensic settings. For research purposes, it also facilitates international comparative studies, which may add information on relative impacts of several risk factors on criminal justice outcomes in different countries. However, because of the fact that cutoff scores for risk levels were derived from the North American sample, it is necessary to explore optimal cutoff scores for Japanese juvenile offenders for a particular decision purpose.

A second approach is to develop a new actuarial instrument. In general, it is common that instruments display reductions in the degree of their predictive accuracy when cross-validated in samples other than construction sample (Olver et al., 2009). It is important to note that there is a possibility that other unique predictors, which are not included in the YLS/CMI, may contribute to enhance the accuracy of prediction among Japanese juvenile offenders. Although there is room for improvement by examining some promising predictors, a drawback of this approach is the heavy cost. Test development takes considerable time to collect data, accumulate empirical research, develop actuarial instruments, and revise it. Having said that, researchers should explore possible unique risk factors for Japanese juvenile offenders, in addition to evaluating the cross-validity of the existing instruments.

### Limitations and Future Directions

Our findings suggest that a total score of the YLS/CMI significantly predicts any recidivism in a sample of Japanese juvenile offenders. This instrument is also able to predict time to recidivism significantly. On the whole, cross-cultural validation of the YLS/CMI total score is confirmed. Nonetheless, a number of methodological limitations to the present study should be mentioned.

First, our data set does not contain any recidivism information after reaching adulthood, although variability of follow-up length for each participant was controlled for in the analysis. Relatively short observation term may contribute to the low base rate of recidivism.

Second, there was a lack of intensive training of the raters to ensure fidelity of administration. Although the current research used prospective design, which allowed more sensitive and accurate results in comparison to the retrospective one that exclusively relies on the document information, it is critical that reliability of the ratings is optimized through training.

A third limitation relates to lack of female participants, restricting the generalizability of the findings to male juvenile offenders in Japan. There has been little research that examined the predictive validity of the YLS/CMI for female juvenile offenders. Although some researchers reported that the YLS/CMI was a robust risk measure in terms of ethnicity and gender (Jung & Rawana, 1999; Schmidt et al., 2005), others raised a question about it (Onifade et al., 2008). Therefore, it is worth investigating the YLS/CMI's validity utilizing several control variables in order to examine the wide applicability and robustness of the instrument.

Fourth, the use of only official recidivism data could be indicated as one of the limitations. In the present study, recidivism was measured through official readmission data into the JCHs post release, and thus, it is likely that our estimate of recidivism is underestimated. Furthermore, it may be useful to use other outcomes as alternatives of recidivism to evaluate the effectiveness of actuarial risk assessment instruments, though recidivism is the most important outcome. More diverse outcome measures (i.e., violation failure), including self-report, would help to clarify the utilities and limitations of the YLS/CMI. In addition, the current cutoff scores suggesting low, moderate, and high categories was an effort to recalibrate the YLS/CMI total score within a Japanese context. These cutoff scores may have capitalized on chance and require cross-validation to determine their robustness.

In summary, proper use of actuarial risk assessment tools could inform recommendation options at the JCH and serve to improve the entire assessment and treatment practice in the Japanese juvenile justice system. It appears that general components of risk have cross-culture validity (Thompson & McGrath, 2012), although certain scales may lack validity and specific cutoff scores for decisions may need to be altered.

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