Article

Predictive Validity of the YLS/CMI in a Sample of Portuguese Young Offenders

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Abstract

The Youth Level of Service/Case Management Inventory (YLS/CMI) is a widely used risk assessment instrument that comprehensively assesses risk factors and criminogenic needs among young individuals. This study explores the association between YLS/CMI scores and subsequent recidivism among 608 Portuguese young offenders aged 12 to 18 years. The results support the predictive validity of the YLS/CMI in assessing recidivism among young offenders. The study found significant connections between YLS/CMI scores and recidivism for Placement in an Education Center (PEC) measures, indicating higher scores correlated with increased reoffending likelihood. However, no significant association was found between YLS/CMI scores and recidivism in Educational Supervision (ES) measures. These results emphasize the need to consider specific measures when gauging YLS/CMI's predictive validity.

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The Youth Level of Service/Case Management Inventory (YLS/CMI; Hoge & Andrews, 2002) is one of the primary risk assessment instruments widely used in various countries in the field of juvenile justice and offender rehabilitation, providing a comprehensive assessment of risk factors and criminogenic needs among young individuals (Koh et al., 2020). According to the theoretical framework of this inventory—the Responsivity, Needs, and Risk (RNR) Model—there are four main individual factors that stand out for their predictive value in predicting criminal recidivism, namely: antisocial attitudes, antisocial friends/peers, an antisocial personality pattern, and a history of previous offenses. These are accompanied by four additional factors, namely: family problems, education and employment, substance abuse, and leisure and recreational activities (Bonta & Andrews, 2017).

The analysis of recidivism has been widely used in research to assess the effectiveness of interventions and risk assessment tools within the juvenile justice system (Cuevas et al., 2018). There is no consensus on the definition of recidivism, and different operationalizations of this concept can be found in the literature (Fazel & Wolf, 2015; Koh et al., 2020; Neves, 2016), as well as within the legal systems of different countries (Ramos, 2015). In a broader sense, recidivism has been defined as the recidivism into criminal behavior, which can involve a range of outcomes, including new detention and new convictions (Fazel & Wolf, 2015). This more comprehensive conceptualization is shared by other authors (Zara & Farrington, 2016), who view recidivism as a longitudinal sequence of offenses in which the same individual commits criminal acts at different points in their life course. One of the most prevalent definitions was presented by Maltz (2001), who conceptualizes recidivism as involving the occurrence of criminal behavior following a conviction, sentence, and (presumably) rehabilitation. Therefore, it is a slightly narrow definition closely aligned with the Portuguese legal conceptualization of criminal recidivism, where "the aggravation of the penalty results from the fact that the new crime demonstrates that the offender did not respect the admonition resulting from the previous conviction" (Neves, 2018, p. 420). The notion of recidivism as the repetition of a criminal act by the same agent previously convicted for one or more crimes thus requires the existence of three elements for its verification: (i) a convicted subject; (ii) a previous conviction; and (iii) the commission of a new crime or crimes after the recurrence (Ramos, 2015). Regarding young

offenders, the operationalization of recidivism within the scientific community appears to vary among different authors, often defined as new arrests and/or charges and/or convictions, which compromises the comparability of results across studies (Fazel & Wolf, 2015; Koh et al., 2020; Zara & Farrington, 2016).

Examining the occurrence of subsequent offenses after the completion of measures, give valuable insights into the predictive validity of assessment instruments like the YLS/CMI. In terms of the validity of the YLS/CMI, its discriminative ability between reoffenders and non-reoffenders has been demonstrated (Anderson et al., 2016; Cuervo & Villanueva, 2018; Koh et al., 2020). Research has shown that the YLS/CMI has a moderate to strong predictive power, corresponding to an area under the curve (AUC) value of around 0.60 or higher (cf. Anderson et al., 2016). A systematic review conducted by Koh et al. (2020) included 19 studies that examined the predictive validity of the YLS/CMI in different countries (Canada: 7; UK: 4; USA: 2; Japan: 2; Spain: 1; Australia: 2; and Singapore: 1) and based on samples ranging from a minimum of 74 participants (Catchpole & Gretton, 2003) to a maximum of 1.138 participants (Vaswani & Merone, 2014). Regarding the results related to the predictive validity of the total score of the YLS/CMI, the authors found AUC values ranging from 0.57 to 0.76, depending on the studies. This variability in AUC is explained by differences in the utilized population samples, definitions of violence and recidivism, and the follow-up periods considered. In addition to predictive validity, the systematic review also examined other psychometric characteristics of the YLS/CMI, including internal and inter-rater reliability (intra-class correlations) which ranged from good to excellent, and internal consistency (measured by Cronbach's alpha) with values also ranging from good to excellent (Koh et al., 2020).

Other studies (Anderson et al., 2016; Pral, 2018; Rennie & Dolan, 2010, Villanueva et al., 2019) have demonstrated the predictive validity of the YLS/CMI, including the abbreviated version of the instrument (Cuervo & Villanueva, 2018). A study conducted in Spain (Villanueva et al., 2019) with a sample of Arab-descendant young offenders ($n = 156$, aged 14–17 years) demonstrated that, regardless of culture, the YLS/CMI risk score was able to predict subsequent recidivism during the follow-up period. A Portuguese study (Pral, 2018) involving a sample of 196 young individuals under educational protective measures also found that the risk assessed through the YLS/CMI predicts recidivism. Specifically, this Portuguese study found that certain characteristics have a greater impact on the assessment of the risk of criminal recidivism, including: the involvement of young individuals in structured activities; personality and behavioral traits (e.g., self-esteem, aggressiveness, attention, frustration tolerance; sensitivity to others,

pro-criminal, antisocial, and defiant attitudes toward authority, as well as the ability to accept/seek help).

Despite research on the predictive validity of the YLS mostly presenting as consistent, supporting the use of this instrument for risk assessment, juvenile offending is often the result of complex interactions between immutable factors and modifiable risks (Chung et al., 2005). However, there are divergences regarding which specific factors are most relevant in risk assessment. While some studies emphasize the importance of certain domains of the YLS, such as attitudes/orientations and prior offenses (Baglivio & Jackowski, 2013; Cuervo & Villanueva, 2015), others find varied results, indicating a lack of consistency in their practical application. Flores et al. (2004) found that "relatively few of the forty-two items contribute to accuracy in risk classification" (p. 1), and that of the eight domains, only three (substance abuse, attitudes/orientations, and prior/current offenses) were related to case outcomes, two of which (attitudes/orientations and prior/current offenses) were also significant in the study by Witherup and Verrecchia (2023). In contrast, a normative Portuguese study (Pimentel et al., 2015) of the YLS revealed that items concerning history of previous offenses are not particularly predictive.

Furthermore, recent studies reinforce the importance of dynamic factors compared to static ones in assessing the risk of recidivism (e.g., Lloyd et al., 2020; Miller et al., 2021; Yukhnenko et al., 2020). A Spanish study (Cuervo & Villanueva, 2015) found that certain dynamic factors (education/employment, leisure/recreation, and personality) emerged as more discriminatory in predicting juvenile recidivism. In another Australian study (McGrath et al., 2018), four of the central eight factors emerged as significant predictors of recidivism (family, substance abuse, leisure, and personality). In summary, research reinforces the importance of the assessment of recidivism and its risk and protective factors (e.g., Lloyd et al., 2020; Miller et al., 2021; Yukhnenko et al., 2020).

Current Study

The Portuguese Educational Tutelary Law (*ETL)* establishes a justice system to deal with juvenile delinquency between the ages of 12 and 16 years. It aims to provide an appropriate response to each young person's situation from the moment they come into contact with the justice system (Art. 43 of the ETL). Among the Educational Tutelary Measures (*ETM)* provided by the ETL are Educational Supervision (*ES*; non-institutional measure) and the institutional measure, specifically Placement in an Educational Center (*PEC*), which are the most severe measures applied in Portugal in this context and are typically applied to young individuals who commit more serious crimes. The ETM

aims to promote social adaptation, instill values and behaviors in accordance with the law, protect the physical, emotional, and moral integrity of young individuals, as well as promote their social reintegration, education, and prevent recidivism (ES Measure, 2023; PEC Measure, 2023; Rodrigues, 2016).

The accurate assessment of the risk of reoffending in individuals under custody is a crucial factor in making decisions related to criminal justice and correctional treatment. In this context, the YLS/CMI has emerged as an effective tool for evaluating the risk of reoffending in young offenders. The YLS/CMI is widely used in different international contexts and was adapted for the Portuguese context by Fonseca et al. (2015). The normative study of the YLS/CMI for the Portuguese population (Fonseca et al., 2015) provided valuable insights into risk patterns among youth in Portugal. By establishing norms for the Portuguese version of the YLS/CMI, the study lays a fundamental foundation for assessing the risk of criminal recidivism among young individuals in the country. The identification of differences in risk/needs scores between institutional and community-based measures, as well as by gender, reinforced the discriminative validity of the instrument. The increase in scores as phases progress and for more restrictive measures underscores its ability to discern nuances in risk levels across different legal contexts. However, it is important to emphasize that, although the normative study of the YLS/CMI was comprehensive, the predictive validity, a fundamental aspect to assess the degree of suitability of the instrument in measuring recidivism, was not analyzed. Predictive validity is essential to assess the YLS/CMI's ability to accurately predict the risk of reoffending in young offenders, something that Directorate of the Juvenile Justice System (DJJS) evaluates annually.

Thus, in the present study, we aimed to examine the predictive validity of the YLS/CMI in relation to recidivism among young Portuguese offenders. The concept of recidivism operationalized by the Portuguese juvenile justice system was adopted, which refers to "the commission of new illegal acts that have led to convictions within the scope of educational or criminal measures" (Moreira et al., 2023, p. 4).

Method

Sample

The present study included 608 participants, of whom 394 had ES measures and 214 had PEC measures. The participants were selected by convenience, for the following criteria: young individuals who served measures of ES and PEC between January 1, 2018, and December 31, 2019. All our sample members met the inclusion criteria for the study.

Table 1. Sociodemographic Description of the Individuals.

	N = 608
Variable	N (%)
Nationality	
Portuguese	560 (92.1)
Brazilian	12 (2)
Cape Verdean	15 (2.5)
Sao Tomean	7 (1.2)
Bissau-Guinean	6 (1)
Other	8 (1.2)
Sex	
Male	524 (86.2)
Female	84 (13.8)
Education level[a]	
Fourth grade	178 (42.8)
Sixth grade	219 (52.6)
Ninth grade	19 (4.6)
Type of ETM	
ES	394 (64.8)
PEC	214 (35.2)

[a]The number of participants in the education level variable ($n = 416$) is lower than the total number of participants ($n = 608$). This is due to the fact that it was not possible to assess the information regarding the education level of 192 of the participants.

Of the participants in the study, 524 (86.2%) were male and 84 (13.8%) were female, aged between 12 and 18 years ($M = 14.55$, $SD = 1.17$). Finally, most of the participants ($n = 560$, 92.1%) were of Portuguese nationality and had up to sixth grade of schooling ($n = 219$, 52.6%; see Table 1).

Instruments

Youth Level of Service/Case Management Inventory (YLS/CMI; Hoge & Andrews, 2002; Adapted for the Portuguese Population by Fonseca et al., 2015).
The YLS/CMI consists of seven sections. The first section, "assessment of risks and needs," consists of 42 items distributed over eight domains: (1) prior and current offenses and dispositions; (2) family circumstances and parenting; (3) education and employment; (4) peer relations; (5) substance use; (6) leisure and recreation; (7) personality and behavior; (8) attitudes and orientation. Each item on the YLS/CMI is coded as present (1) or absent (0), and

a score per domain and a final score can be calculated, ranging from 0 to 42 points. In the second section, "summary of risks and needs," calculations are made to determine the level of risk of recidivism, which is translated into four risk categories: low risk (0–8); moderate risk (9–22); high risk (23–34); and very high risk (35–42). In the third section, "assessment of other needs and special considerations," the presence or absence of other needs and special considerations related to the youth's family/parents and the youth are noted. In the fourth section, "personal assessment of the overall level of risk/needs of the young person," if the evaluator disagrees with the level of risk obtained in the inventory, assigns a new risk justifying it properly, an action known by the expression override. The last three sections of the inventory focus on case management. In the fifth section, "level of contact," the level of contact with the young person is determined. In the sixth section, "case management plan," the case management plan is drawn up, indicating the objectives and actions to achieve them. Finally, the seventh section, "(re) evaluation of case management," allows for the reassessment of case management by flagging changes in risk levels, levels of contact with the young person, and progress or revisions to the plan. The YLS/CMI must be quoted by appropriately credentialed technicians, who must use all available information about the evaluated youth, including through interviews with the youth, review of case records, and information obtained from collateral sources.

Recidivism (Measured by the Directorate of the Juvenile Justice System—DJJS). Measure defined by the DJJS and as described in Moreira et al. (2023). Information is collected quarterly by consulting the Social Reintegration Information System and the Prison Information System, of all young offenders. The measure consists of three dimensions: (1) without evidence of recidivism; (2) with evidence of recidivism (not having been convicted, nor being in compliance with an ETM, but there is evidence of the practice of facts qualified by law as a crime, translated into the existence of inquiry or ETM or criminal proceedings; and (3) recidivist (having been applied penalty or judicial measure, final and unappealable, for facts after the ETM, either in ETM or criminal proceedings).

Procedure

Data Collection. For collecting data, permission was obtained from the Directorate General for Recidivism and Prison Services (DGRPS). The study was performed with the collaboration of the University of Minho and DJJS. To

collect data, institutions were contacted to schedule a meeting to explain the aims of the study and start data collection. Every year, DJJS collects data from youths subject to ES and PEC measures to initiate their intervention. The data were provided as part of this assessment, considering that at the outset of any process, youths are faced with the possibility to participate in studies. We were able to identify 1,117 individuals that ended ETM of ES and PEC between the years of 2018 and 2019. All of 1,117 individuals were contacted via telephone. The potential participants were informed about the study's conditions and the confidential and voluntary nature of the study. Among the individuals who agreed to participate ($n = 608$) provided oral informed consent and responded to an interview to obtain information regarding the YLS/CMI items. No compensation or reward was given for participation in the study.

The YLS-CMI was applied in the pre-sentencing phase by the Senior Technician in charge of court advisory. The process involved conducting semi-structured interviews with the youth, their parents, and other relevant sources. The interviews and information collection were carried out by the Senior Technician responsible for the assessment. All cases were supervised by the Team Coordinator. Some, whenever deemed pertinent, underwent second-level supervision by the Technical Support Unit. In situations of special complexity or media attention, third-level supervision was provided by DJJS.

Data Analysis

The data collected was analyzed using version 27.0 of the SPSS (Statistical Package for Social Sciences) software. First, univariate statistics were used to characterize the recidivism measure and the degree of risk identified by the YLS/CMI per measure.

Mann-Whitney tests were calculated between ordinal variables (Martins, 2011) and, subsequently, effect sizes were calculated using Cohen's *d*, considering the magnitude to be null (values between 0 and 0.10), weak (values between 0.11 and 0.29), moderate (values between 0.30 and 0.49), and strong (values equal to or greater than 0.50; Cohen, 1988). Internal consistency was calculated to analyze the psychometric properties of the YLS/CMI inventory using Cronbach's alpha ($\geq.07$; cf. Field, 2017) and the mean inter-item correlation (values ranging from .15 to .50; Finch et al., 2016). To determine the convergent validity of the YLS/CMI, we used the recidivism variable by using the non-parametric test (Spearman correlation) because the assumption of normal distribution of the variables was not met (Leech et al., 2015;

Table 2. Characterization of YLS/CMI Risk Levels and Recidivism by JSD, by Measure (*N* = 608).

Variables	*n* total (%)	*n* EA[a] (%)	*n* IEC (%)
Recidivism			
Without evidence	535 (88)	353 (89.6)	182 (85)
With evidence	41 (6.7)	21 (5.3)	20 (9.3)
Recidivist	31 (5.1)	19 (4.8)	12 (5.6)
YLS/CMI			
Low risk	58 (9.5)	51 (12.9)	7 (3.3)
Moderated risk	327 (53.8)	246 (62.4)	81 (37.9)
High risk	222 (36.5)	97 (24.6)	125 (58.4)
Very high risk	1 (.2)	0	1 (.5)

[a]The number of participants in the recidivism variable (*n* = 607) is lower than the total number of participants (*n* = 608). This is due to the fact that it was not possible to discriminate the information regarding the recidivism of one of the young individuals who terminated the probation measure.

Marôco, 2014). Finally, the predictive validity of the YLS/CMI was estimated from the receiver operator curves (ROCs) and its area under the curve (AUC), considering its accuracy in predicting recidivism. In the violence risk assessment literature, AUC scores above 0.60 are considered adequate effect sizes (Rice & Harris, 2005).

Results

Descriptive Analysis of the YLS/CMI Measure and of Recidivism by Measure (ES and PEC)

The sample for the YLS/CMI predictive validity study included 608 youth who terminated ES and PEC measures between 2018 and 2019. From this sample, we found that most youth had no evidence of recidivism (88%) and had a moderate risk level by the YLS/CMI (53.8%).

We proceeded to these descriptive analyses according to the measure applied. Most of the youths with and ES measures (89.6%) and with PEC measures (85%), showed no evidence of recidivism. In turn, most of the youths with the ES measure were classified as being at a moderate risk level (62.4%), the same not being true for those with the PEC measures, where the majority (58.4%) presented a high-risk level by the YLS/CMI (see Table 2).

Table 3. Mann-Whitney Tests Between ES and PEC Measure and Effect Sizes
($N=608$).

YLS/CMI	n	ES ($n=394$) M (DP)	PEC ($N=214$) M (DP)	U	d
1. Prior and current offenses and dispositions	608	0.32 (0.65)	0.83 (0.95)	28,547*	0.32
2. Family circumstances and parenting	608	3.18 (1.66)	3.92 (1.52)	31,022.50*	0.22
3. Education and employment	608	3.73 (1.96)	4.56 (1.84)	31,461*	0.21
4. Peer relations	608	2.01 (1.29)	3.03 (1.23)	24,403*	0.36
5. Substance use	608	0.61 (1.11)	1.27 (1.56)	32,856.50*	0.21
6. Leisure and recreation	608	1.85 (1.12)	2.26 (1.04)	32,319.50*	0.20
7. Personality and behavior	608	3.04 (1.75)	4.23 (1.66)	26,438.50*	0.31
8. Attitudes and orientation	608	2.11 (1.50)	3.27 (1.44)	24,284*	0.36
9. Total score	608	16.84 (7.09)	23.36 (6.70)	20,841*	0.42

*$p<.001$.

Differences in the Risk of Reoffending According to the Measure Applied, ES and PEC

We conducted Mann-Whitney tests (Table 3) to assess differences between youth who ceased ES measures and those who ceased PEC measures, in the years 2018 and 2019, at the factor level and total score of the YLS/CMI. Effect sizes were obtained using Cohen's *d*.

Through the analysis of Table 3 there are significant differences between youth with PEC measures and youth with ES measures at the level of risk assessed by YLS/CMI ($U=20,841$, $p<.001$, $d=0.42$), with a moderate effect size. Youth, with PEC measures ($M=23.36$, PD=6.70), showed a significantly higher level of risk than youth with ES measures ($M=16.84$, PD=7.09). Also, at the level of the eight factors that make up the YLS/CMI, statistically significant differences were detected between the two groups of young individuals, as shown in Table 3. However, only in the factors "prior and current offenses and dispositions," "peer relation," "personality and behavior," "attitudes and orientation" the effect sizes were moderate, while in the remaining factors ("family circumstances and parenting," "education and employment," "substance use," and "leisure and recreation") the effect sizes were weak (Table 3).

Table 4. Inter-item Correlation of the YLS/CMI, on the ES Measure.

YLS/CMI	1	2	3	4	5	6	7	8
1. Prior and current offenses and dispositions	1							
2. Family circumstances and parenting	.07							
3. Education and employment	.08	**.34**						
4. Peer relations	.12	**.36**	**.24**					
5. Substance use	**.26**	**.23**	.09	**.32**				
6. Leisure and recreation	.05	**.35**	**.26**	**.26**	**.15**			
7. Personality and behavior	**.19**	**.36**	**.51**	**.25**	**.18**	**.24**		
8. Attitudes and orientation	**.17**	**.48**	**.48**	.52	**.34**	**.42**	.55	
9. Total score	.20	**.52**	**.50**	**.47**	**.32**	**.41**	**.57**	**.73**

Note. Factor/factor correlation (marked in bold if > .15 > .50); total/factor correlation (marked in bold if > .20).

Internal Consistency of the YLS/CMI: Alpha and Inter-Item Correlation

Reliability analysis focused on assessing internal consistency was performed by calculating Cronbach's alpha. In the present study sample, Cronbach's alpha was .80 for the total YLS/CMI sample ($N=608$), .76 for the ES measures ($N=394$), and .73 for the PEC measures ($N=214$), indicating reasonable internal consistency (Marôco & Garcia-Marques, 2013).

The mean inter-item correlations (see Table 4), in the sample of youth with ES measure, were in the range of .05 to .55. Caution is needed in assessing the correlations of our sample, as the correlation of factor 1 "prior and current offenses and dispositions" with factors 2 "family circumstances and parenting," 3 "education and employment," and 4 "peer relation"), and 6 "leisure and recreation" (i.e., .07, .08, .12, and .05), and between factor 3 "education and employment," and factor 5 "substance use" (i.e., .09) were low, signifying a lack of consistency in the scale. On the other hand, the correlations of factor 3 "education and employment," with factor 7 "personality and behavior" (i.e., .51), and of factor 8 "attitudes and orientation" with factor 4 "peer relation" and factor 7 "personality and behavior," tended to be high (i.e., .52 and .55) which may indicate redundancy in the items (Miles & Gilbert, 2005).

In parallel, considering the relationship between each factor and the total scale, coefficients ranging between $r=.20$ and .57 were recorded, except for factor 1 "prior and current offenses and dispositions" ($r=.20$), which showed no correlation with the total scale, the items showed adequate values (Table 4).

The mean inter-item correlations in the sample of youth who completed PEC measures ranged from −.08 to .61 (Table 5). Caution is needed when

Table 5. Inter-item Correlation of the YLS/CMI, on the PEC Measure.

YLS/CMI	1	2	3	4	5	6	7	8
1. Prior and current offenses and dispositions	1							
2. Family circumstances and parenting	**.40**							
3. Education and employment	.09	**.25**						
4. Peer relations	.10	**.32**	**.23**					
5. Substance use	**.16**	.05	.10	**.34**				
6. Leisure and recreation	−.08	**.20**	**.28**	**.37**	**.25**			
7. Personality and behavior	.05	**.20**	**.49**	**.31**	.12	**.24**		
8. Attitudes and orientation	.09	**.39**	**.43**	**.61**	**.27**	**.46**	**.56**	
9. Total score	.11	**.34**	**.46**	**.55**	**.27**	**.42**	**.50**	**.72**

Note. Factor/factor correlation (marked in bold if > .15 > .50); total/factor correlation (marked in bold if > .20).

interpreting these correlations, as several correlations were low. Specifically, the correlation of factor 1 "prior and current offenses and dispositions" with factors 3 "education and employment," 4 "peer relation," 7 "personality and behavior," and 8 "attitudes and orientation" was found to be .09, .10, .05, and .09, respectively. Additionally, the correlations between factor 5 "substance use" and factors 2 "family circumstances and parenting," 3 "education and employment," and 7 "personality and behavior" was .05, .10, and .12, respectively, indicating a lack of consistency in the scale. Furthermore, the correlation between factor 1 "prior and current offenses and dispositions" and factor 6 proved "leisure and recreation" was negative (i.e., −.08), further supporting the lack of coherence within the scale. Conversely, the correlations of factor 8 "attitudes and orientation" with factor 4 "peer relation" and factor 7 "personality and behavior" were relatively high (i.e., .61 and .56), suggesting potential redundancy in the items (Miles & Gilbert, 2005).

Additionally, when considering the relationship between each factor and the total scale (Table 5), coefficients ranging from $r = .11$ to .72 were observed, except for factor 1 "prior and current offenses and dispositions," which showed no correlation with the total scale. Overall, the items demonstrated adequate values in terms of their relationship with the total scale.

Regardless of the results presented above, we chose to continue the analyses with all factors, considering that, according to the literature, all factors represent risk factors for recidivism.

Convergent Validity

To estimate the convergent validity of the YLS/CMI, Spearman correlations were performed using the recidivism variable (cf. Table 6).

Table 6. Convergent Validity Between YLS/CMI Risk and Recidivism.

| | Recidivism | |
| | ES (N=394) | PEC (N=214) |
YLS/CMI	r_s	r_s
1. Prior and current offenses and dispositions	−.01	−.00
2. Family circumstances and parenting	−.02	.12
3. Education and employment	−.04	−.03
4. Peer relations	−.02	.14*
5. Substance use	−.04	−.01
6. Leisure and recreation	−.02	.00
7. Personality and behavior	−.02	.12
8. Attitudes and orientation	.00	.22**
9. Total score	−.03	.14*

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

The YLS/CMI total risk score is positively correlated with recidivism in youth with PEC measures (rs=.14, p=.03). At the same time, the factor "peer relation" and the factor "attitudes and orientation" were statistically positively correlated with recidivism in youth with PEC measures (i.e., rs=.14, p=.03; rs=.22, p=.002, respectively), while the other factors were not (see Table 6).

Regarding the ES measure, Spearman's correlations between the YLS/CMI total risk score and recidivism were not statistically significant (rs=−.03, p=.63) and were even inversely proportional. Similarly, the correlations between recidivism in youth with an ES measure and the YLS/CMI total risk score were inversely proportional (negative) and not statistically significant (see Table 6).

Predictive Validity of the YLS/CMI: Discriminant Validity and Calibration

To assess the predictive validity of the YLS/CMI, a ROC curve analysis was performed to evaluate the sensitivity and specificity of the instrument. A total of 608 subjects participated, with 394 having completed a ES measure and 214 having completed a PEC measure (Table 7).

Of the youth with PEC measures, 12(5.6%) recidivated. The results prove a statistically significant curve (AUC=0.70; SE=0.06; p=.04; 95% CI [0.55, 0.80]), demonstrating that if randomly chosen, 70% of the youth who

Table 7. ROC Curve Analysis Between the YLS/CMI and Recidivism.

	Recidivism			
	ES (394)		PEC (214)	
Measures				
YLS/CMI	AUC (*SE*)	[95% CI]	AUC (*SE*)	[95% CI]
Total score YLS/CMI	0.51 (0.06)	[0.40, 0.62]	0.67 (0.06)*	[0.55, 0.80]
1. Prior and current offenses and dispositions	0.49 (0.07)	[0.36, 0.62]	0.66 (0.07)	[0.52, 0.81]
2. Family circumstances and parenting	0.54 (0.07)	[0.41, 0.67]	0.58 (0.06)	[0.46, 0.70]
3. Education and employment	0.50 (0.07)	[0.36, 0.63]	0.54 (0.08)	[0.39, 0.68]
4. Peer relations	0.44 (0.07)	[0.31, 0.57]	0.74 (0.05)**	[0.64, 0.84]
5. Substance use	0.49 (0.07)	[0.36, 0.62]	0.50 (0.09)	[0.33, 0.66]
6. Leisure and recreation	0.55 (0.06)	[0.42, 0.67]	0.51 (0.09)	[0.34, 0.68]
7. Personality and behavior	0.47 (0.05)	[0.37, 0.57]	0.63 (0.09)	[0.45, 0.80]
8. Attitudes and orientation	0.54 (0.06)	[0.42, 0.67]	0.62 (0.08)	[0.48, 0.77]

Note. CI = confidence interval; AUC = area under the curve.
*$p < .05$. **$p < .01$.

reoffend will have higher scores than those who do not reoffend or have evidence of reoffending on the YLS/CMI (Table 7).

Similarly, of the youth with an ES measure, 19 (4.8%) had actual recidivism. The results did not demonstrate a statistically significant curve (AUC = 0.51; *SE* = 0.06; *p* = .88; 95% CI [0.40, 0.62]) (Table 7).

Only one of the factors (i.e., "peer relation") of the YLS/CMI significantly predicts recidivism for the group of youth with PEC measures (AUC = 0.74, *p* = .006), and no statistically significant results were found at the level of predictive ability of the YLS/CMI factors in the group with ES measures (Table 7, Figures 1 and 2).

Discussion

The main goal of this study was to analyze the usefulness of the YLS/CMI as a measure used in the Portuguese juvenile justice system, for risk/needs assessment in young offenders covered by ES and PEC measures, seeking to analyze its predictive validity of recidivism.

The results show that the YLS/CMI total score is positively correlated with recidivism. Similarly, the YLS/CMI proved to be able to differentiate with considerable precision between recidivist and non-recidivist youth in the group of participants with institutional measures (i.e., PEC), confirming its predictive validity (AUC = 0.67; 67% of youth with PEC measures who
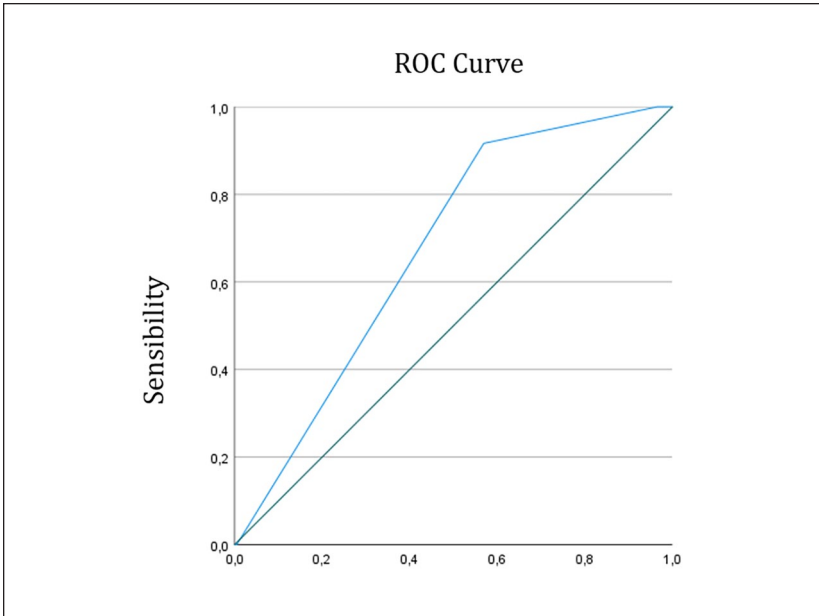
Figure 1. ROC curve for PEC.

recidivated had higher YLS/CMI scores). Of all the YLS/CMI factors, peer relations dynamic factor emerged as the one that showed the highest predictive validity with recidivism, with an AUC of .74 ($p < .05$). Indeed, studies on the predictive validity of the YLS have shown that not all domains of this instrument carry equal weight in predictive validity. Thus, in general, dynamic items have been identified as having a promising role in the predictive validity of the YLS (e.g., Cuervo & Villanueva, 2015, McGrath et al., 2018; Miller et al., 2021), compared to historical items such as criminal history (Pimentel et al., 2015).The results discovered in this group of youth, with a PEC measure, corroborate that found in other international studies (Dellar et al., 2023; Koh et al. 2020; Onifade et al., 2008; Shepherd et al., 2015; Villanueva et al., 2019), in which the YLS/CMI total score demonstrated moderate associations (AUC indices between 0.60 and 0.75) with recidivism of youth offenders in a variety of correctional settings (Campbell et al., 2014; Villanueva et al., 2019). A systematic review involving 19 studies with the YLS/CMI found AUC ratios to be between .57 and .76 (Koh et al., 2020).

Regarding the group of youths in community settings, ES measures, the YLS/CMI total score showed a low association with recidivism and no
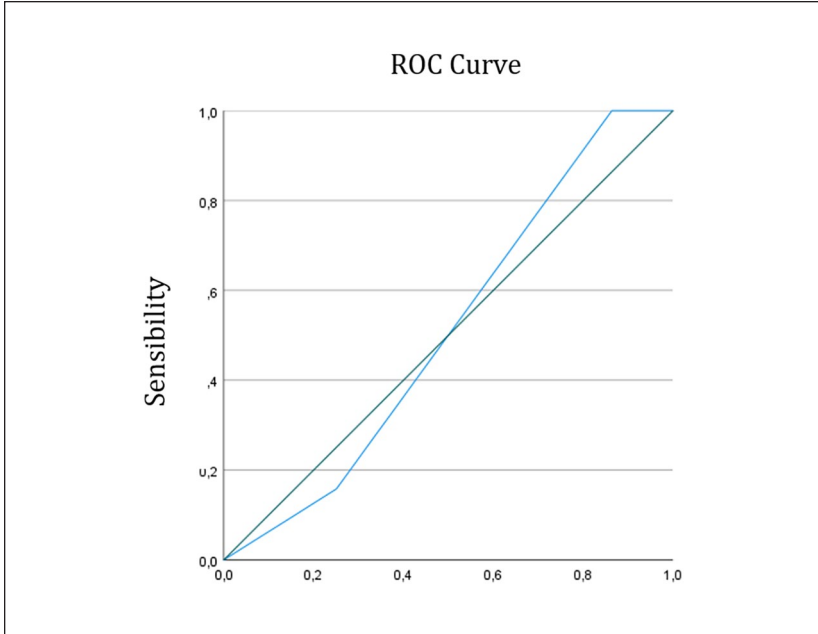
Figure 2. ROC curve for EA.

statistical significance (AUC=0.51; p=.88). Such results could possibly mean a lower discriminative power of the YLS/CMI when we are facing groups of youth who at the outset (considering the nature of the ES measure compared to PEC measure) would present a lower risk of future offending, as documented in other international studies (Shepherd et al., 2015). However, the absence of a statistically relevant correlation between the YLS/CMI and recidivism (the values even seem to point to an inversely proportional—negative—correlation) does not allow us to validate this possible explanatory hypothesis of the reduced discriminative power of the YLS/CMI in the group of young individuals with ES measures. It should be noted that most of the young individuals with ES measures were classified with a moderate risk level (62.4%), followed by high (24.6%) and then low (12.9%), something that seems inverse to what was found at the level of recidivism presented by this group of young individuals (no evidence=89.6%; with evidence=5.3%; and recidivism=4.8%). This apparent decrease in the predictive validity of the YLS among participants with ES could still be attributed to potential clinical override made by professional, as documented in other studies (Guay &

Parent, 2018; Schmidt et al., 2024). It's crucial to understand the underlying reasons for such decisions, which are inherently complex. The fact that the risk levels of this participant group mainly fall between moderate and high risk seems to support the hypothesis that clinical overrides are used. Indeed, research has shown that technician-initiated changes in clinical override can impact the predictive validity of the YLS, and should only be conducted in strictly necessary and well-justified circumstances. Guay and Parent (2018) suggest that clinical overrides should not exceed 5% of all cases, where deemed necessary.

In this sense, another hypothesis may be based on the possibility that in higher risk cases, offenders are subject to more intensive community supervision and, therefore, subject to greater social control than lower risk cases (Skeem & Lowenkamp, 2016). To better understand these results, it would also be important to attend to the sociodemographic and cultural characteristics of the sample, considering that some more recent international studies document the importance of attending to the disparate impact that the use of YLS/CMI can in having certain ethnic groups (Gomis-Pomares et al., 2022). More concretely, it has been held that even if a given instrument can perfectly measure risk (predictive validity), its use may be unfair (disparate impact), the latter concept being fundamentally moral or social (Skeem & Lowenkamp, 2016). As an example, a study conducted in Spain (Gomis-Pomares et al., 2022) with 223 youth offenders (divided into two groups according to Roma community membership) showed that the YLS/CMI showed slightly lower predictive validity for the group of youth belonging to the Roma community, and this group also showed higher risk scores. Testing the predictive validity of the YLS/CMI in groups with different ethnic backgrounds is therefore essential to better understand its possible disparate impact.

The psychometric properties of the instrument prove to be adequate across studies. International studies (e.g., Cuervo et al., 2017; Cuervo & Villanueva, 2018; Dellar et al., 2023; Villanueva et al., 2019) confirm the optimal internal consistency of the inventory, with Cronbach's alpha values ranging from .85 to .91. In the present study, the values found are somewhat lower (i.e., .73 for the PEC measure; .76 for the ES measure; and .80 for the total sample) but still acceptable. Thus, it has been shown that youth with different levels of risk identified by the YLS/CMI differ significantly with respect to their recidivism rates and time until the emergence of behavioral recidivism. Specifically, higher risk youth have higher rates of recidivism and shorter time periods until recidivism (Dellar et al., 2023; Olver et al., 2009; Onifade et al., 2008; Villanueva et al., 2019).

Limitations and Future Research

The study has some limitations that should be considered. Firstly, the reliance on electronic data from the justice system may result in an underestimation of recidivism, as it may not capture additional offenses that were not detected or processed through the system. The retrospective methodology used in the study may also underestimate the presence of dynamic risk factors due to the inability to gather repeated measurements over time and control for external variables. Another important limitation is that the assessment of inter-rater reliability was not possible due to the unavailability of the information needed. This limitation can impact the consistency and accuracy of YLS/CMI assessments, potentially influencing the study results. Additionally, restricted access to sociodemographic characteristics limited the availability of information on ethnicity of the participants. As mentioned earlier, ethnicity can be a relevant factor influencing YLS/CMI scores. The lack of this information may limit a comprehensive understanding of the study results.

Future studies should strive to overcome these limitations by seeking additional data sources for recidivism assessment to obtain a more comprehensive understanding of criminal reoffending. This may involve self-report measures (e.g., self-report by young people or even their legal guardians) and consideration of official records (Gomes et al., 2018; Harris et al., 2009). Also, it would be valuable to consider a broader definition of recidivism in future research, as this would provide a more nuanced understanding of the patterns and factors associated with repeated criminal involvement (Harris et al., 2009). Regarding methodology, it is recommended that future research adopts prospective designs with repeated measurements, allowing for a more accurate and dynamic assessment of risk factors over time. In terms of YLS/CMI evaluation, it is advisable to involve multiple assessors to ensure inter-rater reliability and improve the consistency and precision of assigned scores. Given the evidence regarding the varying contributions of different domains of the YLS to its predictive validity, it is crucial to persist in research efforts in this area. This entails understanding the actual predictive value, particularly of historical items, with the aim of advancing equity within the juvenile justice system. Moreover, given that clinical override can influence the predictive validity of the YLS, it is equally vital to examine the circumstances under which technicians in the Portuguese juvenile justice system employ clinical override in the YLS/CMI. This analysis would involve sampling young individuals involved in the justice system and identifying potential demographic factors, offense characteristics, and criminogenic needs profiles associated with technicians' use of clinical override. Furthermore, it is essential to consider the inclusion of comprehensive sociodemographic

information, such as ethnicity or even gender, to better understand how these factors may impact assessments and outcomes. These future recommendations aim to enhance the validity and applicability of the study, contributing to a better understanding of the risk of criminal recidivism in young offenders and informing effective interventions in the field of juvenile justice.

Contributions and Practical Implications

Research into recidivism and its predictors is of great importance in the fields of juvenile justice and offender rehabilitation. Understanding the factors that contribute to youth recidivism is important for developing effective interventions and strategies to reduce recidivism. By identifying risk factors and offending needs associated with recidivism, policy makers, practitioners, and researchers can improve the design and implementation of evidence-based programs and interventions that target those specific factors. These results will allow re-education staff, during their initial assessment, to provide more precise and targeted indications of the risk levels of young individuals, as well as the criminogenic needs that should be addressed. In the pre-sentential phase, the use of the instrument will allow for more accurate detection of cases of transient delinquency and lower risk, which will require minimal intervention by the justice system, with an educational focus, differentiating them from situations of higher risk that require more intense interventions, to promote effective crime prevention (Bonta & Andrews, 2017). In cases of young offenders with PEC measures, the use of the YLS/CMI will allow testing their risk levels in a comparative way with national data and define concrete profiles of criminogenic needs that should guide the supervision plans essential for an adequate execution of the measure. The use of the YLS/CMI can thus increase the transparency of judicial decisions, reducing strict interventions of the justice system in cases where they are not necessary or even counterproductive (e.g., de-judicialization) and intensifying judicial supervision actions with specialized technical intervention, for the cases that really need it when justified.

Additionally, the weakened correlation between the total YLS/CMI score and its lack of statistical significance among participants with an ES measure necessitates thorough consideration and analysis by the juvenile justice system. This observation underscores the importance of critically examining the current procedures inherent to the educational monitoring model. It highlights the potential need for the system to reassess and improve its strategies for addressing the needs of adolescents with ES, with a focus on better accommodating their unique circumstances and requirements (including ethnic and gender-related issues). Such introspection and analysis could pave

the way for the development of more effective interventions and support mechanisms tailored to this specific demographic, ultimately enhancing the system's capacity to foster positive outcomes for all youth involved.

Declaration of Conflicting Interests

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