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# Predicting risk of recidivism in Spanish young offenders: Comparative analysis of the SAVRY and YLS/CMI

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## Abstract

**Background:** This study offers a comparative analysis of evidence for the predictive validity of SAVRY and YLS/CMI scores in predicting risk of recidivism in a group of young people who received a Juvenile Justice order. **Methods:** The sample was made up of 594 youths aged between 14 and 18 (M=15.63, SD=1.08) at the time they committed an offense. **Results:** Both instruments showed high accuracy in predicting recidivism, with the greatest accuracy observed in the SAVRY and YLS/CMI total scores, as well as in the Individual domain of the SAVRY. Comparative analysis of the AUCs of both instruments indicated no statistically significant differences between total scores from the two instruments. Results showed statistically significant differences in comparisons of means and AUCs between the groups of young reoffenders and non-reoffenders in all cases. Our results did not support the hypothesis that dynamic risk factors are a better predictors of recidivism in young offenders. **Conclusions:** This study offers empirical evidence of the predictive capacity and differential functioning of the SAVRY and YLS/CMI instruments in the Spanish context.

***Keywords:*** Risk assessment, recidivism, adolescent, offenders, SAVRY, YLS/CMI.

## Resumen

***Predicción del riesgo de reincidencia en jóvenes infractores españoles: comparación de los instrumentos SAVRY e YLS/CMI.*** **Introducción:** se presenta un análisis comparativo de la evidencia de validez predictiva de las puntuaciones del SAVRY e YLS/CMI para predecir el riesgo de reincidencia en un grupo de jóvenes a los que se les había abierto un expediente en Justicia Juvenil. **Método:** la muestra estaba compuesta por 594 jóvenes que tenían entre 14 y 18 años (M=15.63, DT=1.08) en el momento de la comisión del hecho delictivo. **Resultados:** los resultados de ambos instrumentos mostraron una alta capacidad predictiva de la reincidencia, con mayor precisión observada en las puntuaciones totales de SAVRY e YLS/CMI, así como en el dominio individual de SAVRY. El análisis comparativo de las AUC de ambos instrumentos no indicó diferencias estadísticamente significativas entre las puntuaciones totales de los dos instrumentos. Se han encontrado diferencias estadísticamente significativas en las comparaciones de medias y AUC entre los grupos de jóvenes reincidentes y no reincidentes. Los resultados de este trabajo no apoyan la hipótesis de que los factores de riesgo dinámicos son mejores predictores de la reincidencia en los jóvenes infractores. **Conclusiones:** el presente estudio ofrece evidencia empírica de la capacidad predictiva y el funcionamiento diferencial de los instrumentos SAVRY e YLS/CMI en el contexto español.

***Palabras clave:*** evaluación del riesgo, reincidencia, adolescentes, infractores, SAVRY, YLS/CMI.

The use of instruments to assess risk of recidivism is an increasingly common practice in juvenile justice (Vincent, 2015). The importance of choosing the right intervention with the young offender makes it essential to use tools that are specifically adapted to the characteristics of these young people. Tools that assess risk of reoffending help professionals in the Juvenile Justice system to identify the needs of each young offender, as well as to make decisions about the intervention to be carried out, for the purpose of preventing future recidivism (Andrews & Bonta, 2010; Chu, Goh, & Chong, 2016; Lodewijks, Doreleijers, & de Ruiter, 2008).

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The use of recidivism risk assessment tools in Juvenile Courts has led to more demand among Juvenile Justice professionals for tools to work with and to help them recommend the most appropriate intervention for each young offender; this demand in turn has led to an increase in the number of recidivism risk assessment tools (Heilbrun, Yasuhara, & Shah, 2010; Singh, Grann, & Fazel, 2011). Two of the most commonly used instruments in assessing risk of recidivism in young offenders are the Structured Assessment of Violence Risk in Youth (SAVRY) (Borum, Bartel, & Forth, 2006) and the Youth Level of Service/Case Management Inventory (YLS/CMI) (Hoge & Andrews, 2006). Both are based on the Risk, Need, Responsivity (RNR) Model developed by Andrews and Bonta (2010). According to the RNR Model, therefore, youth who present a greater risk of recidivism should receive a greater number of resources in order to reduce their probability of reoffending, while those with a lower risk of recidivism should not be the beneficiaries of large interventions (Andrews, Bonta, & Wormith, 2006).

Risk factors refer to the presence of contextual or personal situations that, when present, increase the probability of recidivism, according to research evidence (Ortega, García, & Frías, 2014; Singh et al., 2011). Andrews and Bonta (2010) refer to the RNR model factors that most predict delinquent behavior as the "Big Four": antisocial cognition, pro-delinquent networks and associates, individual history of antisocial behavior, and traits and factors of an antisocial personality. At the same time, they also distinguish between static and dynamic risk factors. The former are factors that can predict delinquent behavior, but are not subject to change, for example, history of past offenses; the latter are factors that are susceptible to change and may therefore be modified through adequate interventions, with an aim to reduce recidivism.

Prior research on risk factors that are present in reoffending youth, both dynamic and static factors, has served as a reference in the construction of risk assessment tools. Risk assessment tools are formed mainly by dynamic risk factors, owing to their possibilities of change. Static risk factors also form part of the assessment instruments, although to a lesser degree; despite their nonmodifiable nature, they have proven to be important in predicting recidivism in young offenders (Andrews & Bonta, 2010).

Specifically, the YLS/CMI (Hoge & Andrews, 2006) was designed to optimize effectiveness in the intervention and rehabilitation of young offenders by assessing their level of risk and criminogenic needs; it includes 7 dynamic risk factors and one static risk factor. For its part, the SAVRY (Borum et al., 2006) identifies risk factors present in young offenders, with the objective of reducing recidivism through appropriate intervention in modifiable risk factors. Protective factors are predictors of nonrecidivism (Shepherd, Luebbers, & Ogloff, 2016) and they help to mitigate the negative effect of risk factors in a young person (Martín, Hernández, Hernández-Fernaud, & Arregui, 2010; Ward, Yates, & Willis, 2012).

Recently, a number of studies have been published that compare the performance of the SAVRY and YLS/CMI instruments (Chu et al., 2016; Hilterman, Nicholls, & van Nieuwenhuizen, 2014; Perrault, Vincent, & Guy, 2017; Viljoen et al., 2017a), clearly indicating their importance in the current applied context of being able to use the most appropriate instrument for better recidivism risk assessment. These studies have compared different aspects of how the two instruments function, focusing mainly on predictive validity (Chu et al., 2016; Hilterman et al., 2014; Perrault et al., 2017), or on the capacity of both instruments to evaluate change (Viljoen, Shaffer, Gray, & Douglas, 2017). In general terms, the results of these studies do not provide empirical support for the superior performance of either instrument, based on the different samples of young people to which they have been applied. However, other studies have contributed a variety of results (Clarke, Peterson-Badali, & Skilling, 2017; Viljoen et al., 2017b), indicating that the predictive validity of the SAVRY and YLS/CMI may vary depending on the judicial situation and/or dispositions imposed on the youths that make up the study sample (Clarke et al., 2017; Viljoen et al., 2017b), as well as on cultural differences, as the instruments may not necessarily function the same among different ethnic and cultural groups (Viljoen et al., 2017c).

Along this line, Boccaccini (2017) indicates that there are still insufficient studies of recidivism risk assessment tools that examine the predictive validity of the commonly used score interpretations. He insists on the need for continuous incorporation of more validity evidence, given that recidivism risk assessment in itself is always dynamic in nature and subject to cultural differences.

In Spain, previous studies have estimated the AUCs for the YLS/CMI. The first study carried out found AUCs with values between .65-.71 (Garrido et al., 2006). Recently, AUCs have been found with high predictive capacity of the YLS/CMI, with values from .79 to .83 (Villanueva, Basto-Pereira, & Cuervo, 2019).

The aim of this study is to examine the differential functioning of the SAVRY and YLS/CMI instruments in relation to their capacity for predicting recidivism risk in young Spanish offenders being assigned a wide range of judicial dispositions. The hypothesis of this study is that both SAVRY and YLS/CMI will have a high predictive capacity for youth recidivism.

## Method

### *Participants*

The participants that form the sample of this study are young people who have a case on file with the Juvenile Court of Almería (Spain) for having committed some offense that is penalized under Spanish law. According to the Minors' Penal Responsibility Act (Organic Law 5/2000), any young person who commits a criminal offense after their 14th birthday, but prior to turning 18, will be judged in court. The final study sample was obtained from a total population of 720 youths who had an open case file with the Juvenile Court of Almería (Spain). Of these, 126 case files were eliminated because no psycho-socio-educational assessment had been made by Juvenile Court staff; because these files contained insufficient information to complete the instruments used in this investigation. The final study sample was composed of 594 young people. The majority were male (85.4%) with an average age of 15.63 (SD = 1.08) years at the time of committing the offense. Seventy-nine percent of the young people were of Spanish nationality, 9.6% were from Morocco, and 11.4% were of other nationalities. With regard to schooling, 59.9% of the youths had repeated at least one year in school. The most frequent offenses were: personal injuries, 25.3%; damages, 14.3%, and forced robbery, 11.1%. A judicial measure in response to the offense committed was applied to 52.2% of the youths. The most frequently imposed sanctions were: Probation (19.5%), Warning (9.6%), Community benefit (8.2%) and semi-open detention (6.2%).

### *Instruments*

*Structured Assessment of Violence Risk in Youth*. The SAVRY instrument for risk assessment in young offenders is composed of 4 domains, three of which refer to risk factors present in the young person -historical (10 items), social (6 items) and individual (8 items)- and a fourth domain referring to protective factors (6 items). The items were closed response, with three alternatives (low, moderate and high) for the risk items, and two alternatives (presence, absence) for items from the protection domain. The SAVRY produces partial scores for each of the domains (historical, individual, social and protective) and two total scores: *Summary Risk Rating* (SRR) and *Risk Total Score* (RTS). The SRR score is obtained by adding the SAVRY risk factors and the RTS score is obtained by subtracting the protective factor from the sum of the risk factors. For this study, we used the Spanish adaptation by Vallés and Hilterman (2006). In order to study reliability of scores, Cronbach's alpha was calculated for the SRR score, obtaining a value $\alpha$=.893, CI95% [.880, .905].

*Youth Level of Service/Case Management Inventory*. The YLS/CMI instrument for risk assessment in young offenders comprises a total of 42 items with two response alternatives (presence, absence), distributed among 8 risk domains: Prior or Current Offenses/Dispositions (5 items), Family Circumstances/Parenting (6 items), Education/Employment (7 items), Peer Relations (4 items), Substance Abuse (5 items), Leisure/Recreation (3 items), Personality/Behavior (7 items), and Attitudes/Orientation (5 items). The *Prior or current offenses* domain is considered a static risk factor, while the other domains are dynamic risk factors. The inventory allows the coding of the young offender's strengths (protective factor). For this investigation we used the YLS/CMI in its Spanish translation by Garrido, López, & Silva (2006). For studying reliability of the YLS/CMI scores, Cronbach's alpha coefficient was calculated for the total instrument score, obtaining a value $\alpha$=.879, CI95% [.865, .893].

***Recidivism*.** The measure of recidivism for this study was defined as the opening of a new legal case against the young offender, by the prosecuting authority, within a two-year recidivism follow-up period. During the duration of this follow-up period, a new legal case was opened for 35.5% of the offending minors. Legal cases were taken as the reference criterion, since convictions underestimate recidivism (Viljoen et al., 2017a).

### *Procedure*

The data collection process was carried out at the Juvenile Court of Almería. The information required to complete the SAVRY and YLS/CMI instruments was collected retrospectively from the case files of the young offenders. These case files include police information regarding the arrest, investigation of criminal offenses, the psycho-socio-educational report prepared by specialized Juvenile Court staff, and the sentence imposed by the judge. Using the documentation in the young person's case file, we completed our protocol for data collection, including the subject's sociodemographic variables and the SAVRY and YLS/CMI instruments.

Two of the study authors acted as coders. One of the authors coded 100% of the youths' court records, the second coder coded 30% of the files, selected randomly. Agreement between coders was greater than 95%, with discrepancies solved by consensus. Both coders have a doctorate in Psychology; one has over 20 years' experience in Legal and Forensic Psychology.

This research study follows the recommendations of the Risk Assessment Guidelines for the Evaluation of Efficacy (RAGEE) Statement (Singh, Yang, & Mulvey, 2015), and was approved by the University of Almería Ethics Committee, within the framework of a broader study.

### *Data analysis*

Different approaches were employed to analyze the differential functioning of the SAVRY and YLS/CMI instruments: (a) descriptive and correlational analyses of the partial and total scores from both instruments; (b) analysis of mean differences between the reoffending and nonreoffending groups in the different SAVRY and YLS/CMI domains; (c) quantification of both instruments' predictive strength for recidivism, using AUC analysis, including AUC comparisons between total and partial scores of both instruments, along with calculation of the *r* index of effect size (Cohen, 1988). The gender variable has been statistically controlled as a moderating variable in AUC estimated. The contrast statistic was accompanied by estimating the Bayes factor, taking the values proposed by Jeffreys (1961) as our reference. Statistical analyses were carried out using SPSS version 25 and JASP version 0.10.2.

## Results

Table 1 presents descriptive analysis of the scores obtained by the youths on both instruments ($n$=594), showing mean scores, standard deviation and range, for both total and partial scores on the SAVRY and YLS/CMI. As one can observe, in the SAVRY total scores, the mean RTS score was 6.70, while the SRR mean was 8.59. In scores for the SAVRY domains, the highest mean is obtained in the historical domain (3.51), while the lowest mean belongs to the social domain (2.12). In the YLS/CMI total score, we find a mean value of 7.57, with mean scores for the instrument's different domains ranging between 0.22 for Attitudes/Orientation, to 2.02 for Leisure/Recreation. According to the risk level of the YLS/CMI, 59.9% of youth have a low risk and 39.7% have a moderate risk of recidivism.

The correlation coefficients for total and partial scores on the SAVRY and the YLS/CMI have been estimated (Table 2). All the correlation coefficients present moderate/high values in general terms and are statistically significant ($p$<.001); the highest coefficients, with values over .80, correspond to the relationships between total YLS/CMI score and the SAVRY total scores, RTS ($r$=.871) and SRR ($r$=.876), as well as between the total YLS/CMI score and the SAVRY Individual domain ($r$=.842) and Protective domain ($r$=-.810). No correlation has been found between Age and SAVRY. The correlations found between YLS/CMI and Age are small: Prior and current offenses/dispositions (r=.125), Peer relations (r=.087), Substance abuse (r=.172) and Leisure/Recreation (r=-.081).

Table 3 shows results from the difference in means analysis between young reoffenders and nonreoffenders, on scores obtained in the different domains of the SAVRY and YLS/CMI. This table reports the mean scores and standard deviations for each partial or total domain, according to presence of recidivism, along with

*Table 1*
Descriptive statistics for the SAVRY and YLS/CMI instruments

| | M(SD) | Range |
|---|---|---|
| SAVRY | | |
| Historical | 3.51(3.26) | 0-16 |
| Social | 2.12(2.37) | 0-12 |
| Individual | 2.97(2.73) | 0-13 |
| Protective | 2.99(1.88) | 0-6 |
| Risk Total Score | 6.70(7.84) | 0-36 |
| Summary Risk Rating | 8.59(7.40) | 0-36 |
| YLS/CMI | | |
| Prior and current offenses/dispositions | 0.58(0.94) | 0-5 |
| Family circumstances/parenting | 1.23(1.59) | 0-6 |
| Education/Employment | 1.91(1.41) | 0-6 |
| Peer relations | 0.49(0.65) | 0-3 |
| Substance abuse | 0.38(0.60) | 0-4 |
| Leisure/Recreation | 2.02(1.15) | 0-3 |
| Personality/Behavior | 0.76(0.85) | 0-5 |
| Attitudes/Orientation | 0.22(0.59) | 0-4 |
| Total score | 7.57(5.54) | 0-25 |
| Protective factor | 4.10(2.42) | 0-8 |

*Table 2*
Correlations between SAVRY and YLS/CMI

| SAVRY | Historical | Social | Individual | Protective | RTS | SRR |
|---|---|---|---|---|---|---|
| YLS/CMI | | | | | | |
| Prior and current offenses/dispositions | .523** | .526** | .532** | -.494** | .578** | .578** |
| Family circumstances/parenting | .685** | .693** | .657** | -.675** | .764** | .757** |
| Education/Employment | .595** | .618** | .720** | -.714** | .727** | .724** |
| Peer relations | .531** | .670** | .562** | -.525** | .629** | .643** |
| Substance abuse | .475** | .512** | .544** | -.473** | .557** | .564** |
| Leisure/Recreation | .467** | .509** | .588** | -.601** | .573** | .590** |
| Personality/Behavior | .402** | .380** | .579** | -.501** | .513** | .507** |
| Attitudes/Orientation | .409** | .442** | .491** | -.422** | .506** | .491** |
| Total score | .740** | .771** | .842** | -.810** | .871** | .876** |
| Protective factor | -.709** | -.754** | -.803** | .763** | -.827** | -.842** |

** $p<.01$

the result of the difference in means test (*Mann-Whitney U* for contrasting nonparametric means was used when the assumptions for applying parametric tests were not met) and effect size *r* (interpretation of effect size was carried out according to Field (2013): <.10 very small, <.30 small, <.50 medium and >.50 large).

As indicated in Table 3, in the SAVRY total and partial scores, the young reoffenders group obtained higher scores in the risk domains, while the nonreoffenders group obtained higher scores in the protective domain. All the comparisons of means were statistically significant, with medium effect size indices, and values between .34 and .41 for the Historical, Social and Individual factors; .35 for the protective factor and .40-.41 for the total scores RTS and SRR. In the YLS/CMI results, we see that the young reoffenders group scored higher than the nonreoffenders on all scores of this instrument, and all comparisons were statistically significant. Effect sizes showed medium values for the domains Prior and Current Offenses/Dispositions ($r$=.31), Parenting ($r$=.36), Education/Employment ($r$=.34), Peer Relations ($r$=.37) and total score on the YLS/CMI ($r$=.42).

Additionally, Table 3 also presents calculations of correlation coefficients and AUCs, along with the 95% confidence interval. For the total and partial scores of the SAVRY, AUC estimates are statistically significant, with values over .70, indicating large magnitude (Rice & Harris, 2005) for all domains. Regarding total and partial YLS/CMI scores, AUC calculation for the total score produces a high value at .75, while for the instrument domains, values are good, between .70 and .71 (Family circumstances, Education/Employment and Peer relations), moderate, between .64 and .69 (Prior and Current Offenses/Dispositions; Leisure/Recreation and Personality/Behavior), or small, between .62 and .63 (Substance Abuse and Attitudes/Orientation).

Table 4 presents comparisons between the AUCs of total risk scores on the SAVRY and YLS/CMI, as well as partial risk scores that are similar in the two instruments. Specifically, there were two comparisons of total scores and seven comparisons between instrument partial scores. The only risk domain that was not included in the comparisons was the Leisure/Recreation factor of the YLS/CMI, since similar items were not found in any of the SAVRY risk domains. Statistically significant differences were not found in comparisons of the instruments' total scores. When comparing the domains, however, statistically significant differences were found between: $SAVRY_{Individual}$-$YLS/CMI_{Education/Employment}$ ($r$=.1089, CI95%[.029, .188], $SAVRY_{Individual}$–$YLS-CMI_{Substance\ abuse}$ ($r$=.2213, CI95%[.143, .296]), $SAVRY_{Individual}$–$YLS/CMI_{Personality/Behavior}$ ($r$=.2206, CI95%[.143, .296]) and finally, $SAVRY_{Individual}$–$YLS/CMI_{Attitudes/Orientation}$ ($r$=.2515, CI95%[.175, .325]). In the four comparisons, the AUC of the SAVRY domain "Individual" was higher than the AUC of YLS/CMI domains Education/Employment, Substance Abuse, Personality/Behavior and Attitudes/Orientation.

The results for the logistic regressions of young offenders' recidivism, the sex and age variables and the SAVRY and YLS/CMI scores are shown in Table 5.

## Discussion

The aim of this study was to analyze the differential functioning of the SAVRY and YLS/CMI instruments with regard to their predictive capacity of risk of recidivism, in a sample of Spanish young offenders. In general terms, comparative studies of the two instruments did not find either of the instruments to be superior in predicting risk of recidivism in young offenders, in the different samples to which they had been applied. However, the results of other studies suggest that more research is needed in order to determine whether the predictive validity of the SAVRY and YLS/CMI varies depending on factors like the legal situation of the young offenders or the disposition imposed, or the sociocultural context (Viljoen et al., 2017c). The present study offers empirical evidence of the predictive capacity and differential functioning of the SAVRY and YLS/CMI instruments in the Spanish context, using a more comprehensive analysis than other studies with similar characteristics (Chu et al., 2016; Hilterman et al., 2014; Perrault et al., 2017).

Especially high values were found when analyzing correlation coefficients between measures of the domains that make up the two instruments and between their total scores, contributing new evidence that the two instruments measure the same construct, namely, level of risk in young offenders, in the same line as results found by Hilterman et al. (2014). Especially noteworthy is the negative relationship between the SAVRY protection factor and all the domains of the YLS/CMI, especially marked in the cases of

*Table 3*
Differences in scores on the SAVRY and YLS/CMI instruments between young reoffenders and nonreoffenders, and AUC analysis with controlled gender effect

| | | M(SD) | Z(p-$BF_{10}$) | r(ES) | r [CI95%] | AUC(SE) | AUC [CI95%] | r(ES) |
|---|---|---|---|---|---|---|---|---|
| SAVRY | | | | | | | | |
| Historical | R | 4.84(3.51) | -8.68*a | .35 | [.269, .430] | .711(.0215) | [.673, .747] | .4042 |
| | NR | 2.77(2.87) | | | | | | |
| Social | R | 3.14(2.50) | -8.41*a | .34 | [.258, .420] | .706(.0219) | [.668, .743] | .3856 |
| | NR | 1.55(2.10) | | | | | | |
| Individual | R | 4.39(2.71) | -10.08*a | .41 | [.323, .484] | .750(.0208) | [.713, .785] | .4949 |
| | NR | 2.19(2.40) | | | | | | |
| Protective | R | 2.11(1.61) | 8.53*a | .35 | [.263, .424] | .713(.0215) | [.674, .749] | .4058 |
| | NR | 3.47(1.84) | | | | | | |
| RTS | R | 10.57(8.25) | -9.76*a | .40 | [.310, .471] | .745(.0210) | [.707, .779] | .4780 |
| | NR | 4.56(6.72) | | | | | | |
| SRR | R | 12.38(7.46) | -10.02*a | .41 | [.320, .482] | .752(.0206) | [.715, .786] | .5017 |
| | NR | 6.51(6.50) | | | | | | |
| YLS/CMI | | | | | | | | |
| Prior/current offenses | R | 0.98(1.18) | -7.62**a | .31 | [.227, .389] | .674(.0219) | [.634, .711] | .3251 |
| | NR | 0.36(0.69) | | | | | | |
| Family circumstances | R | 1.94(1.73) | -8.75**a | .35 | [.271, .433] | .719(.0214) | [.681, .755] | .4206 |
| | NR | 0.84(1.36) | | | | | | |
| Education/Employment | R | 2.56(1.32) | -8.26**a | .33 | [.253, .414] | .704(.0217) | [.666, .741] | .3865 |
| | NR | 1.55(1.34) | | | | | | |
| Peer relations | R | 0.81(0.71) | -9.03**a | .36 | [.282, .443] | .703(.0213) | [.664, .739] | .3909 |
| | NR | 0.31(0.54) | | | | | | |
| Substance abuse | R | 0.57(0.68) | -6.13**a | .25 | [.169, .33] | .635(.0219) | [.595, .674] | .2535 |
| | NR | 0.27(0.53) | | | | | | |
| Leisure/Recreation | R | 2.44(0.92) | -6.68**a | .27 | [.191, .352] | .663(.0213) | [.623, .701] | .3139 |
| | NR | 1.78(1.20) | | | | | | |
| Personality/Behavior | R | 1.03(1.01) | -5.23**a | .21 | [.133, .294] | .645(.0223) | [.605, .683] | .2658 |
| | NR | 0.60(0.70) | | | | | | |
| Attitudes/Orientation | R | 0.41(0.73) | -6.66**a | .27 | [.189, .351] | .626(.0197) | [.585, .665] | .2618 |
| | NR | 0.12(0.47) | | | | | | |
| Total Score | R | 10.73(5.44) | -10.32**a | .41 | [.332, .493] | .757(.0207) | [.721, .791] | .5089 |
| | NR | 5.83(4.79) | | | | | | |

All means comparisons and AUC*s* are statistically significant (**=$p$<.001, a=$BF_{10}$>100). R: reoffenders; NR: nonreoffenders

Parenting, Education/Employment and Peer relations domains, and for the total YLS/CMI score, similarly reinforcing the empirical evidence of the relationship between the protection factor and nonrecidivism in young offenders (Martín et al., 2010; Shepherd et al., 2016; Ward et al., 2012).

The assessment of how the two instruments function in predicting risk of recidivism was taken one step further, using analysis of the difference in scores on the SAVRY and YLS/CMI, between reoffenders and nonreoffenders in our sample. The tests carried out indicate that both instruments adequately discriminate between the two groups of young offenders. Calculations of effect size indicated that the differences found in the instruments' partial and total scores represented medium effects, offering meaningful evidence of the predictive validity of the SAVRY and YLS/CMI in assessing recidivism risk in young offenders (Chu et al., 2016; Viljoen et al., 2017c).

As commented earlier, the RNR Model establishes that young offenders who present a greater number of risk factors have a greater likelihood of recidivism than do youths who present a lower number of risk factors or who present protection factors (Andrews & Bonta, 2010). In the results from this study, the young reoffenders presented higher scores in all the risk domains and in the total scores of the instruments. By contrast, the nonreoffenders presented significantly higher scores in the protection domain. The evidence supports the importance of protection factors in preventing recidivism in young offenders (Ortega-Campos, García-García, Gil-Fenoy, & Zaldívar-Basurto, 2016; Ortega-Campos, García-García, & Zaldívar-Basurto, 2017; Shepherd et al., 2016).

Recent research studies have revealed that variation in a young offender's total score on the SAVRY and YLS/CMI instruments does not predict recidivism in the youth (Viljoen et al., 2017c). In this study a relationship has been found between the number of

*Table 4*
Comparison of AUCs, with controlled gender effect, for total and partial scores of the SAVRY and YLS/CMI, Effect size and CI95%

| Comparison dyads | AUC | CI95% | Z(p-$BF_{10}$) | r(ES) | r[CI95%] |
|---|---|---|---|---|---|
| $SAVRY_{Historical}$ | .711 | [.673, .747] | 1.797 | | |
| $YLS/CMI_{Prior\ and\ current\ offenses/dispositions}$ | .674 | [.634, .711] | | | |
| $SAVRY_{Social}$ | .706 | [.668, .743] | 0.705 | | |
| $YLS/CMI_{Family\ circumstances/parenting}$ | .719 | [.681, .755] | | | |
| $SAVRY_{Individual}$ | .750 | [.713, .785] | 2.654(1)*a | .1089 | [.029, .188] |
| $YLS/CMI_{Education/Employment}$ | .704 | [.666, .741] | | | |
| $SAVRY_{Social}$ | .706 | [.668, .743] | 0.186 | | |
| $YLS/CMI_{Peer\ relations}$ | .703 | [.664, .739] | | | |
| $SAVRY_{Individual}$ | .750 | [.713, .785] | 5.393**a | .2213 | [.143, .296] |
| $YLS/CMI_{Substance\ abuse}$ | .635 | [.595, .674] | | | |
| $SAVRY_{Individual}$ | .750 | [.713, .785] | 5.376**a | .2206 | [.143, .296] |
| $YLS/CMI_{Personality/Behavior}$ | .645 | [.605, .683] | | | |
| $SAVRY_{Individual}$ | .750 | [.713, .785] | 6.129**a | .2515 | [.175, .325] |
| $YLS/CMI_{Attitudes/Orientation}$ | .626 | [.585, .665] | | | |
| $SAVRY_{SRR}$ | .752 | [.715, .786] | 0.430 | | |
| $YLS/CMI_{Total\ score}$ | .757 | [.721, .791] | | | |
| $SAVRY_{RTS}$ | .745 | [.707, .779] | 1.036 | | |
| $YLS/CMI_{Total\ score}$ | .757 | [.721, .791] | | | |

*=$p$<.01, **=$p$<.001, a=$BF_{10}$>100

*Table 5*
Logistic regression

| | b(SE) | Exp(b)[IC95%] | Z(p) |
|---|---|---|---|
| Sex | .615(.296) | 1.849[1.035, 3.303] | 4.313(.038) |
| Age | -.579(.191) | 0.560[.385, .814] | 9.227(<.01) |
| $SAVRY_{protective}$ | -.177(.084) | 0.838[.711, .988] | 4.410(.036) |
| $SAVRY_{RTS}$ | .071(.020) | 1.073[1.032, 1.116] | 12.782(<.01) |
| | | | $R^2$=.211 |
| Sex | .632(.297) | 1.882[1.051, 3.369] | 4.523(.033) |
| Age | -.592(.192) | 0.553[.380, .806] | 9.502(<.01) |
| $SAVRY_{protective}$ | -.154(.080) | 0.857[.733, 1.003] | 3.719(.054) |
| $SAVRY_{SRR}$ | .087(.020) | 1.091[1.049, 1.136] | 18.530(<.01) |
| | | | $R^2$=.224 |
| Sex | .466(.298) | 1.593[.888, 2.860] | 2.436(.119) |
| Age | -.644(.195) | 0.525[.358, .771] | 10.843(<.01) |
| $YLS/CMI_{protective}$ | -.027(.103) | 0.974[.795, 1.193] | 0.066(.797) |
| $YLS/CMI_{total}$ | .169(.045) | 1.184[1.084, 1.294] | 14.019(<.01) |
| | | | $R^2$=.258 |

risk factors that the youth presents and his/her recidivism, such that the greater the number of factors present, the greater the likelihood of the young person reoffending. This trend follows the line of work that led to the RNR Model, where risk assessment tools were created to help in the process of identifying the youth's criminogenic needs, for the purpose of planning effective actions to be taken when working with the youth.

Juvenile Justice systems require risk assessment tools that present a good capacity for discriminating between young reoffenders and nonreoffenders. The AUCs calculated for the domains and total scores indicate that the SAVRY and YLS/CMI instruments present moderate/high discriminatory capacity for recidivism in young offenders (Hilterman et al., 2014; Ortega-Campos et al., 2017; Viljoen et al., 2017a). The total scores from both instruments present higher AUC curves than do the domains or factors that make up the instruments. In this study, the AUCs calculated for the SAVRY were slightly greater than for the YLS/CMI, even if the difference between the two estimates does not justify a claim that one instrument shows significantly better predictive capacity. In the comparison of risk domains, a better prediction was found only in the case of the SAVRY domain "Individual", when compared to the YLS/CMI domains Substance abuse, Personality/Behavior and Attitudes/Orientation. This difference may be due to the fact that the Individual risk domain of the SAVRY contains items from three domains of the YLS/CMI with which it was compared. In terms of predicting recidivism, the greater the number of risk factors that the minor presents, the greater the likelihood of reoffending; the predictive capacity of the Individual factor is therefore better than the YLS/CMI in individual aspects of the young person, given that the YLS/CMI is fragmented. Application of these two instruments to the sample of young offenders in this study contributes empirical evidence in the line of former published research, asserting that the instruments function adequately (Chu et al., 2016; Perrault et al., 2017; Viljoen et al., 2017a,c; Villanueva, Basto-Pereira et al., 2019), with AUC calculations similar to the estimated mean value obtained for the risk assessment tools in Schwalbe's meta-analysis, AUC=.64 (Schwalbe, 2007).

The results found in this study do not totally support the hypothesis that dynamic risk factors predict recidivism in young offenders to a greater degree (Perrault et al., 2017). According to the AUC estimates in this study, the SAVRY domains most closely related to recidivism would be the Individual domain (AUC=.750) followed by the Historical domain (AUC=.711). In the YLS/CMI, the domains that best predict recidivism are: Family circumstances/parenting (AUC=.719), Education/Employment (AUC=.704), Peer relations (AUC=.703) and Prior and current offenses (AUC=.674).

Data from this study follow the line that emphasizes the importance of the youth's "previous experience with Juvenile Justice" as a risk factor, included in the "Big Four" of the RNR Model (Andrews & Bonta, 2010). According to the division of risk factors of the RNR Model, the SAVRY would present good predictive capacity (greater AUCs) in the domains included in the Big Four, that is, the Individual domain – including antisocial attitudes and personality – followed by the Historical domain which includes history of antisocial behavior. In this case, the Big Four factor that presents a somewhat lower AUC is antisocial associates, included in the Social domain of the SAVRY. In this case, the less predictive case of the antisocial associates factor may be due to being grouped in a domain with other factors, being thus affected by the lower weight of other factors that share the social domain.

As for the YLS/CMI instrument, the Big Four factors with higher AUC estimates are history of antisocial behavior and antisocial associates. The remaining Big Four factors present estimates higher than .62, but are not among the highest AUC estimates for this instrument. As indicated by other researchers in recidivism assessment of young offenders, it is important to be familiar with the young person's case in Juvenile Justice, given that accuracy of instruments can vary according to the sample composition (Viljoen et al., 2017a). In this study, despite obtaining very high AUC estimates, the variability between the domains that present better predictive capacity may be due to the sample composition. This fact does not affect the good functioning of the instruments, as has been demonstrated in the results presented here, but it should be taken into account when making comparisons with other study samples.

This study contributes evidence of the adequate functioning of the SAVRY and YLS/CMI risk assessment tools in young Spanish offenders. The criminogenic needs presented by young people must be taken into account when planning juvenile prevention programs against antisocial behavior, and their presence in young offenders must be considered, given that they increase the probability of juvenile recidivism (Villanueva, Valero-Moreno, Cuervo, & Prado-Gascó, 2019). At the other end, the presence of protection factors in young offenders plays an important role in preventing juvenile recidivism (Shepherd et al., 2016). Risk assessment tools of juvenile recidivism work in two directions: first, they detect the criminogenic needs that young offenders present, for the purpose of applying the most appropriate legal remedies to match their needs (Viljoen et al., 2017c); second, they enable the creation of prevention programs against juvenile delinquency, taking into account the risk and protection factors that are found in the set of young offenders as a whole (Ward & Fortune, 2016). Research in risk assessment of recidivism must continue, focusing on instruments' sensitivity to change, including the SAVRY and YLS/CMI instruments. Another important aspect to be developed is the clinical importance of risk assessment, helping professionals to plan preventive interventions with youth in general, and interventions to be used with young offenders (Chu et al., 2016; Viljoen et al., 2017c).

*Limitations*. In this study the information to score the SAVRY and the YLS/CMI was obtained from the file of the young offender in the Juvenile Court of Almeria. According to recommended practices, the rating of SAVRY and YLS/CMI should be done using a combination of interviews and information from the files. Although file coding is a widely used practice, it is advisable to supplement it with direct information from the young offender (Viljoen, Bhanwer, Shaffer & Douglas, 2018).

Recidivism of young offenders has been measured through official records, although official records underestimate true recidivism rates (Jolliffe & Farrington, 2014), self-reporting of recidivism by some young people may be unrealistic.

*Implications for research and practice*. The relationship between protective factors and young offenders needs to be studied. The scoring of protective factors should be done with caution, as a score of 0 on an instruments' protective factor does not mean that the young offender has no strengths (Viljoen et al., 2018). The strengths presented by young offenders should be taken into account when planning interventions. Protective factors should be studied in non-recidivist and non-offending young people with the aim of improving interventions for the prevention of offending behaviour.

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