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Validation of the Ceredigion Youth Screening Tool
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Validation of the Ceredigion Youth Screening Tool (CYSTEM).

Abstract: Evidence suggests that only a small minority of youth offenders will continue their behaviour in the longer-term and largely independent of any interventions they may receive (Bateman, 2011; Haines and Case, 2015). Hence, 'screening out' this larger low-risk cohort could have a positive impact upon the individual through a reduction in stigmatisation/labelling and free up resources for higher risk clients. This paper outlines development of the Ceredigion Youth Screening Tool (CYSTEM) - developed and tested to address the two facets of criminality and vulnerability - closely aligned to the eight key risk indicators identified in the R-N-R literature (Andrews and Bonta, 2010). Initial results with two cohorts of 372 young people indicates good convergent and discriminative validity in screening out the lowest level referrals, whilst also identifying 90% of potential future offenders. More importantly, CYSTEM is able to screen out approximately 35% of the low risk offenders that are unlikely to require formal evaluation and/or intervention. It is suggested that the streamlining of this process using CYSTEM reduces demand on staff time and decreases the stigmatisation of young people referred for minor offences. Potential improvements to the tool and future developments in statistical risk prediction are also discussed.

Key Words: Screening, Youth Justice, Diversion, Assessment, Risk.

Introduction

The predominant assessment metric currently used in Youth Justice is the ASSET system, an actuarial risk assessment protocol that evaluates a range of potential risk factors across twelve domains (Wilson & Hinks, 2011). Compiled during an interview by trained YOT workers - along with access to statutory records such as Social Services registers - individuals are scored on factors such as living arrangements, substance use, attitudes to offending and motivation to change. ASSET was recently replaced by ASSET-Plus (circa April 2016); theoretically and methodologically updated, the latter tool aims to address some of the shortcomings of the 'scaled approach' (Baker, 2015; YJB, 2013). The key revisions were designed to take ASSET-plus into a more contextualised, holistic assessment paradigm, beyond the prescriptive scored domains of its predecessor (Almond, 2012), although notwithstanding some reservations about how this will manifest itself theoretically and practically (Bishop, 2012; Drake, Fergusson and Briggs, 2014; Goddard and Myers, 2016; Horney, Tolan and Weisburd, 2012).

This paper outlines one such initiative – the Ceredigion Youth Screening Tool or *CYSTEM* – which is being used to 'screen out' low risk referrals to youth justice services with the aim of diverting young people from formal interventions and reducing case loads. The creation of this tool was motivated by the need to allocate resources more effectively; using a simple six-item checklist, approximately 30% of referrals can be provided with a 'light touch' supervision approach without the need for a full risk assessment. Hence, CYSTEM sits procedurally before ASSET in that it will identify and 'disconnect' those young

people from the formal assessment and/or intervention process. The paper outlines the testing and validation stages of CYSTEM and the expected utility of this tool in managing caseloads.

Historically, youth justice has reacted to differing emphasis upon the way young people interact with society; this is particularly pertinent to the response to anti-social and/or criminal behaviour (Kelly, 2012; Newburn, 2007; Rock, 2007). The identification and management of risk in young people have sought to identify factors (risk and protective) which allow predictions on later behaviour(s) (see Armstrong, et al., 2005; YJB, 2001). Recent proposals, such as "Positive Youth Justice" have potential to change the youth justice system by allowing diversionary practices to take into account 'developmental stressors' within the overall framework of youth work generally (Haines and Case, 2015). CYSTEM was largely developed in response to changing levels of service provision in Youth Justice and through the recognition that the majority of service users were very low risk. In essence, the screening tool identifies a number of personal and situational factors in order to differentiate the cohort in terms of service requirements; it is used to screen out the likely low risk offenders and little or no further evaluation (e.g. ASSET) and/or interventions are targeted at these young people. How best respond to youth crime/anti-social behaviour is twofold: firstly, creating a supportive and positive long-term environment for individuals most in need (*risk;* see Kelly, 2012; Haines and Case, 2015); and, secondly, managing and targeting increasingly scarce resources at those most in need and likely to benefit (*needs-responsivity*; see Andrews and Bonta, 1990; Grieger and Hosser, 2014).

Theoretical development of the Ceredigion Youth Screening Tool (CYSTEM)

One of the biggest recent 'success' stories in Criminal Justice has been the general downward trajectory of recorded crime since the late 1980s. Yet, whilst adult offending categories have experienced some levelling off, crime committed by young people in England and Wales has continued to fall by over 54% since 2005 (Howard League, 2015). In some UK regions, for example, Ceredigion in mid-Wales, this reduction is nearly 70%. Youth Justice policy and practice has undoubtedly had a significant impact: the increased understandings of youth crime trajectories, systematic case management, and diversionary policies have been proven to reduce offending behaviour by juveniles (Hendrick, 2015; Wilson and Hoge, 2013). However, evidence suggests that one of the most robust predictors of later adult offending is an involvement with Youth Justice services (Farrington, 2003; Gendreau, Little, and Goggin, 1996).

Much of the literature on the assessment of risk of offending, recidivism and intervention/ management is based on the *Risk-Needs-Responsivity* (RNR) principles, outlined by Andrews et al. (1990), and reviewed by Andrews and Bonta (2010). *Risk* is most closely linked to aligning the most intensive interventions to the offenders with the greatest need (or highest risk). The element most central to the current discussion is *Needs*; the "Central Eight" indicators identified by Andrews and Bonta include: anti-social attitudes, anti-social/criminal associates, previous criminal history, individual differences in anti-social personality features (e.g. impulsivity), substance abuse, dysfunctional family life, educational problems, and lack of pro-social leisure activities (e.g. sports clubs). These eight factors have been reliably shown to predict the

preponderance of offending by young people (Grieger and Hosser, 2014; Lipsey, and Derzon, 1998; Tong and Farrington, 2006). With the exception of prior criminal history, these indicators are dynamic (subject to change) and where interventions can be targeted, i.e. prioritising the factors most likely to influence future criminal behaviour (Helmond, et al., 2015). *Responsivity* is explained by assessing how demographic characteristics (including age, but also social class, gender, and individual differences, such as intelligence) can influence the impact of an intervention (Bergseth and Bouffard, 2013; Losel and Farrington, 2012).

The theoretical basis for CYSTEM reflects on these key eight factors alongside a number of established psychological and criminological concepts. Specifically, it serves to recognise the coexisting elements of *Criminality* and *Vulnerability*. The first – criminality – is grounded within the issue of pro-criminal attitudes and anti-social behaviour; the source of these attitudes is manifested predominantly in peer relationships and family background (Granic and Butler, 1998; Liau, Barriga and Gibbs, 1998; Willinius, Johansson, Larden and Dernevik, 2011). Wider criminological theories, such as Differential Association (Burgess and Akers, 1966; Sutherland, 1974; Rock, 2007) propose that criminal tendencies and pro-criminal attitudes are both created and maintained by association with deviant subcultures (Shapland, Bottoms and Muir, 2012). In the early years, the family is a key source of these attitudes and later the community and peers also exert an influence. A significant amount of research has been expended upon the family unit as a source of criminogenic behaviour (Kazemian, 2007). At a broad level, the early work of Hirschi (1969) identified that children with strong family ties were less likely to be delinquent by age 15. Subsequently, the development

of criminal behaviour(s) often begins in the home, with twin and adoption studies illustrating the extent to which criminal behaviour can be due to an interaction between genetics factors and environment (Bonta, Law and Hanson, 1998; Donker, Smeenk, van der Kaab and Verhulst, 2003).

Peer relationship too can be manifested into externalising problem behaviours (Rokach, 2000). Peer rejection can evoke aggressive reactions and additional developmental problems, such as truancy (Brendgen, Vitaro, Bukowski, Doyle, and Markiewicz, 2001). More severe cases can lead to early-onset conduct disorder and general delinquency (Miller-Johnson, Coie, Maumary-Gremaud and Bierman 2002). However, despite the importance of family and peer relationships in 'developing' (or reducing) the onset of deviant behaviour, longitudinal data (see Moffit and Caspi, 2001) suggest that individual differences (e.g. impulsivity, low IQ, etc.) were more predictive of the maintenance of criminal behaviour. Hence, the scope to address dysfunctional parenting and associations with delinquent peers for those *without* socio-cognitive deficiencies remains promising.

Secondly, vulnerability and welfare problems associated with parental practices and home life can also impact upon childhood problem behaviours. Lack of supervision, harsh and inconsistent punishment and attachment problems have shown consistent relationships with delinquent behaviours (Tremblay, and LeMarquand, 2001). The actual victimisation of young people is one of the key indicators for later adult criminality, particularly interpersonal aggression which is manifested from within a 'cycle of violence' that is also applicable to many

sexual offences (Loeber and Farrington, 2012; Widom and Maxfield, 2001). Reviews of the wider evidence of the impact of child maltreatment have concluded that there are psychobiological consequences exhibited as 'environmentally induced developmental disorders' (De Bellis, 2001). These can lead to low IQ (particularly delayed language development), exclusion from school and emotional/mental health problems (Moffit, 1993). Young children (aged 7-12) that have been the victims of abuse are 2-3 times more likely to become chronic adult offenders that those having began offending in their teens (Loeber and Farrington, 2010). In essence, offending and anti-social behaviour can serve almost as a 'proxy' measure for the identification of vulnerable young people requiring interventions.

Diversion and Labelling

Alongside criminality and vulnerability, the issue of labelling and diversionary practices also features in the aetiology of CYSTEM. Negative reinforces – particularly when unjustified or overly severe – can guide individuals to 'adopt' certain ways of behaving in response to these perceived labels they have attached to themselves (Kurlychek, Brame and Bushway, 2006). Becker (1963) suggested that these 'deviant labels' become a self-fulfilling prophecy in that the individual then 'plays up' to the tag with increasingly persistent deviant behaviour, thus continuing and further reinforcing the pattern. For the management of young people these ideas on labelling have been recognised for some time (see Shur, 1973), yet have received somewhat of resurgence in recent research evaluations (see McAra and McVie, 2007; Loeber and Dishion, 1983). Wiley, Slocum and Esbensen (2013) examined longitudinal data from a number

of cities to test the deviance amplification hypothesis that being stopped or arrested by the police led to increase in later future delinquency. Their findings suggest that juveniles stopped/arrested reported higher levels of later delinquency. In addition, Wiley et al.'s findings recommend that interventions targeted at reducing the consequences of police contact (i.e., poor academic achievement, deviant identity formation, and delinquent peer associations), might also reduce the manifestation of secondary deviance (labeling).

The screening tool developed here aims to address these two linked factors: risk of Offending and risk of Vulnerability. The vast literature – briefly reviewed here – broadly suggests that children are often both perpetrators and victims of crime. For example, we may have young people witnessing and experiencing violent conduct in the home; in turn they may model and/or express this behavior as bullying amongst their peers. Similarly, criminal and anti-social behavior amongst young people can be an expression of pro-criminal attitudes or the externalization of problems with family, school, peers, etc. These issues are recognized amongst the majority of risk assessment models and tools; the aim of the current study is to utilize a range of these items to screen out those falling below the line of discernible risk to direct resources towards medium-high risk referrals.

Method

Sample

The total sample consists of a of 372 young people referred to the Ceredigion Youth Justice and Prevention Service over a 24-month period from 1st April 2014

to 31st March 2016. Data was collected in two stages; the first included 267 individuals up to the 31st September 2015 and the additional 105 making up the full 372 total. The sample consists of 221 males and 151 females (approx.. 60:40 split) and with an age range from 11-18.

Referrals come into the team via 3 main routes:

1. Referrals for prevention services from social workers, teachers/schools, parents/carers, police and young people themselves (known as 'Preventions Referrals'). These referrals account for around two-thirds of all referrals and the subjects of these referrals are considered by the referrers to be at risk of coming into contact with the police through anti-social and/or criminal behaviour.

2. Formal Bureau referrals from the Police Force are part of the agreed criminal justice processes for young people. Bureau referrals account for approximately a quarter of all referrals. Since 2014 all young people aged 10 to 17yrs who admit responsibility for an offence that has been reported to, and investigated by the police, are referred to the bureau system (provided they have not committed a serious specified offence and there is sufficient evidence to ensure realistic chance of conviction if the matter was referred to the criminal courts).

3. Referrals from the criminal courts (Youth Courts) account for less than a tenth of all referrals. The subjects of these referrals have been formally charged with criminal offences and referred to the criminal courts by the Crown Prosecution Service.

All Prevention and Bureau cases are formally assessed (using ASSET/ASSET-Plus); any identified as being at medium/high risk of offending and/or having medium/high safeguarding concerns, are then allocated to qualified staff for further assessment along with all Court referrals[1].

Procedure

Data is collected for both ASSET/ASSET-Plus alongside the additional items from CYSTEM for *all* referrals to the Service. Presently the two systems (ASSET-Plus and CYSTEM) run simultaneously (although see Discussion below for future developments).

Scale development

At its inception, CYSTEM was perceived to be a *pre-screen* tool that would reduce both the administrative burden and the potential for stigmatisation of the young people being referred (Farrington, 1977; Wilson and Hoge, 2013). The tool was initially informed largely by reference to existing practice inventories (predominantly ASSET), but with significant input from case managers and senior assessment staff. An initial pool of 12 items relating to both criminality and vulnerability were developed through a series of staff workshops and case management meetings (See Appendix A).

Initial analysis centred on the values assigned to the categories (i.e. intensity or level of the variable scored from 0-4) and the category boundaries for low-

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[1] YOTs have a statutory duty to complete full assessments on all court referrals and are subject to further in-depth risk assessment. These evaluations typically take around 12 hours to complete; ASSET/ASSET-Plus assessment between 3-5 hours.

medium-high risk. Data was collated (Stage 1: n=267) for the three Criminality items and the nine Vulnerability items representing the two key theoretical domains:

1. Risk of Offending:
    i. 3 items representing criminal thoughts, anti-social attitudes and behaviour;
    ii. Scored 0-4 – total out of 12;
    iii. Arbitrary cut-off at 3 for medium and 6 for high risk.

2. Risk of Vulnerability:
    i. 9 items indicating risk of suicide, contact with sexual/domestic violence perpetrators, records of contact with mental health, on child protection register, subject of strategy meeting, being a looked after child, NEET/homeless, substance misuse, reckless behaviour;
    ii. Quality and extent of evidence define some variable scores;
    iii. Range of scores from binary through to 0-3 – total out of 12;
    iv. Arbitrary cut-off at 2 for medium and 5 for high risk.

Preliminary screening of the data suggested that many of the variables from the Vulnerability items were of a very low frequency. For example, less than 3% of the sample recorded scores on Q1: Child Protection Register; similarly less than 8% scored as present on Q4: NEET/Homeless. Subsequently, the vulnerability scale was reduced down from 9 to 3 items with the low frequency variables removed from the analysis. This left two sub-scales with 3 questions – a total of

six items across the two key domains of risk of criminality and vulnerability (see Appendix B)[2]:

1. Risk of Offending:

    i.   Q1: Criminal/anti-social thoughts

    ii. Q2: Criminal/anti-social environment

    iii. Q3: Criminal/anti-social behaviour

2. Risk of Vulnerability:

    i.   Q3: Looked after child/child in need/social service/disability

    ii. Q8: Living with perpetrator of DV and/or sexual exploitation

    iii. Q9: Reckless/harmful behaviour (incl. sexual)

The six items from the scale were grouped into their two respective categories: *Risk of Offending* and *Risk of Vulnerability*. These two sub-scales are latent variables, measured by the three most frequent items from the main review and were assessed for invariant structure using Confirmatory Factor Analysis. The data from the Stage 1 sample (n=267) was analysed using *Mplus* 6.12 (Muthen and Muthen, 2011). Because each item of the scales has a maximum score of three, robust weighted least squares estimation is used (MLSMV) and scores essentially treated as binary (absent/present). Model fit was examined using the Root Mean Squared Error of Approximation (RMSEA) and Comparative Fit Index (CFI). According to Hu and Bentler (1999), RMSEA values of .06 to .08 indicate adequate fit and ≤.05 good fit (values ≥.1 poor fit). Similarly, Kline (2011)

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[2] Cohen's κ was run to determine if there was agreement between two different case manager's assessment on whether 20 referrals had met the 1-0 threshold for further assessment and/or intervention. There was moderate agreement between the two raters, κ = .519 (95% CI, .356 to .682), p = .008.

recommends CFI values of .9 and above are necessary to support models with good fit, although Marsh, Hau, and Grayson (2005) caution against overreliance on incremental fit indices when analysing item level data. Tests for factorial invariance across gender were estimated using changes in the CFI, with deviations of ≤.01 suggestive of invariance within the model (see Cheung and Rensvold, 2002).

Results

Confirmatory Factor Analysis

Preliminary examination of the data from Stage 1 indicated a model with reasonably good fit to the data: there is some empirical support for the model (X^2 =15.067, df=8, p=.05; RMSEA=.058, 90% CI=.000-.102; CFI=.992). Hence, the items for each domain are good predictors of the variables of Risk of Offending and Risk of Vulnerability. The DIFFTEST procedure is used to assess structural invariance across the model for gender; both latent variances and covariances were invariant across males and females (x^2=12.37, p>.05) and the tool is therefore suitable for use with both genders.

Factor loadings for the six items in the two-factor model are detailed in Table 1. Correlations between the two latent factors were .508. Only Item 4 ("Looked after child/child in need/social services/disability") was not significant.

Sub-scale items:	Standardized		
	B	**S.E.**	***p***
Criminality			
1. Criminal/Anti-social thoughts	.458	.080	<.001
2. Criminal/Anti-social environment	.480	.080	<.001
3. Criminal/Anti-social behaviour	.209	.077	<.01
Vulnerability			
4. Looked after child/in need/social services/disability	.057	.077	>.05
5. Living with DV and/or sexual exploitation	.754	.085	<.001
6. Reckless/Harmful behaviour	.818	.085	<.001

Table 1: Standardized Factor Loadings for the six-item two-factor structure.

Sample 2: Scale Validation

In order to evaluate whether CYSTEM was a valid predictor of risk, a second sample of 105 young people referred to the service was tested using Sensitivity Analysis (AUC). The outcome measure is whether the individual had gone on to offend in the following six-month period.

Sensitivity Analysis (AUC)

Descriptive statistics indicated that a score of 1 on a binary 0-1 format would correctly identify 89% of referrals that would go on to offend (the true positives) and [incorrectly] 11% of those that would offend, but had not been identified for an intervention (the false negatives). Similarly, 66% of those selected for an intervention would not actually offend (false positives) with the remaining 34% being correctly screened out of the system (true negatives)(see Table 2). Similar results for the subscales indicated a less optimum false negative rate in the identification of future offenders: Risk of Offending Subscale (ROF; 25%) and Risk of Vulnerability Subscale (ROV; 29%). However, the ROF scale produced the highest number of true negatives, i.e. those correctly screened out *and* not likely to offend, of 52% compared to 46% for the ROV. In total, CYSTEM would screen

out 32% of all referrals (both later offenders and non-offenders); the ROF in contrast screened 50:50 and the ROV screened out 45%.

Screened:		**CYSTEM**		**ROF**		**ROV**	
		Out	*In*	*Out*	*In*	*Out*	*In*
Offended:	No (93%)	**34%**	**66%**	52%	48%	46%	53%
	Yes (7%)	**11%**	**89%**	25%	75%	29%	71%
Total:		*32%*	*68%*	*50%*	*50%*	*45%*	*50%*

Table 2: Percentage of offenders and non-offenders in each binary group for scale total and individual sub-scales. Both CYSTEM and ROF-subscale were significant at the .01 level (X^2=6.52 & 7.25 respectively).

Common to all predictive tools, there is always a trade off between specificity and sensitivity. The use of ROC analysis enables a more accurate definition of where the ideal cut-off point on each scale lies, alongside the relative ability to predict the outcome, ranging from .5 (no better than chance) to 1 (perfect prediction), with scores of .7 and above being good predictors (Swets, 1986). AUC analysis is also more robust with low base rates than binary logistic regression making it more appropriate with the current sample (Fawcett, 2006).

Using the full ROF-ROV scale as a benchmark, the AUC was .645 (p=.011; 95% CI=.549-.740). The scale scores ranged from 0-3, with the optimum score being between .5 and 1.5. By comparison, the ONSET scale scores which were available for 80 participants in the sample, showed a comparable but not significant AUC of .655 (p=.078; 95% CI=.496-.814), with an optimum score of around 6.5. The ROF has a slightly higher AUC =.677 (p=.002; 95% CI=.570-.784) and the ROV just within significant with an AUC=.615 (p=.043; 95% CI=.507-.723). Hence,

taking into account some minor variations, it appears that the optimum score for the scale total ROF-ROV is a binary 1-0 (see Appendix C for individual AUC plots).

Rice and Harris (2005) produced an effect size rubric for forensic populations, with AUCs of between .56 and .63 representing a small effect, .64-.70 as medium, and .71-1 a large effect size (.5 is the same as chance level accuracy). Hence, the ROV falls slightly below the acceptable limit and was also not significant; however, the full six items of the ROF-ROV (and the ROV subscale), meet Rice and Harris' suggested threshold for a medium effect size relating to their power to predict outcomes. However, whilst these thresholds are published as a guide for estimation, Baird et al. (2013) caution on the variability of the AUC generally as a viable method to establish predictive ability in forensic samples. Hence, any expectations regarding the predictive capacity of CYSTEM would require further validations studies and suitable benchmarks (Gottfredson and Snyder, 2005).

Discussion

CYSTEM is a pre-screen tool; performs at significantly above chance in indicating those referrals for whom formal assessment and/or intervention is unlikely to be necessary. The effect size (AUC=.645) for the whole sample using CYSTEM was - according to Rice and Harris (2005) – medium in magnitude for a forensic sample. Comparisons with wider measures of youth risk assessment such as the Youth Assessment and Screening Instrument (YASI; Orbis Partner, 2007) recorded AUCs of .65. Finding the YASI as one of the top three predictive youth assessment tools, Baird et al's (2013) NCCD study showed these tools to have equal AUC accuracy scores (AUC= .68). Hence, aside from Baird et al's caveat

regarding the utility of AUC predictions in this arena, we can be fairly confident that CYSTEM is a tool that can predict offending behaviour by young people, and, arguably more importantly, has sufficient capacity to screen out those young people unlikely to require full assessment and/or formal intervention.

CYSTEM was devised to manage an increasing caseload by taking a pragmatic approach to the diversion of young people out of the formal Youth Justice system. Based upon the R-N-R literature alongside theoretical models of labelling and vulnerability, it assesses six core facets identified as predictors of later offending. The presence of one of these features during screening necessitates a formal ASSET assessment; for those identified as very low risk (i.e. not scoring on any of the key indicators), then no formal intervention is enacted. With an ASSET assessment taking upwards of 3 hours to complete, the predicted saving of over 30% of the referral caseload is considerable. Moreover, the wider evidence is that not only will it save time and costs, but is likely to have longer-term knock on effects by reducing the likelihood of this cohort encountering the Youth Justice service again in the future. For the remaining two-thirds subjected to a full ASSET evaluation, only a small minority (<10%) will go on to offend; the use of CYSTEM therefore also releases resources to target those most likely to benefit from interventions ("needs-responsivity").

Alongside the assessment of contact with the criminal justice system, CYSTEM also acts as a monitor for potential safeguarding issues. To date, this aspect of the tool has not been validated against statutory safeguarding outcomes. However, the screening questions that relate to safeguarding issues are based on

concerns that should trigger further more in depth assessments by practitioners in order to safeguard young people. Safeguarding concerns by the tool are rated present/absent. The screening process requires the practitioner to interrogate the YJPS and Ceredigion Social Services databases and access partners to carry out checks on the Local Education Authority, Police, Careers Wales and CAMHS systems. Screening one referral takes around 30 minutes compared to 3-5 hours for an ASSET evaluation and 10-12 for a full assessment (Wilson & Hinks, 2007).

Evidence suggests that most young people who enter the criminal justice system do not go on to reoffend within 12 months weather or not they receive a formal intervention to try to reduce their risk of offending. Around 60% of preventions and bureau referrals are screened as low risk with no safeguarding concerns. Where further assessment indicates medium or high risks young people are offered a tailored intervention package aimed at reducing risks. The intervention package is directly based on the ASSET assessment and targets specific dynamic risk factors that have been identified. Future refinement of CYSTEM should examine in more detail the impact of Item 4 (ROV4: Looked after child/ child in need/ social service/ disability), which was non-significant in the factor loading in the CFA. Potentially moving to a two-item factor of Vulnerability, however, is problematic in that it oversimplifies the practical nature of the screening tool. In some respects, the AUC of CYSTEM is improved slightly (from .655 to .677) by the removal of all the Vulnerability items. However, both are within the medium category in their effect sizes. More importantly, the presence of any of the vulnerability items requires statutory investigation under UK child welfare legislation. Additionally, the sample drawn to validate this measure was from a

predominantly rural location with relatively low levels of crime. The screening tool therefore may be more relevant to assess recidivism rates for similar contexts and low-base rate samples. Wider caveats regarding the use of risk assessment tools in predicting offending behaviour are also accepted (Gottfredson and Moriarty, 2006).

Conclusion

Utilising confirmatory factor analysis, a theoretical model of youth offending risk was tested; results indicated that 6 items representing two separate latent variables of Criminality and Vulnerability was retained as an acceptable structure. Sensitivity analysis (AUC) indicated that there was a moderate level of predictive capacity in being able to identify the likely future offenders from the non-offenders. In this domain, the screening tool showed comparable discriminant validity as similar tools. The key advantages of CYSTEM presented here relate to it's relative ease of use, i.e. six binary scored un-weighted items, which is important in respects to the key developmental aims of reducing staff time. As well as correctly identifying nearly 90% of the later offenders in the sample, CYSTEM manages to screen out approximately 35% of those young people unlikely to later offend and subsequently require any formal intervention. This achieves the key aims of reducing the demand for resources whilst also keeping young people outside of the criminal justice system.

References

All Wales Child Protection (2008). *All Wales Child Protection Procedures Review Group.* Available online: http://www.childreninwales.org.uk/our-work/safeguarding/wales-child-protection-procedures-review-group/ (accessed 29/9/16).

Almond, T. (2012). Asset; an assessment tool that safeguards or stigmatizes young offenders? *Probation Journal*, 59, 138–150.

Andrews, D.A., Guzzo, L., Raynor, P., Rowe, R.C., Rettinger, L.J., Brews, A., & Wormith, J.S. (1990). Are there major risk/need factors predictive of both male and female offending? A test with the eight domains of the level of service/case management inventory. *International Journal of Offender Therapy and Comparative Criminology*, 56, 113-133.

Andrews, D.A. & Bonta, J. (2010). *The Psychology of Criminal Conduct* (5th Ed.). Cincinnati, OH: Anderson Publishing.

Armstrong, D. , Hine, J. , Hacking, S. , Armaos, R. , Jones, R. , Klessinger, N. and France, A. (2005). *Children, Risk and Crime: The On Track Youth Lifestyles Surveys*. HORS 278. London: Home Office.

Baird, C., Healy, T., Johnson, K., Bogie, A., Dankert, E.W., & Sharenbroch, C. (2013). A comparison of risk assessment instruments in juvenile justice. National Council on Crime and Delinquency. Retrieved from: www.ncjrs.gov/pdffiles1/ojjdp/grants/244477.pdf

Baker, K. (2015). *Assessing the predictive validity of the Asset youth risk assessment tool using the Juvenile Cohort Study (JCS)*. London: Crown/YJB.

Bateman, T. (2011), Coalition government promises a 'Rehabilitation Revolution' in England and Wales, *Youth Justice*, 11(1), 90-101.

Becker, H.S. (1963). *Outsiders: Studies in the Sociology of Deviance*. New York: Free Press.

Bergseth K. J., Bouffard J. A. (2013). Examining the effectiveness of a restorative justice program for various types of juvenile offenders. *International Journal of Offender Therapy and Comparative Criminology*, 57, 1054-1075.

Bishop, D. (2012), Evidence-based practice and juvenile justice. *Criminology and Public Policy,* 11(3), 483–489.

Bonta, J., Law, M. & Hanson, K. (1998). The prediction of criminal and violent recidivism among mentally disordered offenders: A meta-analysis. *Psychological Bulletin*, 123, 123-142.

Brendgen, M., Vitaro, F., Bukowski, W.M., Doyle, A.B., & Markiewicz, D. (2001). Developmental profiles of peer social preference over the life course of elementary school: Associations with trajectories of externalising and internalising behaviour. *Developmental Psychology,* 37, 308-320.

Burgess, R., & Akers, R.L. (1966). A Differential Association-Reinforcement Theory of Criminal Behavior. *Social Problems*, 14: 363-383.

Cheung, G. & Rensvold, R. (2002). Evaluating goodness-of-fit indexes for testing measurement invariance. *Structural Equation Modelling*, 9(2), 233-255.

De Bellis, M.D. (2001). Developmental Traumatology: The psychobiological development of maltreated children and its implications for research, treatment, and policy. *Development and Psychopathology*, 13, 537-561.

Donker, A.G., Smeenk, W.H., van der Laan, P.H., & Verhulst, F.C. (2003). Individual stability of antisocial behavior from childhood to adulthood: Testing the stability postulate of Moffitt's developmental theory. *Criminology*, 41, 593-609.

Drake, D., Fergusson, R., & Briggs, D. (2014). Hearing new voices: Re-viewing youth justice policy through practitioners' relationships with young people. *Youth Justice,* 14(1), 22–39.

Farrington, D. (1977). The effects of public labelling. *British Journal of Criminology, 17*, 112-125.

Farrington, D. P. (2003). Developmental and life-course criminology: key theoretical and empirical issues. *Criminology, 41,* 221-256.

Fawcett, T. (2006). An introduction to ROC analysis. *Pattern Recognition Letters*, 27(8), 861-874.

Gendreau, P., Little, T., & Goggin, C. (1996). A meta-analysis of the predictors of adult offender recidivism: What works! *Criminology, 34*(4), 575-607.

Goddard, T. & Myers, R. (2016). Against evidence-based oppression: Marginalized youth and the politics of risk-based assessment and intervention. *Theoretical Criminology*, Pre-publication print, April 2016, 1-17.

Gottfredson, D. & Moriarty, L. (2006). Statistical Risk Assessment: Old Problems and New Applications. *Crime and Delinquency*, 52(1), 178-200.

Gottfredson, D. & Snyder, H. (2005). *The Mathematics of Risk Classification: Changing Data into Valid Instruments for Juvenile Courts*. USDOJ. Available online: https://www.ncjrs.gov/html/ojjdp/209158/index.html (Accessed 29/9/16).

Granic I., Butler S. (1998). The relation between anger and antisocial beliefs in young offenders. *Personality and Individual Differences*, 24, 759-765.

Grieger L., Hosser D. (2014). Which risk factors are really predictive? An analysis of Andrews and Bonta's inmates "central eight" risk factors for recidivism in German youth correctional facility. *Criminal Justice and Behavior*, 41, 613-634.

Haines, K.R & Case, S.P. (2015). *Positive Youth Justice: Children First, Offenders Second*. Bristol: Policy Press.
Helmond P., Overbeek G., Brugman D., Gibbs J. C. (2015). A meta-analysis on cognitive distortions and externalizing problem behavior: Associations, moderators, and treatment effectiveness. *Criminal Justice and Behavior*, 42, 245-262.

Hendrick, H. (2015). *Histories of Youth Crime and Youth Justice*. In B. Goldson and J. Muncie (eds), Youth Crime and Justice (2nd Edition), London: Sage (pp.3-16).

Hirschi, T. (1969). *Causes of Delinquency*. Berkeley: University of California Press.

Horney J., Tolan P., Weisburd D. (2012). Contextual influences. In Loeber R., Farrington D. P. (Eds.), *From juvenile delinquency to adult crime: Criminal careers, justice policy and prevention* (pp. 86-117). New York, NY: Oxford University Press.

Hough, M. (2013). Procedural justice and professional policing in times of austerity. *Criminology and Criminal Justice*, 13(2), 181-197.

Howard League for Penal Reform (2015). *Child Arrests in England and Wales 2014 Briefing Paper*. Online: http://howardleague.org/publications/child-arrests-2014/ (Accessed August 2016).

Hu, L. & Bentler, P.M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modelling: A Multidisciplinary Journal,* 6, 1-55.

Kazemian, L. (2007). Desistance from crime: Theoretical, empirical, methodological, and policy considerations. *Journal of Contemporary Criminal Justice*, 23, 5-27.

Kelly, L. (2012). Representing and preventing youth crime and disorder: Intended and unintended consequences of targeted youth programmes in England. *Youth Justice: An International Journal*, 12, 101-117.

Kline, R.B. (2011). *Principles and Practice of Structural Equation Modelling* (3rd Ed.). New York: Guildford Press.

Kurlychek, M. C., Brame, R. & Bushway, S. D. (2006). Scarlet letters and recidivism: Does an old criminal record predict future offending? *Criminology and Public Policy*, 5, 483-503.

Liau A. K., Barriga A. Q., Gibbs J. C. (1998). Relations between self-serving cognitive distortions and overt vs. covert antisocial behavior in adolescents. *Aggressive Behavior*, 5, 335-346.

Lipsey, M.W., & Derzon, J.H. 1998. Predictors of violent or serious delinquency in adolescence and early adulthood: A synthesis of longitudinal research. In *Serious and Violent Juvenile Offenders: Risk Factors and Successful Interventions*, R. Loeber and D.P. Farrington (eds). Thousand Oaks, CA: Sage Publications, pp. 86–105.

Loeber, R., & Dishion, T.J. (1983). Early predictors of male delinquency: A review. *Psychological Bulletin*, 94, 68-99.

Loeber R., Farrington D. P. (Eds.). (1998). *Serious and violent juvenile offenders: Risk factors and successful interventions*. Thousand Oaks, CA: Sage.

Loeber, R., & Farrington, D. (2012). Advancing knowledge about direct protective factors that might reduce youth violence. *American Journal of Preventive Medicine*, 43, S24-S27.

Lösel, F., & Farrington, D. P. (2012). Direct protective and buffering protective factors in the development of youth violence. *American journal of preventive medicine*, *43*(2), S8-S23.

Marsh, H.W., Hau, K.T. & Grayson, D. (2005). Goodness of fit in structural equation models. In A Maydeau-Olivares and KK McArdle (eds), *Contemporary Psychometrics*, NJ: Lawrence Erlbaum Associates, pp.275-340.

McAra, L. & McVie, S. (2007). Youth Justice? The impact of system contact on patterns of desistence from offending. *European Journal of Criminology,* 4, 315-345.

Miller-Johnson, S., Coie, J.D., Maumary-Gremaud, A., & Bierman, K. (2002). Peer rejection and aggression and early starter models of conduct disorder. *Journal of Abnormal Child Psychology,* 30, 217-230.

Moffit, T.E. (1993). Adolescence-limited and life-course-persistent anti-social behaviour: A developmental taxonomy. *Psychology Review*, 100, 674-701.

Moffitt, T.E. & Caspi, A. (2001). Childhood predictors differentiate life-course persistent and adolescent-limited anti-social pathways amongst males and females. *Development and Psychopathology*, 13, 355-375.

Muthen, L.K. & Muthen, B.O. (2011). *MPlus V.6.12*. LA: Muthen and Muthen.

Newburn, T. (2007). Youth Crime and Youth Culture. In M. Maguire, R. Morgan and R. Reiner (eds), *The Oxford Handbook of Criminology*, Oxford: Oxford University Press (pp.575-601).

Orbis Partners (2007). Long-term validation of the Youth Assessment and Screening Instrument (YASI) in New York State juvenile probation. Retrieved from: http://dpca.state.ny.us/pdfs/nyltyasifullreport20feb08.pdf

Rice, M.E. & Harris, G.T. (2005). Comparing effect sizes in follow-up studies: ROC area, Cohen's *d*, and *r. Law and Human Behavior*, 29(5), 615-620.

Rokach A. (2000). Offence type and coping with loneliness. *Psychological Studies*, 45, 69-75.

Rock, P. (2007). Sociological theories of crime. In M. Maguire, R. Morgan and R. Reiner (eds), *The Oxford Handbook of Criminology*, Oxford: Oxford University Press (pp.3-42).

Schur, E. (1973). *Radical Non-intervention: Rethinking the delinquency problem*. Englewood Cliffs, NJ: Prentice-Hill.

Shapland J., Bottoms A. E., Muir G. (2012). Perceptions of the criminal justice system among young adult would-be desisters. In Lösel F., Bottoms A., Farrington D. P. (Eds.), *Young adult offenders: Lost in transition?* (pp. 128-145_. New York, NY: Routledge.

Sutherland, E. H. (1974). *Criminology* (9th ed.). Philadelphia: Lippincott.

Swets, J.A. (1986). Indices of discrimination or diagnostic accuracy: Their ROCs and implied models. *Psychological Bulletin,* 99, 100-117.

Tong L.S.J., Farrington D.P. (2006). How effective is the "Reasoning and Rehabilitation" programme in reducing re-offending? A meta-analysis of evaluations in four countries. *Psychology, Crime & Law*, 12, 3-24.

Tremblay, R.E., & LeMarquand, D. (2001). Individual risk and protective factors. In *Child Delinquents: Development, Intervention, and Service Needs*, edited by R. Loeber and D.P. Farrington. Thousand Oaks, CA: Sage Publications, pp. 137–164.

Wallinius M., Johansson P., Larden M., Dernevik M. (2011). Self-serving cognitive distortions and antisocial behavior among adults and adolescents. *Criminal Justice and Behavior*, 3, 286-301.

Widom, C. S., & Maxfield, M. G. (2001). *An update on the "cycle of violence"* (NIJ Research in Brief). Washington, DC: U.S. Department of Justice, Office of Justice Programs, National Institute of Justice.

Wiley, S.A., Slocum, L.E., & Esbensen, F.A. (2013). The unintended consequences of being stopped or arrested: An exploration of the labelling mechanisms through which the police contact leads to subsequent delinquency. *Criminology*, 51, 927-966.

Wilson, E., & Hinks, S. (2011). *Assessing the predictive validity of the Asset youth risk assessment tool using the Juvenile Cohort Study (JCS)*. London: Crown/YJB.

Wilson, H. A., & Hoge, R. D. (2013). The effect of youth diversion programs on recidivism: A meta-analytic review. *Criminal Justice and Behavior*, *40*, 497-518.

Youth Justice Board (2001). *Risk and Protective Factors Associated with Youth Crime and Effective Interventions*. London, Youth Justice Board for England and Wales.

Youth Justice Board (2003). *Assessment, Planning Interventions and Supervision*. London: YJB.

Appendix A – CYSTem Screening Tool v.1 Questions

A - RISK OF OFFENDING (within the next 12 months)
1. Is there any evidence that the young person experiences thoughts that promote antisocial/criminal behaviour (justifications and minimizations)?
2. Is there evidence that the young person is being exposed more than once or twice a year to situations/environments in which others are behaving in an antisocial/criminal way and/or are expressing thoughts that justify such behaviour?
3. Is there any evidence that the young person is behaving in an antisocial/criminal way more than once a year?

B – VULNERABILITY RISK. RISK OF THE YOUNG PERSON HARMING THEMSELVES OR BEING HARMED OR EXPLOITED BY OTHERS (within the next 12 months; VULNERABILITY RISK)
1. Is the young person currently registered on the child protection register?
2. In the last two years has the young person been the subject of a strategy meeting in which significant concerns were raised?
3. Is the young person a 'looked after child', a' relevant child', a 'child in need' or are they open to TAF? If not has the young person a previous history of any involvement with social services (including being the subject of a strategy meeting more than 1 year ago)? Is the young person a 'young carer' or do they have any significant physical disability.
4. Is the young person currently NEET, homeless and/or is their school attendance less than 80%?
5. Has the young person got any history of involvement with mental health services at tiers 3 or 4 or a formal diagnosis by a CPN or psychiatrist of a mental disorder (including schizophrenia, clinical depression, eating disorder, severe autistic spectrum disorder, OCD, PTS).
6. Has the young person got an evidenced history of self harm, suicidal ideation or suicide attempts. Score 0 if no history.
7. Is there any evidence that the young person is currently at risk of serious harm as a result of their use of substances (A&E admissions/overdose, opiate use, regular ketamine use, regular use of NEDs, Daily alcohol use or regular binge drinking episodes, solvent abuse, injecting user, regular polydrug use)?
8. Is there any evidence of anyone living with the young person, or anyone that the young person is regularly associating with, being a perpetrator of domestic violence or sexual offending or an exploiter of young people.
9. Is there any evidence that the young person is engaging in reckless or other behaviours (including sexual activity) that is likely to lead to lead to them being harmed.

Appendix B - CYSTEM Screening Tool v.2

NAME OF YOUNG PERSON: AGE :   DATE OF SCREEN:
SOURSE OF REFERRAL: SCREENER:

A - RISK OF OFFENDING (within the next 12 months)

4. Is there any evidence that the young person experiences thoughts that promote antisocial/criminal behaviour (justifications and minimizations)?   Yes/No

5. Is there evidence that the young person is being exposed more than once or twice a year to situations/environments in which others are behaving in an antisocial/criminal way and/or are expressing thoughts that justify such behaviour?   Yes/No

6. Is there any evidence that the young person is behaving in an antisocial/criminal way more than once a year?   Yes/No

TOTAL SCORE (0-1-2-3)

GUIDANCE FOR SCORING:
After checking the standard information sources (see checklist below) each of the questions should be scored between 0 and 1 depending on information/evidence available.

• A score of 0 indicates no evidence/information.
• A score of 1 indicates less than three pieces of information/evidence available.

Each question should be scored independently of the others i.e. one piece of information may provide evidence for all three questions e.g. a detailed ASB referral from NPT. It is assumed that the available level of evidence will reflect the risk level. For example the more often a young person is associating with offending peers the more likely it is that they will come to the attention of police and other agencies and therefore the more likely it is that there will be multiple pieces of information to evidence a high score. High scores should reflect the quantity and quality of evidence.

B – VULNERABILITY RISK. RISK OF THE YOUNG PERSON HARMING THEMSELVES OR BEING HARMED OR EXPLOITED BY OTHERS (within the next 12 months; VULNERABILITY RISK)

10. Is the young person a 'looked after child', a' relevant child', a 'child in need' or are they open to TAF? If not has the young person a previous history of any involvement with social services (including being the subject of a strategy meeting more than 1 year ago)? Is the young person

a 'young carer' or do they have any significant physical disability. If you answer yes to any of these questions score 1. Otherwise score 0.

11. Is there any evidence of anyone living with the young person, or anyone that the young person is regularly associating with, being a perpetrator of domestic violence or sexual offending or an exploiter of young people. Score 0 if no evidence. Score 1 if some evidence.

12. Is there any evidence that the young person is engaging in reckless or other behaviours (including sexual activity) that is likely to lead to lead to them being harmed. Score 0 if no evidence. Score 1 if some evidence.

TOTAL SCORE (0-1-2-3)

Refer to Asset – Yes/No (referrals for full assessment if score of 1 or above across both domains).
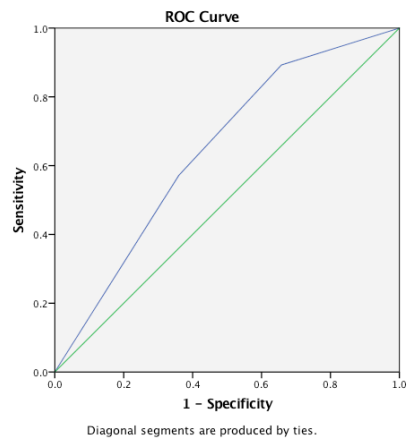
CHECK LIST OF STANDARD SOURSES THAT SHOULD BE CHECKED FOR EVIDENCE BEFORE SCORING:
- Referral & referrer
- Young person (if engagement is current)
- Careworks
- DRAIG
- TAF information
- Police
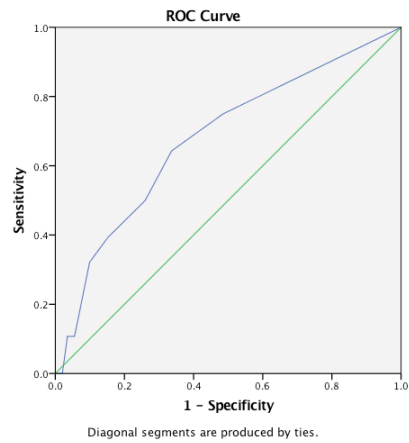- LEA/Carers Wales
- CAMHS
- MARAC database

Provide a **brief** summary of the information/evidence on which this screening was based:
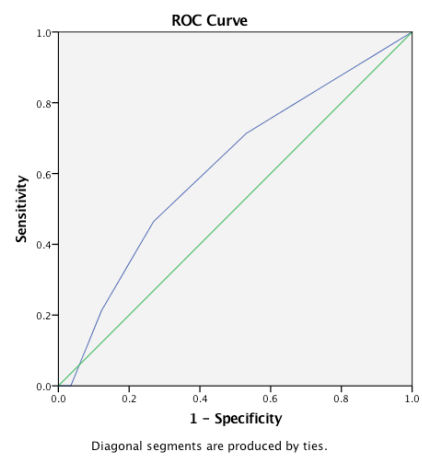
Appendix C – ROC Curves

Full scale (all six questions):

ROC Curve

Diagonal segments are produced by ties.

Offending items (Q1-3):

ROC Curve

Diagonal segments are produced by ties.

Vulnerability items (Q4-6):

ROC Curve

Diagonal segments are produced by ties.

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