Evaluating the Predictive Accuracy of Sex Offender Risk Assessment Measures on UK Samples: A Cross-Validation of the Risk Matrix 2000 Scales

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Abstract

The predictive accuracy of the newly developed risk measures Risk Matrix 2000 Sexual/Violence (RMS, RMV) were cross validated and compared with four risk scales (RRASOR, SACJ-Min, SVR-20, and Static-99) in a sample of sexual (n = 85), violent (n = 46), and general (n = 22) offenders. The sexual offense reconviction rate for the sex offender group was 18% at 10 years follow-up, compared with 2% for the violent offenders. Survival analyses revealed the violent offenders were reconvicted at twice the rate of any other group. Reconviction data were analyzed using the area under the curve (AUC) of the Receiver Operating Characteristic (ROC). The RMV significantly predicted violent recidivism in the sex and combined sex/violent offender groups. The RMS obtained marginal accuracy in predicting sexual reconviction while the RMV obtained good accuracy at predicting violent non-sex reconviction. An item analysis revealed four factors not included in the risk scales significantly correlated with sexual and violent reconviction. Including these factors with Static-99, RMV and RMS increased the accuracy in predicting sexual reconviction but had a negative impact on the accuracy of RMV in predicting violent reconviction. The inclusion of static and dynamic risk factors with actuarial systems is discussed.

Key words: Sexual and violent offenders, actuarial and clinically-guided risk assessment, relative operating characteristic - area under the curve, predictive accuracy

Introduction

Risk assessment is the cornerstone of effective offender management (Andrews & Bonta, 1998) and the identification of the risks posed by offenders, and factors associated with recidivism are crucial to the identification of appropriate and effective interventions designed to reduce the risk of recidivism.

The predictive accuracy of clinical judgment and actuarial measures has been debated (Grubin, 1999; Harris, Rice & Cormier, 2002; Litwack, 2001; Rogers, 2000), and it is widely accepted that actuarial risk measures outperform clinical judgment (Goggin. 1994; Grove, Zald, Lebow, Snitz & Nelson, 2000; Hanson & Bussière, 1996; Hood, Shute, Feilzer, & Wilcox, 2002; McNeil, Sandberg & Binder, 1998). However, actuarial measures are not without their critics. Litwack (2001), Rogers (2000) and Silver and Miller (2002) urge caution over the uncritical acceptance of actuarial measures. In offering a critique of the actuarial movement, and of the Violent Risk Appraisal Guide (VRAG: Quinsey, Harris, Rice & Cormier, 1998; Rice & Harris, 1997) in particular, Litwack (2001) argues that research to date has not demonstrated that actuarial methods of risk assessment are superior to clinical methods because most clinical determinations of dangerousness are not predictions of violence and it is very difficult to compare clinical and actuarial assessments of

dangerousness. Actuarial measures have also been criticized for being atheoretical, and having limited applicability to diverse groups or populations. In a review of sex offender risk measures, Craig, Browne, and Stringer (2003a) reported that 10 out of 12 risk measures examined were better at predicting general offense recidivism than at predicting sexual offense recidivism. Area Under the Curve (AUC) indices of the Receiver Operating Characteristic (ROC) ranged from .60 (Multifactorial Assessment of Sex Offender Risk for Recidivism: MASORR, Barbaree et al. 2001; VRAG, Rice & Harris 1999) to AUC = .92 (Static-99; see Thornton, 2002). Correlations of the predictive accuracy for sexual reconviction ranged from $r = .09$ (Statistics Information on Recidivism Scale, SIR; Bonta et al, 1996) to $r = .45$ (Minnesota Sex Offender Screening Tool-Revised, MnSOST-R; Epperson, Kaul & Hesselton, 1998).

A further caveat when discussing the development and accuracy of risk measures is that of base rates of re-offending. The base rate is the percentage of those reconvicted. Base rates are inherently ambiguous, unreliable and unstable (Koehler, 1996) and vary depending on whether based on official or unofficial sources, and the definitions used such as reconviction, rearrest or re-offending (Marshall & Barbaree, 1988; Falshaw, Bastes, Patel, Corbett, & Friendship, 2003). Base rates differ between ages and sex offender subgroups (Hanson, 2002). For example, the base rate for rapists (17.1%) is higher than that of intrafamilial offenders (8.4%) but less than that of extrafamilial offenders (19.5%). Rapists were more than twice as likely to commit any kind of offense then child molesters but did not differ in their likelihood to commit a new serious offense (Seto & Barbaree, 1999; Serin et al, 2001). Rapists also have worse survival rates than child molesters. However in terms of age and risk of re-offending, extrafamilial child molesters show relatively little reduction in recidivism risk until after the age of 50 (Hanson, 2002). The probability of over estimating the risk (predicting an offender will reoffend when they did not - false positive prediction) is increased when the base rate is low, and conversely, by raising the base rate increases the probability of under estimating the risk (predicting an offender will not reoffend when in fact they did - a false negative prediction). Indeed, with a base rate of 4%, Hood et al., (2002) reported that Static-99 over estimated risk 49 times out of 50, and Craissati (2003) found that with a base rate of 2%, Static-99 (Hanson & Thornton, 2000) and Risk Matrix 2000 (Thornton et al. 2003) over predicted risk 29 times out of 30.

The extent to which actuarial risk measures can be applied to diverse groups or populations has also been questioned. Bartosh, Garby, Lewis, and Gray (2003) investigated the predictive utility of the Static-99, RRASOR (Hanson, 1997), MnSOST-R, and the Sex Offender Risk Appraisal Guide (SORAG; Quinsey et al. 1998) in predicting sexual recidivism and found that the effectiveness of each instrument varied depending on offender type. The Static-99 and SORAG were both significantly predictive of sexual, violent, and any recidivism for extrafamilial child molesters, and all four tests were predictive of violent or any recidivism in this subgroup. For incest offenders, all four tests were at least moderately predictive of sexual recidivism, whereas the Static-99 and the SORAG were highly predictive of violent or any recidivism. None of the four tests established consistent predictive validity across recidivism categories in regard to rapists or hands-off offenders, however, the Static-99 and the SORAG were significant in terms of sexual recidivism. Similarly, Craig, Browne and Stringer (2004a) consider empirically the application of sex offender risk assessment measures on offenders with adult or child victims, and examined the differences between Probation Services and Regional [Medium] Secure Units (RSU) using six actuarial risk measures (Risk Matrix 2000-Sexual/Violent, RRASOR, Static-99, Structured Anchored Clinical Judgment Scale-Minimum [SACJ-Min], and Sexual Violence Risk-20) on 139 sex offenders. Levels of risk of those who offended against children varied when compared with levels of risk of those who offended against adults. Offenders with adult victims obtained significantly higher mean scores using the RMS and SACJ-Min than did sex offenders with child victims who obtained significantly higher scores on the RRASOR. Offenders with adult victims were more likely to be considered

medium-high to high risk using Static-99 and SACJ-Min respectively, whereas offenders with child victims were more likely to obtained scores in the low to medium-low risk categories using the RMS. Similarly, levels of risk also varied depending on the type of referral agency and level of security. Sex offenders referred to a RSU scored significantly higher on RRASOR and RM2000/S than did sex offenders supervised by the Probation Service.

The predictive validity of actuarial sex offender risk assessment measures has also been debated when applied to the sexually violent predator (SVP) commitment proceedings (Berlin, Galbreath, Geary & McGlone, 2003; Janus & Meehl, 1997). Nevertheless, according to Monahan (1996), prediction can be improved with the use of actuarial methods by using criteria that have been empirically validated therefore increasing the validity of the decision-making process. Indeed, in recent years the literature witnessed a surge in empirically derived risk measures, many of which have not been empirically validated.

In a recent development in actuarial measures, Thornton, Mann, Webster, Blud, Travers, Friendship and Erickson (2003) re-examined the Structured Anchored Clinical Judgment Scale (SACJ; see Grubin, 1998, Hanson & Thornton, 2000) and created a two-dimensional risk assessment system for sex offenders classifying risk of sexual recidivism (RMS), and risk of non-sexual violent recidivism (RMV) referred to collectively as Risk Matrix 2000. The RMS has three risk items in step one (number of previous sexual appearances, number of criminal appearances, and age), the sum of which is translated into a risk category. Step two contains four aggravating factors (any conviction for sexual offense against a male, sexual offense against a stranger, non-contact sex offenses, being single or having relationships of less than two years). The presence of two or four of these aggravating factors raises the risk category by one or two levels respectively. Thornton et al., (2003) validated the RMS on two UK samples, treated (n = 647) and untreated (n = 429) sex offenders and obtained AUC of .77 and .75 respectively. RMV risk items include, age on release, amount of prior violence and a history of burglary. Validated on two samples followed-up over 10 years (n = 311) and between 16-19 years (n = 429) RMV obtained AUC of .78 and .80 respectively. Other than the original study, there have been no cross-validation studies using the Risk Matrix scales.

The purpose of the current study was to cross-validate the predictive accuracy of the newly developed risk measures Risk Matrix 2000 Sexual/Violence with that of four other risk scales (RRASOR, SACJ-Min, Static-99 and SVR-20) for the assessment of risk for sexual, non-sexual violent and general (non-sexual / non-violent) recidivism.

Method

Participants

The participants were convicted adult male offenders referred to a UK Regional [Medium] Secure Unit (RSU) for assessment between 1992 and 1995. The RSU is a forensic psychiatric facility that holds medium risk adult psychiatric patients and mentally disordered offenders. The RSU provided an out-patient assessment resource for local agencies such as Probation Services and the Courts from which the present sample was taken. Assessment protocols and psychology assessment reports were examined using a retrospective archival research design.

Of the 250 adult male offenders identified for inclusion in this study, 87 were excluded due to limited personal history information where it was not possible to accurately score levels of risk using the six risk assessment measures. A further 10 individuals were not identified in the reconviction data. The

sample consisted of 153 offenders, 85 sexual offenders (mean age 37.2 years, *SD* = 13.3, range = 15 to 74 years), 46 violent/non-sexual offenders (mean age 27.8 years, *SD* = 8.2, range 16 to 56 years) and 22 general offenders (non-violent/non-sexual) (mean age 30.6 years, *SD* = 10.4, range 17 to 50 years). The sample was split into one of three categories based on their most recent conviction and offense history. Sexual offenders were classified as having committed a contact sexual offense (rape, attempted rape, indecent assault, gross indecency) either current conviction or previous conviction at the time of the assessment. Offenders who had a history of a previous sexual conviction were scored as sexual offenders even though their index offense may have been non-sexual. Violent offenders were classified as having committed a violent offense (actual or grievous bodily harm, murder, manslaughter, wounding, and common assault) having no history of sexual offenses or sexual element to their offending. General offenders were classified as having committed a criminal offense other than sex or violence in nature (i.e., theft, drug offenses, burglary, motoring offenses).

Measures

Structured Anchored Clinical Judgment Scale: (SACJ; reported in Hanson & Thornton, 2000)

Developed by David Thornton, SACJ assesses the risk of sexual and violent recidivism. It is designed so that the assessment of risk can change over time as more information about an offender becomes available. It is made up of three stages, with risk reassessed at each step. Stage one details static or historical risk factor while stage two relates to aggravating factors, the presence of which can increase the risk category. The first two stages are referred to as SACJ-Minimum. The third stage assesses current behavior and response to treatment programs. Tested on a cohort of 533 sex offenders (80% who offended against children) the SACJ-Min correlated .34 with sexual offense recidivism and .30 with any sexual or violent recidivism (see Hanson & Thornton, 2000). In developing Static-99, Hanson and Thornton (2000) reported SACJ-Min correlations of .23 (AUC = .67) with sexual offense recidivism, and .22 (AUC = .64) with any violent recidivism (pp. 126).

Rapid Risk Assessment of Sexual Offense Recidivism: (RRASOR; Hanson, 1997)

The RRASOR is based on a wide range of risk predictors drawn from the Hanson & Bussière s (1996; 1998) meta-analysis. The four main factors selected for use with RRASOR were those variables that accounted for unique variance: prior sexual offenses, age, victim gender and relationship to victim. The scale demonstrated a moderate predictive accuracy across all samples with the average correlation significantly better than the best single predictor (prior sexual offenses *r* = .20). In a validation sample the RRASOR correlated.28 (AUC = .68) with sexual offense recidivism and .22 (AUC = .64) with any violent recidivism (Hanson & Thornton, 2000). Barbaree et al (2001) reported AUC = .76 (*r* =.26) for sexual recidivism and AUC =.65 (*r* = .20) for violent recidivism, while Sjöstedt and Långström (2000) reported correlations of .22 (AUC = .72) with sexual reconvictions. More recently Sjöstedt and Långström (2002) reported AUC of .73 and .62 for sexual and non-sexual violent recidivism.

Static-99 (Hanson & Thornton, 2000)

Static-99 was developed from combining SACJ-Min and RRASOR and was based on four diverse datasets, three of which were used to develop RRASOR. It contains 10 items concerned with four broad categories associated with increased likelihood of committing further sexual offenses; sexual deviance measured by whether the offender has offended against males, ever been married and has committed a non-contact sexual offense; range of potential victim measured by whether the offender offended against unrelated or stranger victim; persistent sexual offending measured by

number of previous sexual convictions; and, anti-sociality as measured by current or previous non-sexual violence or four or more previous criminal convictions and under 25-years of age. Static-99 (AUC = .71, *r* = .33) was more accurate than the RRASOR (AUC = .68, *r* = .28) or SACJ-Min (AUC = .67, *r* = .23) in predicting sexual recidivism and also showed moderate predictive accuracy for violent (including sexual) offense recidivism (AUC = .69, *r* = .32). Sjöstedt and Långström (2000) reported AUC of .76 for sexual recidivism and .74 for non-sexual violent recidivism using Static-99. Similarly, Thornton and Beech (2002) reported AUC = .91 for sexual recidivism using Static-99 over a six-year follow-up while Friendship, Mann and Beech (2003) reported AUC of .70 for sexual reconviction and sexual and/or violent reconviction over a two-year follow-up. These scores are consistent with Barbaree et al (2001) and Thornton (2002). Nunes et al., (2002) reported AUC of .70 and .69 for sexual and sexual/violent reconviction respectively using Static-99.

Sexual Violence Risk-20: (SVR-20; Boer, et al, 1997)

The SVR-20 is a clinically guided checklist designed to assess risk for sexual violence recidivism in sexual offenders. Dempster (1999) examined the predictive accuracy of the SVR-20 against that of the VRAG, SORAG, RRASOR and PCL-R (Psychopathy Checklist-Revised; Hare, 1991) and found that only the RRASOR and SVR-20 were able to distinguish sexually violent from generally violent recidivists. In a later cross validation study using SVR-20 on 51 rapists, Sjöstedt and Långström (2002) reported AUC of .49 and .64 for sexual and non-sexual violent recidivism for Total SVR-20 scores.

Reconviction Data

Official reconviction rates (i.e., Government crime statistics) were calculated using data from the Home Office Offenders Index (OI). Reconviction data were collected in January 2003, from the OI allowing an average follow-up period of eight years seven months (*SD* = 9.5 months, range 5-years 6-months to 10-years 3-months). This was calculated from the date of the original assessment at the RSU to January 2003. Of the 85 sexual offenders, 86% (n = 73) were followed up to eight-years, 49% (n = 42) to nine-years, and 4.7% (n = 4) at 10 years. Of the 46 violent offenders, 87% (n = 40) were followed up at eight years with 43% (n = 20) being followed-up at nine-years. Of the 22 general offenders, 86% (n = 19), 50% (n = 11), were followed up at eight and nine-years respectively.

As might be expected only a small number of offenders were considered to be high or very high risk. The risk categories for the risk measures were submitted to the Receiver Operating Characteristic (ROC) analysis (Mossman, 1994) using the Statistical Packages of the Social Sciences Version 10.0.07 (SPSS, 2000). The ROC analysis is the preferred index used to evaluate the predictive accuracy of a risk assessment tool using the Area Under the Curve (AUC) (Harris, 2003). The ROC analysis is not distorted by variations in the base rate of recidivism and can be interpreted as the probability that a randomly selected recidivist would have a more deviant score than a randomly selected non-recidivist. In examining the effects of a set of predictive factors, Sjöstedt and Grann s (2002) recommendations for interpreting the AUC of the ROC analysis are, AUC of <0.60 low accuracy, 0.60-0.70 marginal accuracy, 0.70-0.80 modest accuracy, 0.80-0.90 moderate accuracy, and 0.90+ high accuracy.

Results

Survival and Reconviction Rates

The OI revealed that 75 (42%) of the sample of 153 offenders were reconvicted during the follow-up period. Of the sample, 16 (10%) offenders were reconvicted of a sexual offense, 24 (16%) re-offended violently and 33 (21%) re-offended in a non-sexual/non-violent manner. Of the 85 convicted sexual offenders, 31 (36%) were reconvicted of any offense within 10-years, while 34 (74%) of the violent offenders were reconvicted during the same period. Survival rates of the three groups are reported in Figure 1. The overall reconviction rate for the sample of sexual offenders (19% at two-years, 28% at five-years, and 36% at 10-years) was lower than that of the violent offender sample (39% at two-years, 63% at five-years, and 74% at 10-years), and general offender sample (18% at two-years, 27% at five-years, and 36% at 10-years). Violent offenders were reconvicted of more violent and general (non-sexual/non-violent) offenses than any other group.

Of the 85 sexual offenders, 6 (7%), 10 (12%) and 15 (18%) were reconvicted of a sexual offense within the two, five and 10-year follow-up periods respectively (see Table 1). None of the general offenders were reconvicted of a sexual offense during the follow-up period compared with only 1(2%) of the violent offender group.

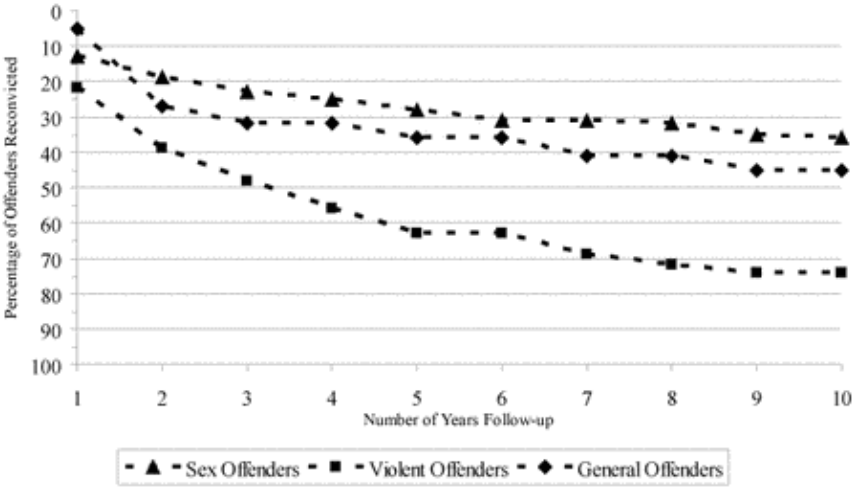

Figure 1: Survival curves for sex, violent and general offender groups

Offender Group	Reconviction		
	Sexual offense	Violent offense	NS/NV offense
2 year follow-up			
Sexual Offender	6 (7.1%)	4 (4.7%)	6 (7.1%)
Violent Offender	1 (2.2%)	6 (13.0%)	11 (23.9%)
General Offender	0	0	4 (18.1%)
5 year follow-up			
Sexual Offender	10 (11.8%)	8 (9.4%)	6 (7.1%)
Violent Offender	1 (2.2%)	11 (23.9%)	17 (37.7%)
General Offender	0	1 (4.5%)	5 (22.7%)
10 year follow-up			
Sexual Offender	15 (17.6%)	8 (9.4%)	8 (9.4%)
Violent Offender	1 (2.2%)	13 (28.3%)	20 (43.5%)
General Offender	0	3 (13.6%)	5 (22.7%)

NOTE: NS/NV – Non-sexual/non-violent offense

Table 1: Distribution of offender and offense reconviction patterns

Predictive Accuracy and Risk Assessment Measures

With the exemption of RMS, the risk assessment measures were generally better at predicting violent reconviction than sexual reconviction in the sex offender sample (Table 2). Compared with other sex offender risk assessment scales, the RMS consistently obtained the highest AUC index for predicting sexual reconviction over the follow-up period. Although the RMV obtained marginal predictive accuracy for sexual reconviction, scores for predicting violent reconviction peaked at AUC .87 at the two-years and .86 at five and 10-year follow-up periods. However, combining the sex and violent offender groups generally had a negative effect on predictive accuracy on all risk scales (Table 2). With the two groups combined the RMS obtained lower AUC scores in predicting sexual reconviction (AUC .57 at two-years, .59 at five-years, and .55 at 10-years). Combining the sex and violent offender groups had a similar effect on the predictive accuracy of the RMV in predicting violent reconviction (AUC .75 at two and five-years, and .84 at 10-years). Including the general (non-sexual/non-violent) offender group in the ROC analysis made little difference to the scores.

Offense	Risk Measures											
	SACJ-Min		RRASOR		Static-99		SVR-20		RM2000-S		RM2000-V	
Reconviction	SO	SV	SO	SV	SO	SV	SO	SV	SO	SV	SO	SV
2 year follow-up												
Sexual	.47	.52	.45	.56	.57	.52	.46	.47	.60	.57	.66	.54
Violent	.52	.57	.66	.56	.57	.62	.72	.59	.54	.58	.87	.75
Sexual & Violent	.49	.55	.54	.57	.58	.58	.57	.54	.58	.58	.76	.67
General	.52	.50	.46	.46	.51	.57	.74	.67	.54	.62	.66	.70
Any reconviction	.50	.53	.51	.52	.53	.59	.65	.62	.57	.62	.75	.72
5 year follow-up												
Sexual	.60	.55	.50	.53	.59	.53	.48	.50	.68	.59	.68	.51
Violent	.58	.55	.71	.50	.69	.60	.54	.53	.64	.62	.86	.75
Sexual & Violent	.57	.59	.58	.55	.62	.61	.52	.53	.65	.63	.76	.70
General	.48	.52	.58	.42	.43	.55	.66	.70	.49	.63	.64	.71
Any reconviction	.55	.58	.54	.50	.58	.62	.57	.64	.62	.67	.76	.77
10 year follow-up												
Sexual	.52	.54	.48	.57	.52	.50	.51	.49	.59	.55	.65	.53
Violent	.58	.59	.71	.55	.69	.66	.54	.56	.64	.68	.86	.84
Sexual & Violent	.58	.58	.57	.55	.60	.60	.52	.53	.62	.62	.74	.71
General	.56	.54	.57	.48	.51	.58	.63	.65	.55	.63	.69	.72
Any reconviction	.57	.59	.55	.51	.57	.61	.54	.62	.61	.66	.75	.76

Table 2: AUC indices for risk scales in a sample of sexual and violent offenders

NOTE: RRASOR = Rapid Risk Assessment for Sexual Offense

Recidivism; SACJ-Min = Structured Anchored Clinical Judgement Scale- Mini-mum; SVR-20, Sexual Violence Risk-20; RM2000-V, Risk Matrix 2000 Violence; RM2000-S, Risk Matrix 2000 Sexual.
SO = Sex Offender (n = 85).
SV = Sex and Violent Offender groups combined (n = 131).

Predicting Reconviction

The validity estimates of the six risk assessment measures were calculated using Person correlations between risk scores and reconviction outcome (Table 3). Consistent with having the largest AUC index, the RMV significantly predicted violent, sexual/violent, general and any reconviction over two, five and 10-year periods. The RMS significantly predicted any offense over two, five and 10-years, and sexual/violent reconviction over five and 10-years, and violent reconviction at 10-years.

Risk Measures	Two-Years					Five-Years					Ten-Years				
	Sexual	Violent	Sexual & Violent	General	Any offense	Sexual	Violent	Sexual & Violent	General	Any offense	Sexual	Violent	Sexual & Violent	General	Any offense
RRASOR	.03	.04	.06	-.05	.00	.02	.00	.07	-.12	-.01	.06	.07	.07	-.04	.00
Static-99	.01	.10	.09	.09	.14	.02	.12	.17	.06	.21*	.00	.21*	.16	.11	.19*
SACJ-Min	.01	.07	.06	-.00	.05	.03	.10	.15	-.00	.14	.03	.15	.15	.02	.15
SVR-20															

Table 3: Correlations between reconviction outcome and risk measures
NOTE: RRASOR = Rapid Risk Assessment for Sexual Offense Recidivism; SACJ-Min = Structured Anchored Clinical Judgement Scale- Mini-mum; SVR-20, Sexual Violence Risk-20; RM2000-V, Risk Matrix 2000 Violence; RM2000-S, Risk Matrix 2000 Sexual.
+ 4 factors = history of substance abuse, history of employment problems/instability, school maladjustment, and history of foster care.
** p < 0.01, * p < 0.05.
Combined sex and violent offender groups (n = 131).

An item analysis of 24 risk items not currently considered by Static-99, RRASOR or the Risk Matrix 2000 scales revealed four risk factors positively correlated with sex and violent reconviction over the follow-up periods; history of foster care ($r = .19$, $p < 0.05$), history of substance abuse ($r = .18$, $p < 0.05$), history of employment problems/instability ($r = .20$, $p < 0.05$), and history of school maladjustment ($r = .30$, $p < 0.001$). These items were considered with the three most recent actuarial risk measures, Static-99, RMS and RMV. Considering the four risk items increased the strength of correlation between the RMV and sexual/violent, general and any reconviction of the three follow-up periods, peaking at $r = .52$ ($p = <.01$) for violent reconviction (Table 3). Considering the four risk items with Static-99 and RMS also increased the correlation strength with sexual/violent, general and any reconviction. However, little effect was found in correlating with sexual reconviction.

However, considering the four risk items with RMS had a positive effect in predicting sexual reconviction (AUC .71 at two-years, .74 at five-years, .62 at 10-years) (Table 4). A similar effect was also found with Static-99 although this was less marked. Although the RMV continued to obtained moderate accuracy in predicting violent reconviction in the sexual offender group and combined sex/violent offender group, the effect of considering four risk items had a depressing effect on the AUC index.

Offense Reconviction	Risk Measures					
	Static-99 +4		RMS +4		RMV +4	
	SO	SV	SO	SV	SO	SV
2 year follow-up						
Sexual	.62	.58	.71	.63	.70	.58
Violent	.61	.65	.62	.62	.84	.73
Sexual & Violent	.62	.63	.68	.63	.77	.68
General	.56	.64	.59	.68	.66	.70
Any reconviction	.61	.66	.66	.68	.75	.73
5 year follow-up						
Sexual	.61	.55	.74	.60	.65	.53
Violent	.59	.65	.69	.64	.76	.73
Sexual & Violent	.68	.66	.72	.67	.78	.71
General	.54	.66	.60	.75	.65	.76
Any reconviction	.66	.72	.72	.77	.78	.80
10 year follow-up						
Sexual	.57	.51	.62	.55	.66	.53
Violent	.70	.73	.69	.73	.85	.83
Sexual & Violent	.66	.65	.68	.66	.75	.71
General	.59	.68	.63	.73	.69	.75
Any reconviction	.65	.70	.69	.75	.76	.78

Table 4: AUC indices for risk scales with additional risk items included
NOTE: RMV, Risk Matrix 2000 Violence; RMS, Risk Matrix 2000 Sexual.
+ 4 factors = history of substance abuse, history of employment problems/instability, school maladjustment, and history of foster care. SO = Sex Offender (n = 85). SV = Sex and Violent Offender groups combined (n = 131).

Discussion

The purpose of present study was to evaluate the accuracy of a number of sexual offender risk measures and to cross-validate the predictive accuracy of the Risk Matrix 2000 scales. The results from this study support the use of some actuarial sex offender risk measures, in particular the Risk Matrix 2000 Sexual and Violent scales.

The violent offenders were reconvicted at twice the rate than any other offender group for non-sexual offenses. This is consistent with other studies who have reported high re-offense rates

for non-sexual crimes (Corbett et al., 2003; Hildebrand, de Ruiter & de Vogel, 2004; Thornton et al., 2003). The overall reconviction rate for the sample of sexual offenders was lower than that of the violent offender sample. However, the sexual reconviction rate for the sex offender group was higher than that of the violent offender group during the follow-up periods. The sex reconviction rate for sexual offenders in the present study is consistent with recent research (Caan, Falshaw & Friendship, 2003).

For the most part, combining sexual and violent offender groups negatively impacted on the predictive accuracy of some risk assessment measures. The RMV consistently obtained moderate accuracy in predicting violent, sexual/violent, and general and any reconviction across the three follow-up periods. Although not significant, the results from this study are broadly consistent with the literature on the RRASOR (Hanson & Thornton, 2000). However, in contrast to previous findings, RRASOR obtained higher AUC index predicting violent reconviction (AUC .66 at two-years and .71 at five and 10-years) in the sample of sexual offenders. In respect of Static-99, this study reported an AUC of .57 for sexual and violent reconviction at two-years follow-up. Static-99 was better at predicting violent reconviction than sexual conviction in both sexual and combined sexual-violent samples. These results are broadly consistent with Nunes et al., (2002) who reported slightly lower AUC indices than Barbaree et al., (2001) and Friendship, Mann and Beech (2003). A similar pattern was true for the SVR-20. The results reported in the present study are consistent with those reported by Sjöstedt and Långström (2002). The differences in AUC indices reported here with that of other studies may partially be explained by the differences in sample characteristics. The sample in the current study consisted of those offenders referred to a Regional [Medium] Secure Unit for assessment. It is not clear why they were referred for assessment but they may poses unusual risk characteristics compared to others offenders supervised by the probation service that required a specialist assessment by an RSU.

Including four additional risk items had a positive effect on the accuracy of RMS (AUC .71 at two-years, .74 at five-years and .62 at 10-years), and Static-99 (AUC .62 at two-years, .61 at five-years, and .57 at 10-years). However this effect was not significantly correlated with sexual reconviction. The four additional risk items had a negative effect on accuracy in the RMV in predicting violent reconviction.

Methodological Problems

Inconsistencies in the present studies findings with that of previously published results may be accounted for by a number of explanations. In the present study, official reconviction rates were calculated using data from the Home Office Offenders Index (OI). This only records whether the offender was reconvicted and of what offense and does not record re-arrest data or victim characteristics. Official sources are known to underreport recidivism (Marshall & Barbaree, 1988, Falshaw et al. 2003). A further confound when using official sources is that serious sexual offenses may be bargained down to violent offenses in order to secure convictions (Bagley & Pritchard, 2000). Corbett et al., (2003) found that 12% of violent convictions were sexually motivated, and in 10 out of 19 rape cases the sexual element of the crime was removed and downgraded to a violent offense (Lees, 1996). It is possible that violent convictions may mask the true motivation of the offense. The OI also does not record whether the offender attended a sex offender treatment program during their incarceration which is known to impact sexual recidivism (Craig, Browne, & Stringer, 2003b; Hanson, Gordon, Harris, Marques, Murphy, Quinsey, & Seto, 2002).

The relatively small sample size in the present study may also impact on the generalisability of the results. Indeed, Cohen (1981) argues that any comparisons between an individual s level of risk and base rate data should be ignored unless all relevant characteristics between the offender

and the sample base rate are shared. Variations in base samples used in developing the risk scales may account for the variability of predictive accuracy of risk measures (Craig, et al, 2003a; Craig, Browne, & Stringer, 2004b).

The process of including four risk items had a positive effect on Static-99, RMS and RMV in predicting sexual reconviction but a negative effect on RMV in predicting violent reconviction. It should be noted that these factors are not acute dynamic risk factors but rather are static risk factors that describe dynamic instability.

Future Research

The pattern of results from the RMV suggests the scale measures facets of behavior different to that of sexual offending, in terms of deviant sexual interest, but is more consistent with other aspects of sexual offending such as anti-sociality and non-sexual violence. It is not clear to what extent levels of violence were displayed during the commission of a sexual assault. This may go some way to explain why RMV obtained higher AUC indices for predicting sexual reconviction than did some of the other risk measures exclusively for sex offenders. Given the evolutionary development, it was expected that the more recently developed risk measures such as Risk Matrix 2000 would outperform the older instruments. However, including additional risk items with static-based actuarial risk measures can improve predictive accuracy. Common among most measures are static factors including, prior criminality (Proulx et al, 1997; Rice, Harris, & Quinsey, 1990; Worling & Curwen, 2000), prior sexual offenses (Hanson, Scot & Steffy, 1995; Hanson, Steefy & Gauthier, 1993; Hanson & Bussière, 1998; Quinsey, Rice & Harris, 1995), Psychopathy or personality disorder (Hanson & Harris, 1998; McGuire, 2000; Rice, Harris, & Quinsey, 1990; Seto & Barbaree, 1999; Serin, Mailoux & Malcolm, 2001; Worling, 2001), age and time spent in custody (Broadhurst & Maller, 1992; Browne, et al, 1998), paraphilias, and deviant sexual interests (Hanson & Harris, 1998; Hanson & Bussière, 1998; Proulx et al, 1997; Quinsey, Rice & Harris, 1995; Worling & Curwen, 2000), all of which have been positively related to sexual re-offending. However such predictors are not restricted to specific groups of offenders. Although the results from the present study support offense specific risk measures, it is not clear what risk factors are better at predicting general, violent or sexual recidivism. Indeed, Långström and Grann (2000) argued that sexual and general recidivist factors are not the same. Risk factors associated with general recidivists are: early conduct disorder, previous convictions, Psychopathy, and the use of death threats or weapons at the index sex offense. Risk factors associated with sexual recidivism include previous sex offenses, poor social skills, male victims, and two or more victims in index offense.

Several authors have considered additional risk factors such as pro-offending attitudes (Hudson, Wales, Bakker & Ward, 2002) and other dynamic measures (Thornton, 2002; Dempster & Hart, 2002) which have increased predictive accuracy when combined with static risk factors. Beech and colleagues have found the identification and measure of deviancy in child molesters can significantly increase actuarial predictive accuracy (Beech, 1998; Beech, Fisher & Beckett, 1999; Beech, Erikson, Friendship, & Ditchfield, 2001; Beech, Friendship, Erikson & Hanson, 2002). Thornton and Beech (2002) examined the extent to which psychological deviance (using the Structured Risk Assessment system, Thornton, 2002; and psychometric indicators, Beech et al. 2002) predicts sexual recidivism compared with Static-99. The two systems of deviance assessment were standardized from which the Number of Dysfunctional Domains could be calculated. The predictive accuracy of the Number of Dysfunctional Domains was compared against Static-99. The Number of Dysfunctional Domains obtained moderate accuracy (AUC ranging from .83 to .85) compared with Static-99 (AUC ranging from .91 to .75). They found the Number of Dysfunctional Domains made a statistically significant independent contribution to prediction over an above Static-99. The combination of the Number of Dysfunctional Domains and Static-99 allowed

better prediction than either measure alone.

More recently Craissati (2003) examined reconviction data on 310 sexual offenders over a four year period using actuarial measures combined with Sexual Risk Behavior (SRB) factors. These included any offense with a sexual element, the targeting of victims and any behavior associated with the index offense. For the rapists sample the AUC increased from .71 to .85 when considering Static-99 (with risk factors, physical abuse during childhood, and a history of two or more childhood disturbances), and Static-99 plus SRB factors. For the child molesters the AUC decreased from .78 to .68 when considering Static-99 (with risk factors victim of childhood sexual abuse), and Static-99 with SRB factors. It was also found that breach of license conditions or treatment failure was not predicted by offense characteristics.

Research into actuarial predictors of sex offender subgroups, extent and severity of violence combined with dynamic factors are likely to further advance our knowledge of sexual re-offending. A combination of risk scales or factors yet to be considered may improve predictive accuracy in distinguishing between violent and sexual assault.

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