The Development of a Brief Actuarial Risk Scale for Sexual Offense Recidivism

1997-04

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Public Works and Government Services Canada
Cat. No. JS4-1/1997-4E
ISBN: 0-662-26207-7

Abstract

Estimating a sexual offender's recidivism risk is important to many areas of the criminal justice system. The present study used data from seven different follow-up studies to develop a brief, actuarial risk scale, which was then replicated on an additional independent sample (total sample size of 2,592). The scale contains four items that are easily scored from administrative records: prior sexual offenses, age less than 25, extrafamilial victims and male victims. The scale showed moderate predictive accuracy (r = .27, ROC area = .71) with little variation between the development and replication samples. The predictive accuracy of the scale was sufficient to justify its use as a screening instrument in settings that require routine assessments of sexual offender recidivism risk.

The development of a brief actuarial risk scale for sexual offense recidivism

Many decisions in the criminal justice system are influenced by judgements concerning the offenders' risk for recidivism. Offenders routinely receive harsher or more lenient treatment depending on the extent to which lawyers, judges, police, expert witnesses and correctional officers perceive the offenders to represent a continued threat to community safety. Risk assessments are important for all offenders, but are particularly important for sexual offenders, who may become the targets of exceptional interventions if judged to be a continuing risk (e.g., post-sentence detention, community notification, lifetime community supervision).

The prediction of future behaviour can never be done with certainty since people and circumstances can and do change. Nevertheless, there is agreement that it is possible to predict general criminal recidivism with at least moderate accuracy (Andrews & Bonta, 1994; Gendreau, Little & Goggin, 1996). The factors most strongly related to general recidivism include a history of criminal behaviour, being young, having criminal associates, and having characteristics of antisocial personality/psychopathy (Gendreau et al., 1996). The best predictions of future criminal involvement have been made with objective risk scales that include combinations of such factors (e.g., Level of Service Inventory - Revised, Andrews & Bonta, 1995; the Wisconsin system, Baird, 1981). These objective risk scales not only specify what should be considered when conducting risk assessments, but they also assigns weights as to the relative importance of the risk factors.

Objective criminal risk scales have worked quite well at predicting general and non-sexual violent recidivism among sexual offenders (Bonta & Hanson, 1995b; Motiuk & Brown, 1993). Risk scales designed for general offenders, however, have not been effective in predicting sexual recidivism. Bonta and Hanson (1995b), for example, found that among a group of 315 federally sentenced sexual offenders, the SIR scale (Bonta, Harman, Hann & Cormier, 1996) correlated .34 with non-sexual violent recidivism, .41 with general (any) recidivism, but only .09 with sexual recidivism.

Hanson and Bussière's (1996) recent review has suggested that sexual recidivism can be predicted by a different set of factors than those that predict general or non-sexual violent recidivism (see also Hanson & Bussière, in press). They found that although general criminological variables, such as age and prior offenses, showed some relationship with sexual offense recidivism, the strongest predictors of sexual offense recidivism were variables related to sexual deviance (e.g., prior sexual offenses, deviant sexual interests and activities). They also found that sexual recidivism was related to specific victim characteristics (e.g., male victims, unrelated victims). Given that many of the exceptional legal procedures are concerned only with the risk of sexual reoffending, separate procedures should be used to evaluate an offender's risk for sexual and for non-sexual recidivism.

There have been few attempts to develop objective risk scales specifically for sexual offense recidivism. Several studies have used statistical techniques (such as stepwise regression) to identify the best combination of predictor variables within a single sample (e.g., Abel, Mittelman, Becker, Rathner & Rouleau, 1988; Barbaree & Marshall, 1988; Hanson, Steffy & Gauthier, 1993a; Prentky, Knight & Lee, 1997; Quinsey, Rice & Harris, 1995; Smith & Monastersky, 1986). Without replication, however, it is difficult to determine how well the best predictors identified in any single sample should generalize to other populations.

Epperson, Kaul, and Huot (1995) are among the few researchers who have developed a sexual recidivism risk scale on one sample and then tested its validity on an entirely new sample. Their original scale contained 21 items related to sexual and non-sexual criminal history, substance abuse, marital status, and treatment compliance. In the replication sample, the scale correlated .27 with sexual offense recidivism. However, many of the individual items did not correlate significantly with sexual recidivism and the scale is currently being revised. An additional concern was that Epperson et al. (1995) attempted to maximize the predictive accuracy by selecting approximately equal proportions of recidivists and nonrecidivists. Consequently, it is difficult to tell how well the Epperson et al. (1995) scale would predict recidivism given the much lower base rates found in naturalistic contexts.

Her Majesty's Prison Service (UK) has also developed a brief scale for assessing risk for sexual offense recidivism (David Thornton, personal communication, March 11, 1997). The scale categorizes offenders into three risk levels (low, medium, high) based on sexual and non-sexual criminal convictions, and the type of victim in the sexual offenses (males, strangers). The scale was developed to predict both sexual and violent recidivism; nevertheless, in a replication sample drawn from the UK prison population, the scale correlated .33 with sexual offense recidivism (David Thornton, personal communication, March 11, 1997). This result is encouraging, but further work is required to determined the extent to which the scale generalizes to other settings.

The Violence Risk Appraisal Guide (VRAG; Webster et al., 1994) has attracted considerable attention as an objective risk assessment procedure (e.g., Borum, 1996). The VRAG was developed to assess violent recidivism among mentally disordered offenders, but subsequent research has suggested that the scale appears to apply equally to their subsample of sexual offenders (Rice & Harris, 1997). Careful reading of the research, however, indicates that the VRAG predicts general violent recidivism (including sexual; r = .47) much better than it predicts sexual recidivism (r = .20; Rice & Harris, 1997, Table 2). For comparison, Hanson and Bussière's (1996) quantitative review found that the single item, "history of prior sexual offenses", correlated .19 with sexual offense recidivism. Consequently, it is unlikely that assessors concerned with cost and efficiency would be interested in using the VRAG as a measure of sex offense

recidivism risk, given the VRAG's substantial resource requirements (i.e., professionally trained interviewers and careful file review).

There remains a need for a brief, efficient actuarial tool that could be used to assess the risk for sexual offense recidivism. The present research was intended to fill this gap using data from eight different sexual offender follow-up studies. Seven of these studies were used to develop a risk scale that was then cross-validated on an independent data set. The scale development strategy was guided by the dual concerns of empirical validity and ease of administration. First, a sample of easily scored risk predictors were drawn from Hanson and Bussière (1996). Next, the intercorrelations of these variables were computed for each of the seven data sets. These correlations were then averaged into a single correlation matrix. The best predictors of sexual offense recidivism were then selected using stepwise regression on this averaged correlation matrix. The best predictors were then translated into a easily scored risk scale, and the predictive validity was then tested on an independent sample. The procedure was not intended to maximize prediction for each sample; instead, the aim was to develop an easily administered scale that was likely to be valid for a range of settings.

Method

Potential predictor variables. The initial pool of predictor variables was selected from Hanson and Bussière's (1996) meta-analysis. The variables selected were those that had an average correlation of at least .10 with sexual offense recidivism, and that could be scored using commonly available information (e.g., offense history, police reports, demographic characteristics). If several variables were expected to be highly correlated with each other (e.g., never married/currently married) only the variable with the highest correlation was selected. The initial list of predictor variables is displayed in Table 1.

The next step was creating common operational definitions of each the predictor variables. In Hanson and Bussière (1996), the coding of the variables depended on the coding in the original studies. Age, for example, was sometimes analyzed as a continuous variable, and sometimes dichotomously (with various cut-points). Consequently, it was necessary to create common definitions that could be used to determine understandable cut-points (e.g., what age is young?). These definitions were created based on an informal examination of the variables distributions, and of their correlations with sexual offense recidivism.

Table 1.

Predictor variables selected from Hanson & Bussière's (1996) meta-analysis.

Variable	average r	sample size/n of studies
Prior sex offenses	.19	11,294/29
Any stranger victims	.15	465/ 4
Any prior offenses	.13	8,683/20
Age (young)	.13	6,969/21
Never married	.11	2,850/ 8
Any non-related victims	.11	6,889/21
Any male victims	.11	10,294/19

The specific definitions were as follows:

Prior sex offenses. This variable counted the number of sexual offenses that were officially recorded prior to the index offense. Self-reported sexual offenses were not included, nor were charges/convictions related to the index offense. Since not all arrests result in convictions, the coding scheme placed relatively more weight on convictions. The coding was as follows: '0' - no prior convictions or arrests for sexual offenses; '1' - one prior conviction, or 1-2 prior arrests; '2' - two or three prior conviction, or 3-5 prior arrests; and '3' - four or more prior convictions, or six or more prior arrests.

For example, an offender was charged in 1990 with two counts of sexual assault, but neither resulted in a conviction. In 1994, he was charged with another three counts of sexual assault and convicted on one (his index offense for which he is currently serving time). In this case, the offender would receive a score of "1" for the two prior charges.

Any prior non-sexual offenses. Included in this category were any arrests or convictions for non-sexual offenses (violent or non-violent). These included non-sexual offenses related to the index offense. The coding was as follows: (any = '1') and (none = '0'). This variable had a slightly different definition than the "any prior offense" category coded by Hanson and Bussière (1996), which included both prior non-sexual offenses and the total prior offenses (including sexual).

Any stranger victims. A stranger was someone who had no real relationship with the offender prior to the offense (less than that of an acquaintance). The coding was as follows: (any stranger victims = '1') and (none = '0').

Age. This variable measured age when exposed to risk (at time of release for incarcerated offenders; when evaluated for those in the community). For the purpose of this study, offenders less than 25 years of age were considered young: (less than 25 = '1') and (25 and older = '0').

Never married. This category included both legal marriages and common-law relationships (including homosexual): (never married/common-law = '1') (ever married/common-law = '0').

Any non-related victims. Related victims included the full range of biological and step-relations (e.g., biological and step-children, nieces, cousins, siblings, parents). As well, this category included a small number of cases involving victims who were living with the offender as a family member (e.g., foster children). The coding was as follows: (any non-related victims = '1') (only related victims = '0').

Any male victims. Those who had ever offended against a male victim (adult or child) were coded '1', and never equaled '0'.

Recidivism outcome variable. The recidivism outcome variable was any new sexual offense as indexed by official records (arrests, convictions, re-admissions). Non-sexual violent recidivism was not included since previous research has suggested that non-sexual recidivism may be predicted by different factors than sexual recidivism (Hanson & Bussière, 1996). The specific methods used to index recidivism varied somewhat across studies; however, these methods were controlled within each study since the same definitions and follow-up periods were used for both the recidivists and nonrecidivists. Other research (Hanson & Bussière, in press) has suggested that the same predictor variables apply to different methods of defining recidivism (e.g., conviction versus arrest), even though different recidivism criteria can have substantial influence on the overall recidivism rates (Prentky, Lee, Knight & Cerce, in press).

Samples. Seven different follow-up studies were used in the development of the risk scale and a separate independent sample was used for validation (see Table 2). The development samples were selected because they represented a range of settings in which risk assessments for sexual offenders are often conducted (correctional institutions, specialized treatment programs, secure mental health facilities). The validation sample was selected because it contained a complete set of variables, a sufficient sample size (303), and a long follow-up period (16 years). As well, the fact that it was based in a different setting (England and Wales) from the other studies (based in the USA or Canada) provides a strong test of generalizability of the findings.

Since the individual studies have been described in previous publications, only a brief outline will be presented below. All the studies used longitudinal designs in which a number of different variables were used to predict subsequent sexual recidivism. Most of the studies included all of the variables listed in Table 1; the missing variables are noted below in the descriptions of each sample.

The studies varied in terms of follow-up periods, recidivism criteria, and legal jurisdictions, but these factors were matched for both the recidivists and nonrecidivists within each study. All the studies used mixed groups of sexual offenders, except the Millbrook follow-up study (Hanson, Steffy & Gauthier, 1993b), which only examined child molesters. All the subjects were adult males.

Development samples.

Millbrook Recidivism Study (Hanson et al., 1993b; see also Hanson, Scott & Steffy, 1995; Hanson, Steffy & Gauthier, 1992; Hanson et al., 1993a). This study collected long-term recidivism information (15-30 years) for child molesters released between 1958 and 1974 from Millbrook Correctional Centre, a maximum security provincial correctional facility located in Ontario, Canada. About half of the sample went through a brief treatment program. For the treatment sample, the information concerning the predictors was collected from their clinical files, whereas for the remainder of the sample, the information was extracted from their correctional files. Information was available on all the relevant predictor variables. Recidivism information was coded from national records maintained by the Royal Canadian Mounted Police (RCMP).

Canadian Federal Recidivism Study - 1983/1984 Releases (Bonta & Hanson, 1995a; see also Bonta & Hanson, 1995b). This study examined the 316 sexual offenders included in the complete sample of 3,180 federal offenders released by the Correctional Service of Canada in 1983/1984. Sexual offenders were defined as those who were released following any sexual conviction. Recidivism information was collected in 1994 using RCMP records. The predictor variables available were those recorded from correctional files for use in previous studies on the prediction of recidivism within general criminal populations (Hann & Harman, 1992a; 1992b). Since the study was designed for general offenders (not sex offenders), the only predictor variables available were age at release, marital status, prior sexual offense, and prior nonsexual offenses. Consequently, this sample was used to develop the average correlation matrix of predictors, but was not used to test the resulting risk scale.

Table 2

Study characteristics

Study	sample size	age (years)	% rapists	average follow-up in years	recidivism rate	sex offense recidivism criteria
Development samples						
Millbrook, Ontario	191	33.1	0.0	23	.35	convictions
Canadian Federal 1983/84 releases	316	30.5	n/a	10	.20	convictions
Institut Philippe Pinel	382	36.2	29.6	4	.15	convictions
Alberta Hospital Edmonton	363	35,5	23.1	5	.06	charges
SOTEP (California)	1138	37.6	27.6	5	.12	charges
Canadian Federal 1991/1994 releases	241	36.8	56.0	2	.07	charges
Oak Ridge (Penetang)	288	30.4	50.7	10	.35	charges/readmissions
Validation sample						
HM Prison Service (UK)	303	34.3	18.7	16	.25	convictions

Institut Philippe Pinel (Montreal). (Proulx, Pellerin, McKibben, Aubut & Ouimet, 1995; see also Proulx, Pellerin, McKibben, Aubut & Ouimet, 1997; Pellerin, Proulx, Ouimet, Paradis, McKibben, & Aubut, 1996). This study focused on sexual offenders treated at a maximum security psychiatric facility between 1978 and 1993. The Institut Philippe Pinel provides longterm (1-3 years) treatment for sexual offenders referred from both the mental health and correctional systems. Information concerning predictor variables was drawn from their clinical files and recidivism information from RCMP records collected in 1994. Information was available on all the predictor variables except stranger victims.

Alberta Hospital Edmonton - Phoenix Program. (Reddon, 1996; see also Studer, Reddon, Roper & Estrada, 1996). The sexual offenders in this study were drawn from those treated at the Phoenix (Alberta Hospital Edmonton) program between 1987 and 1994. The Phoenix program is an eclectic inpatient treatment program that receives most of its referrals from federal correctional facilities. Information concerning predictor variables were coded from clinical files and recidivism information was collected in 1995 using RCMP records. Information was available for all the relevant predictor variables.

California's Sex Offender Treatment and Evaluation Project (SOTEP). (Marques & Day, 1996; see also Marques, Day, Nelson & West, 1993; Marques, Nelson, West & Day, 1994). The primary aim of this ongoing study is to examine the efficacy of treatment. The sample used in the current study included sexual offenders randomly assigned to treatment (n = 172), matched volunteer controls, treatment refusers, as well as a general sample of sexual offenders from the California correctional system (total sample of 1138). Men who had offended only against their biological children were not included in the study. Subjects were admitted to this study between 1985 and 1995; follow-up information was based on local and national criminal record searches conducted in 1995. Information was available for all the predictors variables except prior nonsexual offenses.

Canadian Federal 1991/1994 Releases (Motiuk, 1995; see also Motiuk & Brown, 1993; Motiuk & Brown, 1996). This study followed a group of sexual offenders released by the Correctional Service of Canada between 1991 and 1994. The offenders in this group were those who were reviewed in 1991 (see Motiuk & Porporino, 1993) while they were still incarcerated. Follow-up information was coded from 1994 RCMP records. Information was available for all the predictor variables except number of prior nonsexual offenses.

Oak Ridge Mental Health Centre, Penetanguishene, Ontario (Penetang). (Rice & Harris, 1996; see also Quinsey et al., 1995; Rice & Harris, 1997; Rice, Harris & Quinsey, 1990; Rice, Quinsey & Harris, 1991). The Penetang study followed sexual offenders referred for treatment and/or assessment to a

maximum security mental health centre between 1972 and 1993. The majority of the referrals came from the mental health systems or the courts (e.g., pretrial fitness examinations), with a minority of cases coming from provincial or federal corrections. Follow-up information was based on RCMP records as well as mental health records (i.e., new admissions for sexual offenses, whether or not new charges were laid). Information was available for all the predictor variables; however, relationship to victim was only available for the most serious offense.

Replication sample.

Her Majesty's Prison Service (UK). (Thornton, 1997). The study provided a 16 year follow-up of 303 sexual offenders released from Her Majesty's Prison Service (England and Wales) in 1979. Recidivism information was based on Home Office records collected in 1995. Very few of the offenders in this sample would have received specialized sexual offender treatment. Recidivism was defined as a new conviction for a sexual offense. Information was available for all the relevant predictor variables, with the exception that relationship to victim was only available for the index offense.

Analytic strategy. The goal of the analysis was to identify the best subset of nonredundant predictors or sex offense recidivism. These variables could then be combined into an easily scored risk scale. The first step was to calculate the intercorrelations of the predictor variables within each of the seven development data sets. The correlation coefficient, r, was used as a measure of association since it is easily understood and the statistical procedures for aggragating rs are well documented (Hedges & Olkin, 1985; Rosenthal, 1991). Next, following Becker (1996), the individual correlations in each study were combined to create an averaged correlation matrix. The specific methods used for aggregating the correlations were those of Hedges and Olkin (1985). The averaged correlation matrix was then analyzed using stepwise regression. In order to minimize trivial effects, the sample size was artificially reduced to 1,000 with p to entry of .05. (The average sample size per correlation was 2,145). With these parameters, variables whose beta weights were less than .06 were considered non-significant.

The advantages of analyzing the averaged correlation matrix were that a) it combines the information from all the studies into a single analysis, and b) it generates large enough samples sizes to minimize the small random fluctuations to which stepwise regression are so sensitive (Pedhazur, 1982). Statisticians may argue about the appropriateness of applying standard regression analyses to averaged correlation matrices since the findings are nested across studies, and the studies had different sample sizes, and, therefore, different standard errors (Hedges & Olkin, 1985). As well, the use of stepwise regression could be questioned since the results of stepwise analyses are often unstable (Pedhazur, 1982). In the context of the present study, however, the use of the regression analyses acted only as a heuristic to identify a set of potentially useful predictors

that could be combined into an easily scored risk scale. The most important stage of the analysis tested the predictive accuracy of the resulting scale.

Index of predictive accuracy. Two measures were used to describe the predictive accuracy of the risk scale: a) r, the correlation coefficient, and b) the area under the receiver operating characteristic (ROC) curve (Hanley & McNeil, 1982). ROC curves are the plot of the number of accurately identified recidivists, "hits", against the falsely classified nonrecidivists, "false alarms", for each value of the prediction scale. The area under the ROC curve can vary from .50 (chance prediction) to 1.0 (perfect prediction). The area can be interpreted as the probability that a randomly selected recidivist will have a more deviant score than a randomly selected nonrecidivist. ROC statistics have been recommended for assessing predictive validity since they are easily interpreted and are not influenced by base rates (Mossman, 1994; Rice & Harris, 1995). Metz, Shen and Wang's (1989) ROCFIT program was used to compute the ROC statistics (areas and variances).

McClish's (1992) procedures were used to compare ROC areas across studies. Specifically, the average area was computed as follows: $\tilde{A} = \Sigma W_i A_i / \Sigma W_i$, were $\tilde{A}$ is the average area, A_i is the area for each study and $W_i = 1/Var(A_i)$. The test of homogeneity across studies was follows: $\chi^2 = \Sigma W_i (A_i - \tilde{A})$, where the resulting χ^2 is tested with degrees of freedom equal to one less than the total number of samples.

Results

The first stage of the analysis involved generating an averaged correlation matrix (see Table 3). The sample size varies somewhat for each correlation due to missing data (range of 628 to 2880, with an average of 2,145). For most of the averaged correlations (68%), there was no significant variability across the studies. Due to the large sample sizes, all of the correlations greater than |.04| were statistically significant ($p < .05$, two-tailed).

All of the predictor variables were significantly correlated with sexual offense recidivism. Many of the effects, however, were rather small. The strongest individual predictors were a history of prior sexual offenses (r = .20) and having extrafamilial victims (.14). The weakest predictor was prior nonsexual offense (r = .06, $p < .05$). The other predictors (age, marital status, stranger victims, male victims) had correlations in the .10 to .12 range. The magnitudes of the correlations were very similar to those previously found (see Table 1).

The predictor variables tended not to be highly correlated with each other (.10 to .20 range). The exceptions were the relatively high correlations between having stranger victims and extrafamilial victims (r = .49), having intrafamilial victims and being married (r = .32), and being young and being single (r =.28).

These correlations were to be expected since familial victims tend to be children, and stranger victims would also qualify as extrafamilial victims.

Although not the focus of this study, the correlation matrix can also be used to infer certain patterns to offending. For example, those offenders who selected stranger victims tended to be single (r = .18), select female victims (r = -.11) and have prior sexual (.14) and nonsexual (.13) offenses. Further elaboration of such patterns will be left to interested readers.

Table 3

Average intercorrelation of predictor variables

Variables	1.	2.	3.	4.	5.	6.	7.	8.
1. age								
2. single	.28	-						
3. prior sex offenses	-.10	.05	-					
4. prior nonsex offenses	-.04	.04	.15	-				
5. extrafamilial victims	.09	.32	.19	.13	-			
6. stranger victims	.09	.18	.14	.13	.49	-		
7. male victims	-.02	.16	.10	-.12	.09	-.11	-	
8. sex offense recidivism	.11	.12	.20	.06	.14	.10	.11	-

Note: Average sample size of 2,145. All correlations of .05 or greater are statistically significant.

When stepwise regression (n = 1,000; $p < .05$ in; $p > .10$ out) was used to predict sexual offense recidivism, four variables were retained: prior sex offenses (beta = .19), age less than 25 (beta = .12), any male victims (beta = .09), and any extrafamilial victims (beta = .09). The remaining variables (stranger victims,

marital status, prior nonsexual offenses) did not significantly contribute to the prediction equation once the initial four variables were entered. The multiple correlation for the four variable equation was .27. When all seven variables were considered the multiple correlation only increased to .28.

Based on the results of the regression analysis, a brief actuarial risk scale was constructed by simply adding together the best four predictor variables (see Table 4). This scale was labeled the Rapid Risk Assessment for Sexual Offense Recidivism, or RRASOR. One point was assigned for each of the following characteristics: age less than 25, any extrafamilial victims, and any male victims. Consistent with the results of the regression analysis, additional weight was placed on the sexual offense history in comparison to the other variables. Consequently, the subject could receive up to three additional points based on the number of prior sexual offenses. The scale could range from '0' (first time incest offenders over the age of 25) to '6' (extrafamilial boy-object pedophiles with four or more prior convictions who are released prior to the age of 25). Although a score of 6 was theoretically possible, there were no offenders observed in the highest risk category. Detailed scoring rules are presented in Appendix I.

The next stage of the analyses examined the predictive validity of the risk scale in each of the development and validation samples.

As can be seen in Table 5, the RRASOR showed a moderate level of predictive accuracy across all the samples. In the development samples, the correlations with sexual offense recidivism ranged from .19 to .30, with an average of .27. The variability in the correlations across studies was no more than would be expected by chance (χ^2 [5] = 3.88, p > .30). Similarly, the average area under the ROC curve indicated moderate predictive accuracy (.71) with no significant variability across the studies (χ^2 [5] = 7.75, p > .10). The predictive accuracy of the RRASOR in the independent validation sample (HM Prison) was not significantly different from that found in the development samples (r = .25; comparison Z = .24, p > .70; ROC area = .67; comparison Z = 1.04, p > .25). Consequently, the results from all the samples were combined to yield an average correlation of .27 (n = 2,592) and an average area under the ROC curve of .71 (SD = .015).

An important question is the extent to which the risk scale can be used to estimate overall recidivism rates for different risk categories. Such estimates are difficult to make since the recidivism rates depend on the follow-up period as well as local criminal justice practices (e.g., police vigilance, victims willingness to report). Nevertheless, a rough estimate of the estimate recidivism rates is provided in Table 6. The recidivism rates were first calculated by simply summing the findings across study (column 1). A limitation to this approach is that the follow-up periods varied across studies (range of 2.4 to 23 years, with an average of 9.3 years). Consequently, the next two columns of Table 6 present

estimates of the recidivism rates assuming standard five and 10 year follow-up periods.

Table 4

The Rapid Risk Assessment for Sexual Offense Recidivism (RRASOR).

Prior sex offenses (not including index offenses)	
none	0
1 conviction; 1-2 charges	1
2-3 convictions; 3-5 charges	2
4 or more convictions; 6 or more charges	3
Age at release (current age)	
more than 25	0
less than 25	1
Victim gender	
only females	0
any males	1
Relationship to victim	
only related	0
any non-related	1

To standardize the rates across studies, certain assumptions concerning the recidivism rates were required. Based on previous long-term follow-up studies (e.g., Hanson et al., 1993; Rice & Harris, 1997), it was assumed that the recidivism rate was quickest during the first five years and then continued at a lower rate (approximately half) for up to 15 years post release. The amount of recidivism following 15 years post release was considered to be negligible. It was also assumed that the ratio of the recidivism rates for the different risk levels would be approximately constant across time (i.e., the "proportional hazard" assumption). Consequently, the adjustment was based on the following simple formula:

Total recidivism rate =
YRR*years(for years 1 - 5) + (½)YRR*years(for years 6 - 15),

where YRR is the estimated yearly recidivism rate for years 1 to 5. After estimating the average yearly recidivism rate in each study, the 5 and 10 year recidivism rates were then calculated for each level of the risk scale. The estimates from each sample were then averaged. This procedure increases the recidivism rates for studies with short follow-up periods, and decreases the rates for studies with long follow-up periods.

Table 5

Validity of the RRASOR for predicting sexual offense recidivism.

Sample	r	ROC area	sample size
Development samples			
Millbrook	.22	.64	99
Institut Philippe Pinel	.27	.73	340
Alberta Hospital Edmonton	.25	.77	355
SOTEP (California)	.30	.74	1091
Canadian Federal 1991/1994 Releases	.19	.68	241
Oak Ridge (Penetang)	.21	.62	153
Validation sample			
HM Prison Service (UK)	.25	.67	303
Total	.27	.71	2,592

As a check on the accuracy of this estimation procedure, the estimated rates were compared to the observed yearly recidivism rates in one of the long term data sets in which survival rates were available (Hanson et al., 1993). The estimates correlated .99 with the observed values (interclass correlation of .95, using equation ICC[A,1] from McGraw & Wong, 1996), lending support to the validity of the estimation procedure.

Table 6

Estimated recidivism rates for each risk scale score.

		Recidivism rate (%)		
			adjusted rates	
RRASOR Score	Sample Size	unadjusted	five year	10 year
0	527	5.3	4.4	6.5
1	806	8.8	7.6	11.2
2	742	16.2	14.2	21.1
3	326	26.7	24.8	36.9
4	139	36.7	32.7	48.6
5	52	53.8	49.8	73.1
total	2,592	14.9	13.2	19.5

Each increase in value of the risk scale was associated with an orderly increase in the sexual offense recidivism rate. The rates were less than 7% in the lowest category, and increased to over 50% in the highest risk categories. Most of the sexual offenders would be classified as moderate to low risk by this scale (80% of the sample would have an expected 5 year sexual offense recidivism rate less than 15%). The results also suggest that it is possible to identify a small subgroup of sexual offenders (2% - 8%) who are at substantial risk for sexual offense recidivism over the long-term.

Discussion

The sexual offense recidivism rates and the predictor variables identified in this study were very similar to those found in other recidivism studies. In the current study, the estimated five year sexual offense recidivism rate was 13.2% (n = 2,592), which was very close to the 13.4% estimate (n = 23,393) provided in Hanson and Bussière's (1996) meta-analysis. All official sexual offense recidivism rates should be considered underestimates, however, since many

sexual offenses are never reported (Bonta & Hanson, 1994). As in other studies, prior sexual offenses was a moderate recidivism predictor (r = .20); all of the other variables showed small, although statistically significant, correlations with recidivism (i.e., extrafamilial victims, stranger victims, being single, being young, male victims, and prior nonsexual offenses).

Not all of the predictor variables, however, contributed new information. When the variables were statistically combined to predict recidivism (stepwise regression), four variables accounted for unique variance: prior sexual offense, age (young), extrafamilial victims and boy victims. These variables are those that have repeatedly been identified as important for risk assessment of sexual offenders (Quinsey et al., 1995; Radzinowicz, 1957). Even though a variable did not contribute to the regression equation, it does not mean that it was unimportant. Stranger victims, for example, significantly contributed to the regression equation when extrafamilial victims was excluded; however, the high correlation between stranger victims and extrafamilial victims resulted in only one of these variables contributing unique variance.

A risk scale based on the four best predictor variables showed moderate predictive accuracy in both the development and replication samples. The predictive accuracy varied somewhat across samples, but the amount of inter-study variability was no more than would be expected by chance. Lack of statistically significant variability does not necessarily mean that there were no real differences across the samples (Schmidt, 1996): the scale may, indeed, work better in some settings than in others. Such variability would be expected due to differences in local criminal justice policies or to minor differences in the coding of the predictor and recidivism measures. However, the amount of observed variability was small and there were no obvious factors that could account for the between study differences (e.g., mental health versus correctional setting, length of follow-up, Canada versus USA).

On average, the brief risk scale (RRASOR) correlated .27 with sexual recidivism, which was significantly higher than the best single predictor (i.e., prior sexual offenses, r = .20). The level of predictive accuracy found in this study suggest that it is possible to identify a large group of relatively low risk offenders whose chances of recidivism are less than 15% over ten years, as well as identifying a small group of sexual offenders whose chances of long-term recidivism are greater than 50%. This level of predictive accuracy is as good or better than that found using more elaborate scales, such as the VRAG (Rice & Harris, 1997) or the Minnesota risk assessment scheme (Epperson et al., 1995). The unpublished HM Prison Service risk scale has been reported to have slightly better accuracy than the RRASOR in the sample of offenders from England and Wales (.33 versus .27; D. Thornton, personal communication, March 11, 1997), but the applicability of the HM Prison Service scale to other settings has yet to be examined.

The current study found little contribution of nonsexual criminal history to sexual offense recidivism. The zero-order correlation was only .06, and it did not contribute unique variance to the regression equation. The current findings contrast with Hanson and Bussière's (1996) previous findings that sexual offense recidivism was predicted by a number of variables related to general antisocial behaviour (antisocial personality, total prior offenses). The difference could be related to different coding procedures. In some previous studies, evidence of sexual deviance may have contributed to assessments of general criminality, which could have artificially inflated the relationship between general criminality and sexual offense recidivism. On the other hand, there may be aspects of general criminality that do contribute to sexual offense recidivism, but these aspects were not captured by the simple coding scheme used in this study (i.e., no prior versus any prior nonsexual offenses). For example, it is possible that only those offenders with extensive nonsexual criminal histories are at increase risk for sexual offense recidivism. As well, increased risk may be related to the co-morbidity of sexual deviance and antisocial lifestyle/psychopathy (see Rice & Harris, 1997). Such hypotheses await further empirical study.

Another direction for future research is the extent to which the same factors apply to subgroups of sexual offenders. It may be that age, for example, is a more important risk factor for rapists than for child molesters. Similarly, male victims may be a more relevant risk factor for child molesters than for rapists. Nevertheless, the consistency of the results across the different samples suggest that many of the same factors apply to diverse groups of sexual offenders.

Implications for applied risk assessment

For most areas of human behaviour, actuarial predictions have worked as well or better than predictions based on unguided clinical judgement or expert opinion (Grove & Meehl, 1996). Predicting sexual offense recidivism is unlikely to be an exception. Hanson and Bussière (1996) found that the average accuracy of clinical assessments to predict sexual offender recidivism was an unimpressive r = .10 (ten different follow-up studies, n = 1,453). The brief risk scale introduced in this study is a clear improvement over the typical unguided clinical judgement, but its use in isolation is not recommended.

Sole reliance on actuarial risk scales can only be justified when the scale considers a sufficient number of relevant predictor variables. The RRASOR was not intended to provide a comprehensive assessment of all the factors relevant to the prediction of sexual offender recidivism. Instead, the RRASOR should be used only to screen offenders into relative risk levels. These risk levels could then be adjusted by the consideration of other relevant information, such as deviant sexual preferences and treatment compliance (Hanson & Bussière, in press).

Given the low accuracy of clinical assessments, prudent evaluators will be exceedingly cautious about diluting actuarial predictions with irrelevant information. Many of the "standard" clinical risk factors, such as denial or a history of child sexual abuse, have not been found to predict sexual offense recidivism (Hanson & Bussière, 1996). Even with the most well documented risk factors, the extent to which they contribute unique variance remains an important empirical question. There is, nevertheless, sufficient recidivism research to suggest that applied risk assessments should consider more than the four basic factors covered in the RRASOR.

The obvious weakness of the RRASOR is that it does not directly consider deviant sexual preferences. Deviant sexual preferences were among the strongest recidivism predictors in Hanson and Bussière's (1996) meta-analysis. For those offenders with a long history of sexual offending, specialized assessments of deviant sexual preferences are unlikely to provide much new information; however, it is possible that specialized sexual preference assessments may be informative for those without an established pattern of sexual crime.

Other areas not covered were the offenders' cooperation with treatment and community supervision. Offenders who failed to complete treatment are at higher recidivism risk than those who complete treatment (Hanson & Bussière, in press) and there is some evidence that those offenders who fail to cooperate with community supervision are also at increased risk (Hanson & Harris, 1997). Whether these factors contribute unique variance to risk assessments has yet to be determined.

Conclusion

The brief actuarial risk scale developed in this study predicted sexual offense recidivism with sufficient accuracy to justify its use as a screening measure. It is easily scored from administrative records and could have considerable utility in contexts that require routine assessments of sexual offender risk levels. Although its predictive accuracy was as good or better than other available measures, it does not provide a comprehensive evaluation and is not recommended to be used in isolation. As well, it is likely that the consideration of additional variables (such as measures of sexual deviancy) may lead to the development of even better actuarial risk assessment measures than the measure proposed in this study. Nevertheless, the current results suggests that sexual offense recidivism can be usefully predicted through the consideration of a limited number of uncomplicated variables.

Author note

I would like to thank David Day, Janice Marques, Larry Motiuk, Shelley Brown, Jean Proulx, John Reddon, Marnie Rice, Grant Harris and David Thornton for providing the data used in this report, and for comments on earlier versions. I would also like to thank Jim Bonta, Andrew Harris, and all those at the Department of the Solicitor General of Canada whose ongoing support has made this research possible.

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Appendix I

Coding rules for scoring the RRASOR

The following coding rules guided the development of the RRASOR. The scale is intended only for adult males who have already been convicted of at least one sexual offense. Its application to adolescents (less than 18 years) or female offenders is not recommended. The scale contains four items: prior sexual offenses, age at release, victim gender, and relationship to victim. The victim items should be coded based on all available information (official records, case notes, offender self-report, etc.). Prior sexual offenses, however, is based only on officially recorded arrests and convictions.

Prior sexual offenses. This item is based on officially recorded arrests and convictions for sexual offenses. Only arrests/convictions prior to the index offense are included. The basic concept is whether the offender has already been detected and/or sanctioned for sexual offense and then continued to offend. The index offense or offenses are not counted, even when there are multiple offenses and/or victims involved, and the offenses occurred over a long period of time. However, if, after being convicted with the index offense, an offender is arrested/convicted of historical offenses committed prior to the index offense, these offenses are counted.

Sexual offenses include all explicitly sexual offenses, such as sexual assault, incest, and prostitution related offenses, as well as non-sexual arrest/convictions that were based on sexual misbehaviour, such as Contributing to Juvenile Delinquency (child molesting), Trespass by Night (voyeurism), and Common Assault (plead down from sexual assault).

Arrests and convictions are recorded separately. A conviction counts as one arrest if there is no explicit mention of multiple charges leading to that conviction. In the cases of a plea bargain, where the conviction is different from the arrest (e.g., assault versus sexual assault), both the charge and the conviction are considered sexual. For both arrest and convictions, the number of different counts are coded (e.g., conviction for three counts of sexual assault at one hearing would be coded as three prior convictions).

The RRASOR score is based on the either the number of charges or the number of convictions, depending on which indicates the highest risk level. The categories are as follows:

Score	Prior convictions	Prior charges
0	0	0
1	1	1 or 2
2	2 or 3	3, 4 or 5
3	4 or more	6 or more

The following example illustrates the coding rules.

Offense History			Coding	
Date	Charges	Convictions	Convictions	Charges
1982	Sexual Assault Indecent Act	Common Assault	1	2
1984	Robbery	(withdrawn)		
1987	Gross Indecency	Gross Indecency	1	4
	Buggery (3 counts)	(acquitted)		
1990		Theft over $1000		
1992		Invitation to sexual touching (index offense)	<not counted>	

This offender had a total of 2 prior sexual convictions (2 points on RRASOR) and 6 prior charges (3 points on RRASOR). Consequently, the offender would receiver a score of '3' on this item, the highest of the two scores.

Age at Release (current age). The RRASOR is based on the offender's age at the time period targeted by the risk assessment. If the assessment concerns the offender's current risk level, it would be his current age. If the assessment concerns an anticipated exposure to risk (e.g., release, reduced security at some future date), the relevant age would be his age when exposed to risk. Offenders who are between their 18th and 25th birthday receive one point, whereas those 25

years old or older receive a score of zero. The RRASOR is not intended for those who are less than 18 years old at time of exposure to risk.

Age	RRASOR score
18 - 24.99	1
25 +	0

Victim gender. If the offender has ever committed a sexual offense against a male victim, then the offender receives one point on the RRASOR. Sexual offenders who exclusively target female victims receive a score of zero. Nonsexual offenses against male victims do not count, unless, of course, a nonsexual charge/conviction was for acts of sexual misbehaviour. To judge whether the offender has ever targeted male victims for sexual offenses, all available information is used, including offender self-reports, official records, collateral sources and case notes.

Victim gender	RRASOR score
Any male victims	1
Only female victims	0

Relationship to victim. Offenders who selected any unrelated victims receive one point on the RRASOR. Related victims include spouses (legally married and common-law) and those family members who are too closely related to be married (e.g., biological and step-children, parents, grandchildren, in-laws, nieces, nephews). As well, if the offender is in a parental role to a victim living in the same household, they are considered to be related. However, offenders who move into a household simply to obtain victim access should be considered extrafamilial. In general, offenders who remain in a household for more than two years before initiating sexual abuse should be intrafamilial.

All available information is used to identify whether the victims were related or unrelated.

Relationship to victim	RRASOR score
Any unrelated victims	1
Only related victims	0

RRASOR Total Score. The RRASOR total score is simply the sum of the individual items. These scores can range from zero to six.