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ORIGINAL ARTICLE

Effect of Age-at-Release on Long Term Sexual Re-offense Rates in Civilly Committed Sexual Offenders

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Abstract A cohort of 136 rapists and 115 child molesters civilly committed to a prison in Massachusetts and followed for 25 years (see Prentky, Lee, Knight, & Cerce, 1997) was examined for the effect of age at time of release on sexual recidivism. The present study (1) examined the recidivism rates for each of five age-at-release groups, separately for rapists and child molesters, (2) tested the fit of linear and quadratic models for 5, 10, 15, 20, and 25-year windows using Cox regression analysis, (3) presented the predicted failure rates for rapists (up to five years post-release) and child molesters (out 21 years post-release), and (4) provided a computational formula for estimating the sexual recidivism rate given an individual's age and number of years post-release. For rapists, a linear model extending 5 years best captured our data ($LR = 5.62$, $p < .02$). Going out any further than 5 years did not enhance the predictive efficacy of the model. By contrast, a quadratic model extending the full duration of the study (25 years) provided the best fit ($LR = 6.30$, $p < .04$) for child molesters. Our data supported the general conclusion that risk of sexual recidivism diminishes as a function of increasing age at time of release for rapists. We found marked differences, however, in the re-offense patterns of rapists and child molesters, with the latter group evidencing a distinct quadratic, rather than linear, pattern. Since these findings derive from a population screened for civil commitment by virtue of their presumptive dangerousness, they may not be generalizable to samples of sex offenders drawn from the general prison population.

Keywords Sex offender recidivism · Age at release · Civil commitment

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Advancing age is well known to have a mitigating effect on general criminality (for example, Farrington, 1986; Hirschi & Gottfredson, 1983; Sampson & Laub, 2003; Wolfgang & Ferracuti, 1982). Even among habitual criminals, a subgroup defined by its intractability, frequency of offending may begin to decline in middle age (for example, Blumstein, Cohen, Roth, & Visher, 1986). This phenomenon of middle age desistance is sufficiently well-recognized to have earned the colloquial moniker of "burnout." Even more remarkably, perhaps, the concept of burnout has been applied, perhaps rather loosely, to criminal psychopaths (Hare, McPherson, & Forth, 1988; Robins, 1966). In their study of age-related declines in re-offense rates in 317 psychopaths and 204 nonpsychopaths, Hare, Forth, & Strachan (1992) found that age is complexly related to decreased recidivism among some psychopaths and unambiguously related to decreased recidivism in nonpsychopaths. Among the nonpsychopaths, conviction rates for new violent offenses peaked at 21% in the 21–25 year olds and dropped linearly to 7% in the 41–45 year olds and 3% in the 46–50 year olds. In a study more directly relevant to age-related declines in general criminality, Harpur and Hare (1994) obtained PCL-R scores on 889 offenders ranging in age from 16 to 70 at the time of assessment. The sample was grouped into seven discrete age categories, from 16–20 to >45, and mean scores on Factor 1 and 2 plotted. The Factor 2 scores, reflecting antisociality, dropped linearly as a function of age, with the most precipitous drop after age 45. Although there is no apparent reason why this pronounced effect of age on general criminality should not also be observed among those committing sexual crimes, it has not, until very recently, been examined.

Over the past few years there has been increased attention to the potentially risk-mitigating effect of age at time of release for sexual offenders subject to civil commitment (for example, Barbaree, Blanchard, & Langton, 2003; Fazel, Sjostedt, & Langstrom, 2006; Hanson, 2002; Thornton, 2006). This question is of singularly urgent importance, since a variety of mechanistic procedures are routinely used to assist with assessment of risk, and it is unclear how age at release impacts those assessments. In one of the first empirical examinations of the general question of the relationship of age to sexual recidivism, Hanson (2002) reviewed the records of 4,673 taxonomically mixed sex offenders drawn from ten samples, primarily in Canada. Hanson (2002) found, overall, that "the recidivism rate declined steadily with age" and that "the association was linear," (p. 1053). Although the effect of age was linear for the combined sample, this pattern was not precisely the same for rapists, extrafamilial child molesters, and incest offenders, when examined separately. Among incest offenders, the sexual recidivism rate (SRR) was highest in the youngest age group (31%), dropped sharply to around 10% in the next oldest age cohort (25–29), and continued to drop slowly thereafter to 0% by age 60. Rapists' SRR steadily declined with age, from roughly 23% in the youngest group to 0% by age 60. The most complex pattern was evidenced by the extrafamilial child molesters, who begin with the lowest SRR (around 21%), jumped to about 26% in the next oldest group (25–29) and remained at that risk plateau for about ten years. There is slight decline until the mid-forties (45–49 age cohort), afterwhich there is a marked drop to around 10% in the fifties, and continued decline thereafter, until reaching a zero point at around age 70 (one such child molester re-offended at age 72).

Packard (2002) reported on long-term follow-up of 1,621 sex offenders in the State of Washington. Among the rapists ($n = 465$), the percent re-incarcerated for a sexual crime was 12.1 for those younger than 25, 18.3 for those between the age of 25 and 34, 5.9 for those between 35 and 44, and 0 for those older than 44. Among the child molesters ($n = 796$), the percent re-incarcerated for a sexual crime was 12.5 for those younger than 25, 16.3 for those between the age of 25 and 34, 13.0 for those between 35 and 44, 13.9 for those between 45 and 54, and 8.3 for those older than 54. Similar, to Hanson's findings, rapists evidence

a linear decrease in SRR as a function of age, while (non-incest) child molesters remain at comparatively higher risk for a period ranging from age 25 until, in Packard's case, the early fifties. After age 54, the SRR dropped to below 10%.

In a more recent study, Barbaree, Blanchard, & Langton (2003) reported that (1) age was a "powerful determinant" of sexual arousal assessed by volumetric phallometry, and (2) sexual recidivism decreased as a linear function of age at time of release from prison (based on an analysis of 468 sex offenders released from a federal penitentiary in Ontario). The latter finding obtained after controlling for time-at-risk and relative degree of risk, using one of the standard actuarial scales. As Barbaree et al. (2003) observed, these findings are less than surprising, given the well documented decline of bioavailable testosterone over the course of the lifespan, and the equally well documented decrease in libido in males as age increases. As Barbaree et al. point out, it is not immediately evident why what is commonly known in the human endocrinology literature and in the human sexuality literature should not also apply to sexual offenders. It appears from the few studies that have thus far been published, the predicted age-related decline in sexual recidivism among sexual offenders does apply and is clearly supported, especially among rapists and incest offenders.

As noted, the criticality of this issue is its direct impact on – or application to – determinations of risk for those subject to civil commitment or those who have been civilly committed. It does not appear, however, that the hypothesis of an age-related decline in sexual recidivism has been tested on an exclusively civilly committed group of offenders, who arguably present with a higher base rate of risk since they have already been "pre-screened" for risk by virtue of their commitment. The present study examined that hypothesis in a sample of 265 rapists and extrafamilial child molesters discharged from the Massachusetts Treatment Center over a twenty-five period. A prior study employing the same data set addressed three substantive areas of variability in recidivism rates – type of criminal re-offense, criminal disposition (that is, charge, conviction, imprisonment), and duration of follow-up period (Prentky, Lee, Knight, & Cerce, 1997). More thorough discussion of the methodology of this research project may be found in that earlier report.

Method

Participants

The participants in this study were 265 male sexual offenders who had been committed to the Massachusetts Treatment Center for Sexually Dangerous Persons (M.T.C.) in Bridgewater, Mass. The Center was established in 1959 under special legislation for the purpose of evaluating and treating individuals convicted of repetitive and/or aggressive sexual offenses. The legislation provides for a civil, day-to-life commitment by the court. Release is contingent on being found no longer "sexually dangerous."

This sample was divided into two groups – rapists and child molesters. Those men whose sexual offenses targeted only victims who were 16 years of age or older were classified as rapists ($N = 136$), and those men who only targeted victims under the age of 16 were classified as child molesters ($N = 115$). A sexual offense was defined as any sexually-motivated assault involving physical contact (that is, "hands-on") with the victim. Fourteen cases were dropped from analysis, because they could not be clearly classified as a rapist or child molester (that is, victim selection was indiscriminate), leaving a sample of 251. In this, as with all other similar studies, our calculation of re-offense rates is necessarily limited only to those criminal re-offenders that were caught.

Table 1 Demographic characteristics of the sample

		Rapists	Child molesters
N		136	115
Race	Caucasian	88.3%	93.7%
I.Q.	Mean/SD	101.51/15.23	96.84/15.40
	Range	69–138	57–131
Education[a]	Mean/SD	8.90/2.10	8.02/2.30
	Range	3–13	2–16
Employment[b]	Mean/SD	1.29/1.27	1.10/1.23
	Range	0–4	0–4
Prior sex offenses[c]	Mean/SD	2.51/1.98	3.59/2.95
	Range	0–13	0–16

[a]Highest grade level achieved.

[b]Highest skill level achieved as measured on a 7-point scale (0 = unskilled, 6 = professional).

[c]Average number of prior sexual offenses committed as an adult (age 18 years or older); excludes governing offense that precipitated referral to the Massachusetts Treatment Center.

The demographic characteristics of the two samples are provided in Table 1. As may be observed, both samples are very similar with respect to all demographic variables that were examined. The samples are predominantly Caucasian, of average intelligence, with an 8th grade education and a semi-skilled level of employment. Although clearly within the average range, the child molesters, as a group, had a significantly lower full scale IQ than the rapists ($t = 4.50$, $p < .001$). The average group difference was 4.67 IQ points. This finding is consistent with several recent studies (Cantor et al., 2004; Cantor, Blanchard, Robichaud, & Christensen, 2005).

The average number of known sexual offenses *prior* to Treatment Center commitment was 2.5 for the rapists and 3.6 for the child molesters. The group difference in prior sexual offenses was significant ($t = 2.99$, $p < .01$). The mean age at release for the rapists in our sample was 37.24 ($\sigma = 11.79$), with a range of 21.5–80.9. The mean age at release for the child molesters in our sample was 41.45 ($\sigma = 11.82$), with a range of 19.95–74.9.

Sources for data acquisition

Criminal follow-up data were gathered from six criminal record sources: the Massachusetts Board of Probation records, the Massachusetts Parole Board records, Bureau of Identification (State Police) records, the Department of Correction Research Department records, the Massachusetts Treatment Center Authorized Absence Program records, and the Federal Bureau of Investigation (F.B.I.) records. Four sources (Probation, Parole, M.T.C. files, and F.B.I.) proved to be highly reliable (that is, each of these four sources kept records on all of the offenders in our sample).

Although these five sources provided redundant information, they cast as inclusive a net as possible and allowed for cross-checking of information. Like all other recidivism studies, the major limitation of the present data set was that it includes only identified subjects who came into contact with the criminal justice system. Thus, if an offender did not commit any new offenses or was not apprehended for ones he did commit, no information about him appeared in the records.

Description of outcome measures

We classified criminal offenses by generating a list of all possible criminal charges using a Commission of Probation handbook and an FBI handbook. In addition, coders added to the original list when they encountered charges that had not been included initially. The final list included a total of 172 criminal charges, of which a total of 78 different charges were coded (67 different charges for the rapists and 57 different charges for the child molesters). For purposes of the present study, we only looked at *hands-on sexual charges*.

The study period began in 1959 and ended on January 1, 1985. A date of discharge to the street was determined for each subject who was released during their period. If an offender was discharged from his "sexually dangerous person" status, but went back to prison to complete his criminal sentence, the discharge date was the date that he was released from prison to the street. In all other cases the date of discharge from MTC was used. Those offenders who were residents at MTC but were previously discharged, reoffended and were recommitted were included in our sample. All post-release charges against subjects in our sample were encoded in chronological order for each individual (that is, the first charge after release was #1, and so forth) up to the most recent charge. Although the follow-up formally ended on January 1, 1985, the last charge was posted in October, 1984. For each charge that was encoded, the date, description of the charge, the disposition, and the state it occurred in were specified.

Data analysis

Although the study period was fixed at 25 years, the actual exposure time varied considerably among the subjects, depending on their discharge date. Consequently, survival analysis was used to estimate recidivism. This collection of methods for analyzing time-to-re-offense outcomes was chosen because it takes into account not only whether members of each group commit subsequent crimes, but also the length of time between release and criminal activity. Moreover, it allows one to include in a single analysis all subjects, both those who were followed until they re-offended, and those who were followed for the duration of the study without re-offending. Thus, these data analytic procedures yield a statistical summary of all cases regardless of the length of time each was followed and whether or not they re-offended during the study period.

Sexual re-offense may be calculated in a variety of different ways. In the present study, as with our earlier study (Prentky et al., 1997), we examined re-offense as the simple proportion of those known to have re-offended among all members of the cohort. In addition, we calculated the failure rate as the proportion of individuals that re-offended using Kaplan-Meier survival analysis. This analysis takes into account the length of time each individual has been in the community and thus exposed to the risk of re-offending. Moreover, those individuals who remained undetected as re-offenders until the end of the study period are included in the analysis. These are commonly referred to as "right censored" cases in survival analysis. It should be noted that in our earlier study (Prentky et al., 1997) we used the Weibull model to estimate failure rates. Consequently, there is not precise correspondence between the failure rates previously reported (Table 4 of Prentky et al., 1997) and the failure rates reported here.

Although recidivism is typically conceptualized as a failure rate or re-offense rate over time, the definition of failure varies considerably, from parole violation and arrest or charges to conviction and re-incarceration. As noted above, in this study we *only* examined *charges* for a new sexual offense, with the intention of capturing the largest possible number of

Table 2 Proportion of reoffense by age category

Type	Age category	Total *N*	*N* reoffended	Rate (%)
Rapists	18– <30	39	11	28.2
	30– <40	57	16	28.1
	40– <50	18	4	22.2
	50– <60	15	3	20.0
	60 +	6	0	0.00
	Total	135	34	25.2
Child molesters	18– <30	19	4	21.1
	30– <40	41	17	41.5
	40– <50	28	10	35.7
	50– <60	13	3	23.1
	60 +	12	2	16.7
	Total	113	36	31.9

re-offenses. Within the Commonwealth of Massachusetts, charge is more inclusive than arrest (that is, you may be charged without being arrested). Moreover, the original charge is substantially less likely to have been reduced to a lesser, nonsexual offense as a result of plea bargaining. We tracked new sexual charges for three age-at-release cohorts over the twenty-five year life of the follow-up. The cut-offs for establishing age-at-release groups were guided both by necessity given our relatively small samples and the groupings employed in prior studies, thereby facilitating comparisons.

Results

Results are presented in a series of four steps: first, we report the proportion of each of five age-at-release groups that were charged with a new sexual offense (see Table 2, Fig. 1); second, we employed Cox regression to test the fit a series of linear and quadratic models using five exposure windows (5, 10, 15, 20 and 25 years) for rapists and child molesters

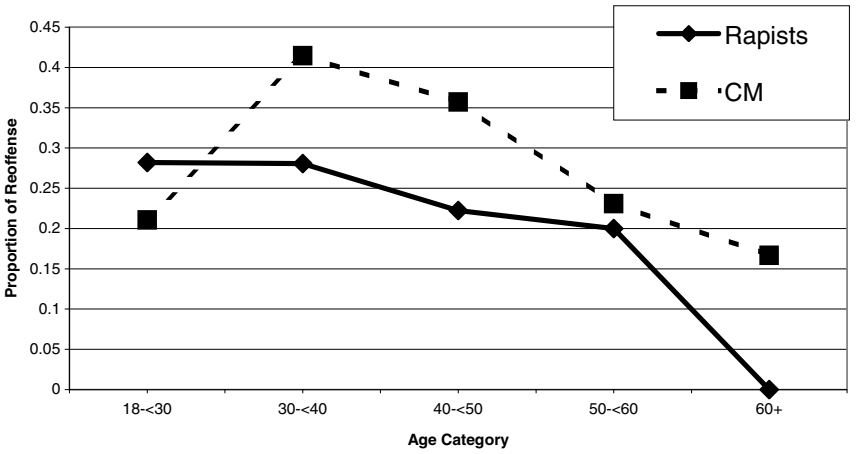

Fig. 1 Proportion of Reoffense by Five Age Categories

separately; third, Kaplan-Meier survival analysis was used to calculate the failure rates and the confidence limits at five ages (20, 30, 40, 50, 60) for rapists and child molesters separately; and lastly, we provided a formula for calculating the estimated sexual recidivism rate given an individual's age at time of release and a chosen follow-up period.

Sexual recidivism rates by five age groups

We report the simple proportion of those rapists and child molesters who were charged with a new hands-on sexual offense for each of five age-at-release groups. For this analysis, we attempted to approximate prior age-at-release studies by dividing the rapists and child molesters into five age-at-release subgroups: (1) 18–29, (2) 30–39, (3) 40–49, (4) 50–59, (5) 60 + . Table 2 and Fig. 1 present the percentage of sexual re-offense for each age group for rapists and child molesters.

For rapists, the proportion of sexual re-offense was stable at about 28% through the end of the third decade, dropping to roughly 22% in the forties, continuing in drop slightly in the fifties and reaching 0 (no detected re-offense) in the oldest group age 60 + (see Table 2 and Fig. 1). It should be evident, however, that when our relatively small sample was parsed into as many as five groups, the group Ns were extremely small. The total number of rapists occupying the three oldest groups (40–49, 50–59, 60 +) was only 39. Indeed, with only 21 rapists released after the age of 49 (that is, 50–59 + 60 +) and a total of 3 detected sexual re-offenders, the sexual re-offense rate for rapists age 50 or older was 14.3%.

For child molesters, the re-offense pattern looks quite different (see Table 2 & Fig. 1). The youngest group (18–29) had a lower overall sexual re-offense rate than the rapists (21.1%), increasing dramatically for those released in their thirties (41.5%), declining somewhat for those released in their forties (35.75), and dropping considerably for those released in their fifties (23.15) and sixties (16.7%). The "bump" that we observed among the child molesters in the general age range of 30–45, looks similar to what is observed in Hanson (2002), though in our sample the noteworthy decline does not appear until age 50. As with the rapists, the group Ns for the child molesters are very small. The total number of child molesters occupying the two oldest groups (50–59, 60 +) was only 25. With a total of 5 detected sexual re-offenders, the sexual re-offense rate for all child molesters released at the age of 50 or older was 20%.

Testing cox regression models

Appropriate use of a proportional hazard model requires that the estimate of the log (−log [survival distribution estimate]) plotted against the log [failure time] yields lines that are roughly parallel. Our plot of rapists and child molesters produced lines that clearly were non-parallel, reinforcing mathematically what is apparent visually, namely that the re-offense patterns of these two groups are distinctly different. We tested the same statistical assumption on the similarity of age at release groups for child molesters and rapists separately, finding the lines to be approximately parallel. Thus, Cox regression models were examined separately for these two offender groups.

We tested ten models for each group: 5 follow-up periods or windows by 2 hazard functions (linear or quadratic). The results for all ten models for both groups are presented in Table 3. As may be readily observed in Table 3, the re-offense patterns of rapists and child molesters are very different. Among rapists, persistence extends about 5 years. There

Table 3 Regression estimates from cox proportional hazards survival models

Group	Time span	Model	LR Chi-Square	*p*	Estimate	SE	*p*	HR
Rapists	5-year	Linear	5.62	0.02	− 0.043	0.020	0.04	0.96
		Quadratic	7.85	0.02				
		linear term			0.195	0.182	0.28	1.22
		quadratic term			− 0.003	0.002	0.20	1.00
	10-year	Linear	4.27	0.04	− 0.035	0.019	0.06	0.97
		Quadratic	6.71	0.03				
		linear term			0.190	0.164	0.25	1.21
		quadratic term			− 0.003	0.002	0.18	1.00
	15-year	Linear	2.90	0.09	− 0.027	0.017	0.11	0.97
		Quadratic	4.41	0.11				
		linear term			0.123	0.136	0.36	1.13
		quadratic term			− 0.002	0.002	0.28	1.00
	20-year	Linear	2.90	0.09	− 0.027	0.017	0.11	0.97
		Quadratic	4.41	0.11				
		linear term			0.123	0.136	0.36	1.13
		quadratic term			− 0.002	0.002	0.28	1.00
	25-year	Linear	2.90	0.09	− 0.027	0.017	0.11	0.97
		Quadratic	4.41	0.11				
		linear term			0.123	0.136	0.36	1.13
		quadratic term			− 0.002	0.002	0.28	1.00
CM	5-year	Linear	0.30	0.58	− 0.009	0.017	0.59	0.99
		Quadratic	1.67	0.43				
		linear term			0.141	0.139	0.31	1.15
		quadratic term			− 0.002	0.002	0.28	1.00
	10-year	Linear	0.25	0.62	− 0.008	0.016	0.62	0.99
		Quadratic	2.87	0.24				
		linear term			0.189	0.134	0.16	1.21
		quadratic term			− 0.002	0.002	0.14	1.00
	15-year	Linear	0.39	0.53	− 0.009	0.014	0.54	0.99
		Quadratic	5.83	0.05				
		linear term			0.275	0.138	0.05	1.32
		quadratic term			− 0.003	0.002	0.04	1.00
	20-year	Linear	0.39	0.53	− 0.009	0.014	0.54	0.99
		Quadratic	5.83	0.05				
		linear term			0.275	0.138	0.05	1.32
		quadratic term			− 0.003	0.002	0.04	1.00
	25-year	Linear	0.60	0.44	− 0.011	0.014	0.44	0.99
		Quadratic	6.30	0.04				
		linear term			0.279	0.138	0.04	1.32
		quadratic term			− 0.003	0.002	0.04	1.00

was no appreciable increase in the accuracy of the model by adding additional data beyond 5 years. The LR value is the largest at yr. 5 ($\chi^2 = 5.62$), drops at yr. 10 ($\chi^2 = 4.27$) and is non-significant thereafter. Although the total drop from the youngest offenders to those in their fifties was only 8%, the pattern was, nevertheless, linear. The highest recidivism rate was among the youngest offenders, dropping slightly but consistently until age 60, after which there was no detected recidivism. Notably, the eldest group, evidencing no detected sexual recidivism, was extremely small ($n = 6$). In sum, the sexual re-offense rates among

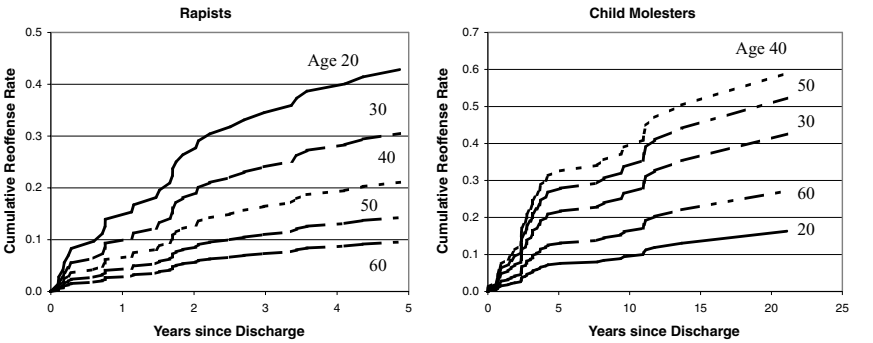

Fig. 2 Predicted Cumulative Reoffense Rate Since Discharge by Age-at-Discharge

the rapists were uniformly low (below 30%) compared with the child molesters and declined slowly across the age span until age 60.

By marked contrast, the sexual re-offense pattern for the child molesters was best captured by a 25-year, quadratic model, reflecting the longer-term persistence of the child molesters. Close to one-third of the child molesters who re-offended (11/36, 31%) did so *after* Year 5, compared with 8.8% of the rapists (3/34). The LR values for the quadratic model increased from 1.67 at Year 5 to 2.87 at Year 10, 5.83 at year 15 and 20, to 6.30 at Year 25, with only the LR value at Year 25 being statistically significant ($p < .04$). The age at release pattern for the child molesters is visually as well as statistically quadratic. Indeed, all LR values for the 5 linear models were *very* small (0.30, 0.25, 0.39, 0.39, 0.60, respectively). Overall, the distribution of the sexual recidivism rates for the five child molester age at release groups could be characterized as moderately bell-shaped and positively skewed (Fig. 1).

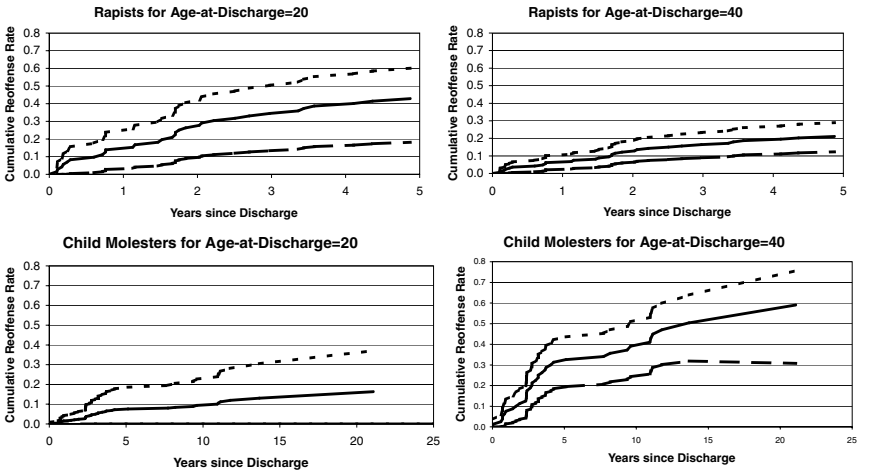

Fig. 3 Predicted Cumulative Recidivism Rate with 95% CI at Age-at-Discharge 20 and 40

Table 4 Predicted cumulative recidivism rates with 95% confidence intervals

Years since discharge	Age-at-Discharge 20			30			40			50			60		
	CRR (%)	95% CI		CRR (%)	95% CI		CRR (%)	95% CI		CRR (%)	95% CI		CRR (%)	95% CI	
Rapists															
0.5	8.3	0.4	15.6	5.5	1.1	9.7	3.6	0.6	6.6	2.4	0.0	4.8	1.5	0.0	3.6
1.0	13.9	2.8	23.8	9.3	3.5	14.7	6.2	2.0	10.1	4.0	0.3	7.6	2.7	0.0	5.8
1.5	18.1	4.7	29.7	12.2	5.6	18.4	8.1	3.3	12.7	5.4	0.7	9.8	3.5	0.0	7.6
2.0	26.4	8.9	40.5	18.1	10.0	25.4	12.2	6.0	18.0	8.1	1.6	14.2	5.3	0.0	11.2
2.5	30.4	11.1	45.5	21.0	12.4	28.8	14.2	7.4	20.6	9.5	2.1	16.4	6.3	0.0	13.1
3.0	34.5	13.4	50.4	24.1	14.9	32.3	16.4	8.9	23.3	11.0	2.6	18.7	7.3	0.0	15.0
3.5	37.3	15.0	53.7	26.2	16.6	34.7	17.9	10.0	25.2	12.1	2.9	20.4	8.0	0.0	16.4
4.0	38.7	15.8	55.3	27.2	17.5	35.9	18.7	10.6	26.1	12.6	3.1	21.2	8.4	0.0	17.0
4.5	41.4	17.4	58.5	29.4	19.3	38.3	20.3	11.7	28.0	13.7	3.5	22.9	9.1	0.0	18.5
5.0	42.8	18.2	60.1	30.5	20.2	39.5	21.1	12.3	29.0	14.3	3.7	23.7	9.5	0.0	19.2
Child molesters															
0.5	0.2	0.0	0.9	0.8	0.0	2.3	1.2	0.0	3.6	1.0	0.0	3.0	0.4	0.0	1.4
1.0	105	0.0	4.2	4.7	0.4	8.9	7.5	1.3	13.3	6.2	0.8	11.4	2.7	0.0	6.0
2.0	2.4	0.0	6.2	7.2	1.5	12.5	11.2	3.6	18.3	9.4	2.5	15.9	4.2	0.0	8.7
3.0	4.6	0.0	11.8	13.8	4.9	21.8	21.2	10.6	30.6	18.0	7.7	27.1	8.1	0.0	16.1
4.0	6.5	0.0	16.3	19.0	7.7	28.9	28.8	16.4	39.3	24.5	12.1	35.2	11.4	0.0	21.8
5.0	7.6	0.0	18.6	21.8	9.3	32.5	32.6	19.4	43.6	27.9	14.4	39.3	13.1	0.0	24.7
10.0	9.4	0.0	22.7	26.5	11.8	38.7	39.0	24.3	50.9	33.7	18.2	46.2	16.1	0.0	29.8
15.0	13.1	0.0	30.5	35.3	16.2	50.1	50.4	31.9	63.8	44.1	24.7	58.5	22.1	0.0	39.3
25.0	16.3	0.0	37.2	42.6	16.4	60.5	59.0	30.8	75.7	52.3	24.0	70.0	27.2	0.0	47.7

Cumulative recidivism rates for five age-at-release groups

Predicted cumulative recidivism rates for five ages at time of release are presented in Table 4, separately for rapists and child molesters (see Fig. 2). These are failure rates derived from survival analysis. Although interpolation is permissible (for example, an interpolated cumulative recidivism rate of 20.25% for a 35 year old rapist at Year 3 could be derived by taking the halfway point between 24.1% [age 30] and 16.4% [age 40]), we provide a formula for calculating the estimate more precisely (see next section). For this example, the formula yields an almost identical estimate of 19.92%.

A linear decline in rates is clearly evident among the rapists. At Year 5, as far out as we went for the rapists, predicted rates dropped from 42.8% at age 20 to 30.5% at age 30, to 21.1% at age 40, to 14.3% at age 50, to 9.5% at age 60.

By contrast, the Year 5 predicted recidivism rates for child molesters began at a low of 7.6% at age 20, increased to 21.8% at age 30, increased again to 32.6% at age 40, dropped slightly to 27.9% at age 50, and dropped again to 13.1% at age 60. Unlike the rapists, however, failure rates continued to rise *after* year 5. By year 15, the predicted rates rose from 13.1% at age 20, to 35.3% at age 30, to 50.4% at age 40, dropping to 44.1% at age 50, and dropping again to 22.1% at age 60. By year 25, the predicted rates rose from 16.3% at age 20, to 42.6% at age 30, to 59% at age 40, dropping slightly to 52.3% at age 50, and dropping sharply to 27.2% at age 60.

Notably, the confidence intervals are quite large at ten years or more post-release (see Fig. 3). At year 15, for example, the confidence intervals for predicted sexual recidivism ranges from 0% to 30.5% at age 20, 16% to 50.1% at age 30, 31.9% to 63.8% at age 40, 24.7% to 58.5% at age 50, and 0% to 39.3% at age 60. By the end of the study period at year 25, the confidence intervals ranged from 0% to 37.2% at age 20, 16.4% to 60.5% at age 30, 30.8% to 75.7% at age 40, 24% to 70% at age 50, and 0% to 47.7% at age 60.

Calculating recidivism rates given release age

Using our dataset, we have provided the formula and component values for calculating the cumulative recidivism rate for individuals given a specific age-at-release and a fixed number of years post-release. Two formulas are given, the first for rapists and the second for child molesters, followed by two examples making use of the formulas. The critical information is supplied in Table 5. Based on the Cox regression analyses, we went out 5 years (4.87 years) post-release for the rapists and 21 years post-release for the child molesters.

For rapists:

age = age at discharge
t = number of years since discharge rounded to the lower number in Table 4
A = the value of the column A corresponding to t in Table 4
Cox-regression coefficient: $b_1 = -0.04296$
log of survival probability = $\left[\exp(b_1 \times age)\right] \times \left[\log(1 - A/100)\right]$
survival probability = exp (log of survival probability)
predicted recidivism rate in percentage = 100 × (1 − survival probability)

For child molesters:

age = age at discharge
t = number of years since discharge rounded to the lower number in Table 4
A = the value of the column A corresponding to t in Table 4

Table 5 Base numbers for calculating predicted recidivism rates for given age-at-discharge

Years since discharge	A	B	Years since discharge	A	B	Years since discharge	A	B
Rapists								
0.000	0		1.128	32.497	19.666	2.220	57.521	25.832
0.101	3.283	3.890	1.158	35.096	20.664	2.508	59.448	25.952
0.112	6.483	6.116	1.470	37.664	21.572	2.700	61.310	26.008
0.170	9.608	8.094	1.520	40.157	22.386	2.979	63.180	26.012
0.189	12.653	9.906	1.662	42.576	23.106	3.362	65.014	25.955
0.244	15.625	11.585	1.700	44.913	23.732	3.436	66.777	25.837
0.287	18.518	13.138	1.703	47.166	24.267	3.578	68.471	25.662
0.602	21.426	14.640	1.752	49.340	24.717	4.110	70.133	25.429
0.720	24.301	16.059	1.845	51.474	25.102	4.364	71.736	25.148
0.758	27.101	17.368	2.026	53.546	25.412	4.873	73.303	24.811
0.761	29.817	18.561	2.062	55.555	25.654			
Child molesters								
0.000	0		2.371	0.050	0.146	5.125	0.112	0.324
0.041	0.003	0.011	2.409	0.055	0.159	7.732	0.118	0.343
0.586	0.007	0.021	2.628	0.059	0.171	8.194	0.125	0.362
0.704	0.011	0.032	2.741	0.063	0.184	9.372	0.132	0.383
0.706	0.014	0.043	2.757	0.068	0.196	9.613	0.140	0.406
0.838	0.018	0.053	3.001	0.072	0.209	10.946	0.149	0.433
0.942	0.022	0.064	3.179	0.077	0.223	11.009	0.159	0.460
1.421	0.026	0.076	3.181	0.081	0.236	11.151	0.169	0.489
1.643	0.030	0.087	3.444	0.086	0.250	11.770	0.180	0.521
1.908	0.034	0.099	3.652	0.091	0.265	13.676	0.198	0.574
2.316	0.038	0.110	3.726	0.096	0.279	21.084	0.252	0.727
2.355	0.042	0.122	4.077	0.101	0.294			
2.363	0.046	0.134	4.257	0.106	0.309			

Note: The values in Column A is to be used to calculate predicted cumulative recidivism rate; the values in Column B can be used to calculate confidence interval for the recidivism rate.

Cox-regression coefficients: $b_1 = 0.27884, \quad b_2 = -0.0033$
log of survival probability $= [\exp(b_1 \times age + b_2 \times age^2)] \times [\log(1 - A/100)]$
survival probability $=$ exp (log of survival probability)
predicted recidivism rate in percentage $= 100 \times (1 -$ survival probability$)$

Remaining formula is the same as shown above.

Example 1

A convicted rapist whose age at discharge is 35. The task is to predict the cumulative recidivism rate after 3 years post-release. Then,

$age = 35$
Since 3 lies between 2.979 and 3.362; pick the lower value for t, so $t = 2.979$
$A = 63.180$
Cox-regression coefficient: $b_1 = -0.04296$
log of survival probability $= [\exp(-0.04296 \times 35)] \times [\log(1 - 63.180/100)] = -0.22213$

survival probability = exp (log of survival probability) = 0.80081
predicted recidivism rate in percentage = 100 × (1 − survival probability) = 19.92%

We would predict that the sexual recidivism rate for this 35 year old convicted rapist would be 19.92% *within the first 3 years since discharge*. For purpose of comparison, from Table 3, the rates are 24.1% and 16.4% for ages-at-discharge 30 and 40, respectively.

Example 2

A convicted child molester whose age at discharge is 35. The task is to predict the cumulative recidivism rate after 3 years post-release. Then,

$age = 35$
Since 3 lies between 2.757 and 3.001; pick the lower value for t, so $t = 2.757$
$A = 0.068$
Cox-regression coefficients: $b_1 = 0.27884$, and $b_2 = -0.0033$

$$\text{log of survival probability} = [\exp(0.27884 \times 35 - 0.0033 \times 35^2)] \times [\log(1 - 0.068/100)] = -0.2055$$

survival probability = exp (log of survival probability) = 0.814
predicted recidivism rate in percentage = 100 × (1 − survival probability) = 18.6%

We would predict that the sexual recidivism rate for this 35 year old convicted child molester would be 18.6% *within the first 3 years since discharge*. For purpose of comparison, from Table 3, the rates are 24.1% and 16.4% for ages-at-discharge 30 and 40, respectively.

Calculating the confidence intervals for the recidivism rates is complicated. Such a calculation requires the use of the values in column B of Table 5. Interested readers are referred to p. 260 of Klein and Moeschberger (1997).

Discussion

The present study examined the hypothesized effect of age-at-release on rates of new sexual charges in samples of 136 rapists and 115 child molesters using the same 25-year follow-up data reported on previously (Prentky et al., 1997). The samples were drawn from the Massachusetts Treatment Center in Bridgewater between 1959 and 1985, and all participants had been civilly committed under the original statute (M.G.L. c. 123A, §1). By virtue of the screening process that selected these offenders for "special treatment," they arguably posed a greater than average risk for recidivism.

Results from this study supported prior findings of a risk mitigating effect of age at time of release for rapists, with failure rates dropping linearly as a function of age from 42.8% at age 20 to 30.5% at age 30, 21.1% at age 40, 14.3% at age 50, and 9.5% at age 60. Failure rates for child molesters presented a more complex picture. Among the child molesters, the failure rate at age 20 was 16.3%, increasing sharply to 42.6% at age 30, increasing again to 59% at age 40, dropping slightly to 52.3% at age 50, and declining significantly to 27.2% at age 60. Overall, the age-crime pattern is linear and declining among the rapists, while the equivalent pattern among the child molesters is quadratic, beginning low, increasing sharply, plateauing for several decades, and declining at age sixty. Although failure stops at Year 5 for the rapists, it extends almost the duration of our follow-up – to Year 21 – for the child molesters.

The age distribution of crime is one of the most robust findings in criminology (Hirschi & Gottfredson, 1983; Sampson & Laub, 2003). It was Hirschi & Gottfredson's (1983) contention that the familiar inverted J-curve relationship between age and crime is invariant across all known social, cultural, and temporal dimensions. Hirschi & Gottfredson (1983) referred to this remarkably stable relationship as "one of the brute facts of criminology," (p. 552). According to this invariant age-crime curve, criminal behavior spikes during adolescence, peaks in late adolescence and early adulthood, and then declines throughout adulthood, plateauing at a low level around age 40 (see Blumstein, 1995).

Given the durability of this age-crime relationship, it is plausible that the same or similar relationship would be observed with sexual crime. As noted, that certainly seems to be the case (for example, Barbaree et al., 2003; Fazel et al., 2006; Hanson, 2002; Packard, 2002; Thornton, 2006; Wollert, 2006). Wollert (2006) recently concluded that the age-invariance theory of Hirschi & Gottfredson (1983) applied to sex offenders. The present study clearly indicated that the match between generic criminals and sex offenders is most evident with rapists, who, as a group, bear a stronger resemblance to generic criminals than child molesters. Indeed, the linear decline in re-offense rates with advancing age among rapists is quite similar to the general criminal population. This is not surprising given the similarity in factors presumed to be responsible for generic criminal behavior and rape (for example, elevations in testosterone during adolescence, lifestyle and behavioral impulsivity, delinquency, criminogenic attitudes, negative or hostile masculinity, PCL Factor I traits, such as callous, unemotional, unempathic, narcissistic). This overlap of risk factors for psychopathy and sexual aggression against women was explicit in Malamuth's (2003) hierarchical-mediational confluence model. Similarly, Knight & Sims-Knight (2003) proposed a structural model predicting sexual aggression against women that included components common to general criminal behavior. The age-crime literature cited earlier suggests that most of these risk factors diminish in intensity with increasing age.

The age-crime curve for child molesters in the present study, however, suggested that the highest risk period is "middle" age, roughly from the late twenties to the mid-forties, followed by a decline thereafter. Since our sample of child molesters had no exclusive endogamous incest offenders, this pattern may be specific to extra-familial child molesters and more exaggerated with higher risk child molesters, as was the case with the sample in this study. Understanding this middle age "bump" or elevation in risk as a distinguishing feature of this subset of criminals is obviously critical from the standpoint of assessing risk. The primary risk factor that defines most adult extra-familial child molesters is some degree of deviant sexual attraction or sexualized interest in children. In a study that examined risk factors in 111 extrafamilial child molesters, three variables significantly discriminated between recidivists and non-recidivists and all three involved sexual deviance – number of prior sexual offenses, degree of sexual preoccupation with children, and paraphilias (Prentky, Knight, & Lee, 1997). However, in a recent large scale study comparing 2,028 pedophiles, hebephiles (those most attracted to adolescents) and teleiophiles (those most attracted to physically mature partners), sexual arousal peaked shortly after puberty and then declined with age in a similar fashion for all three groups (Blanchard & Barbaree, 2005). To the extent that sexual crimes are driven by "deviant sexual arousal" in child molesters, it does *not* appear that the decline in sexual arousal as a function of age *alone* provides an adequate explanation of the age-crime curve in this group of offenders. The answer, not surprisingly, is undoubtedly more complicated. A reasonable hypothesis that might explain the quadratic effect in our data and the less pronounced "bump" observable in Hanson's (2002) data is the *joint* operation of *two* age-related factors: age and actuarial risk (Barbaree, Langton, & Peacock, 2006). The first factor is the linear decline in risk as a function of age. The second

factor, hypothesized to be operative in child molesters, is an *increase* in risk factors across the age-at-release groups (see Barbaree et al., 2006). Thus, one hypothesis is that the quadratic effect is the product of the joint contribution of these two factors.

A second, more parsimonious, hypothesis involves the proportion of victims to age-appropriate sexual partners. Child molesters, virtually by definition, have problems establishing and sustaining age-appropriate intimate partnerships. Needs for intimacy and sexual gratification are met with children. Rapists, by contrast, are not saddled with that particular problem. Rapists are likely to have, over the course of their lifetime, far more non-coercive than coercive sexual encounters with age-appropriate peers. By middle age, most rapists will have "settled into" a non-coercive relationship. However, as long as child molesters are restricted to children as outlets for their sexual gratification, *all* sexual "partners" will be age-inappropriate and thus criminal. Stated otherwise, child molesters are likely to have far more inappropriate and coercive sexual encounters with children than appropriate sexual encounters with peers. Since the age-crime curve plots "victims" (that is, re-offenses) and not sex partners, the high and steady concentration of victims among child molesters roughly between the ages of 25 and 45 may reflect no more than the unavailability of legal options during the prime years of sexual activity. This simple interpretation would explain the greater persistence of child molesters into their forties and fifties. The lower re-offense rates among younger child molesters (that is, between 18 and 25) may simply reflect a developmental window when sexual preference is not yet certain. Although sexual drive may be peaking in adolescence, it may be difficult to discern a clear sexual preference among adolescents (Hunter & Becker, 1994; Hunter, Goodwin, & Becker, 1994). Thus, a distinct sexual preference for children may not become clear until the mid-twenties. Perhaps the simplest hypothesis, however, is that the youngest cohort of child molesters at the time of release has a higher proportion of individuals whose offenses were motivated by developmental and psychosexual immaturity and/or the normative impulsivity of adolescence and desisted with age.

Overall, it would seem clear, based on these findings, that the age-crime persistence patterns for rapists and child molesters are quite different and that these differences should be taken into account in risk analysis. Rape is fundamentally predatory antisocial behavior that is subject to the same type of age-related decline observed with non-sexual antisocial behavior. Moreover, persistence among rapists occurs within a fairly narrow window, roughly five years. Child molestation, on-the-other-hand, is characterized by anomalous sexual preference, or more colloquially, a form of *sexual deviance*, with persistence patterns that reflect greater longevity. Among extrafamilial child molesters, twin curves are hypothesized: (1) the natural, predicted decline in risk as a function of the aging process, and (2) a middle age elevation in actuarial risk factors (for example, strength of sexual drive, degree of sexual preoccupation with children, degree of exclusivity in sexual preference for children) that is stable for several decades before declining in the late fifties or early sixties. Clearly, much more research is required on subtype-differentiated samples of child molesters (for example, exclusive endogamous incest offenders, *true* pedophiles [those with an exclusive sexual and social preference for children], and child molesters with a non-sexual criminal history) to further clarify the crime persistence patterns of these offenders. This step is critical for informing risk analysis on this heterogeneous group of child offenders.

The obvious limitations of the present study are twofold. First, our sample is small compared with other similar studies, thus restricting statistical power. Second, our sample was composed entirely of civilly committed sex offenders with an average of 2.5 known *prior* sex offenses for the rapists and 3.6 known *prior* sex offenses for the child molesters. Hence, this sample clearly has a higher base rate for sexual recidivism than samples drawn from the

general prison population. Although this latter consideration must be regarded as a limitation in terms of generalizability, it may also be seen as a strength of the study. Presumably, using a higher risk sample is a more severe test of the age-crime hypothesis, providing confirmatory support for the rapists and "amplifying" or exaggerating the quadratic blip in Hanson's (2002) data for child molesters.

In addition, there is one important caveat that relates to the generalizability of our findings. Close inspection of the confidence intervals for predicted recidivism rates reveals *very* wide ranges, particularly among the child molesters ten years or more post-release. For example, the confidence intervals for the cumulative recidivism rate at year 25 for a 30 year old child molester ranges from 16.4% to 60.5%. Clearly, readers must be very cautious about what inferences may be drawn when these sexual recidivism rates are applied to individuals.

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