The Constant Multiplier Assumption Misestimates Long-term Sex Offender Recidivism Rates

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Many clinical psychologists have claimed that long-term sexual recidivism rates are a fixed multiple of short-term rates and have estimated that the true value of this constant falls somewhere between 1.5 and 3.0. They have also proposed that it is "mathematically sound" for evaluators to estimate the long-term rate for any actuarial score in sexually violent predator civil commitment cases by multiplying its short-term rate by this constant. The present paper questions the "constant multiplier assumption" and summarizes disconfirming data collected by its proponents and others showing that the fixed ratios for groups with low short-term rates are actually greater than the ratios for groups with high short-term rates. These results rule out the use of the constant multiplier assumption by risk evaluators. It is concerning that this assumption has not been previously tested. The authors call on the developers of risk assessment systems to collect and report data that clearly validate the assumptions that underpin their actuarial tables before they are disseminated or administered. The APA ethical standards also require forensic evaluators to acknowledge the limitations of their risk assessments when they testify, a practice that is invaluable to the trier of fact.

Key words: sex offender risk assessment, sexual recidivism, sexually violent predators, constant multiplier assumption.

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It is obvious that "long-term" 20-year sexual recidivism rates for sex offenders, symbolized here as P_{20}, are greater than their "short-term" 5-year rates, or P_5. The extent to which these rates differ is uncertain, however. In an attempt to address this issue a number of psychologists have hypothesized that the 20-year rate is a fixed multiple of the 5-year rate. They have further proposed that accurate long-term sexual recidivism estimates for sex offenders may be obtained by scoring them on an actuarial instrument, finding the short-term rates associated with their scores, and multiplying the rates by a constant which is independent of their scores.

When Hanson (1997) developed the RRASOR, for example, he "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." He also assumed that the ratio of the long-term recidivism rates to the 5-year recidivism rates for the different score categories "would be approximately constant." He then estimated the long term recidivism rate P_{15} for each score on the RRASOR by multiplying its 5-year recidivism rate by 1.5.

Doren extended this position to sexually violent predator civil commitment risk assessments. Specifically, he argued (2008, p. 18-10) that "five-year recidivism rates are about half of very long-term … recidivism rates" and that this assumption "can be used by risk evaluators to estimate very long-term recidivism rates from the far more typically found five-year estimates (from actuarial instruments or other empirical sources)." He also stated that

> *A mathematically sound process would be to multiply the relevant five-year rate by 2.0 to find the very long-term rate … the most conservative evaluators can instead multiply the relevant five-year rate by 1.5 … the least conservative evaluators can use a multiplier of 3.0 … I recommend using the 2.0 multiplier, potentially also offering the range of possible extrapolations (using both the 1.5 and 3.0 multipliers) to the consumer of the evaluation as well, as representative of an approximated confidence interval.*

Thornton (2010a, 2010b) and Sachsenmaier (2010) have most recently relied on Hanson's and Doren's views to formulate tables that present specific long-term recidivism rates for different actuarial scores. Referring to his "Structured Risk Assessment" scheme, Thornton (2010b) indicated that

> *Long-term sexual recidivism risk (20+ years) is taken to be about twice the 5-year rate so 5-year rates of 15%, 20% and 25% are taken to correspond to long-term rates of 30%, 40% and 50%.* (p. 2).

Tables of percentages derived from the constant multiplier assumption may appear to provide a straightforward answer to an important question. The following line of reasoning suggests, however, that they are susceptible to error:

1. Letting k be a constant, the formula for the long-term recidivism rate according to the constant multiplier assumption is that $P_{20}/P_5 = k$ for each actuarial score for a 20 year study. For a 15 year study the formula for long-term recidivism would be $P_{15}/P_5 = k$ and it would be $P_{10}/P_5 = k$ for a 10 year study. The constant would, of course, assume different values.

2. One can easily think of situations where the foregoing formulas will produce impossible results. Suppose an offender falls in a group with a 5-year recidivism rate of 40%. Multiplying this rate by a factor of 3.0 will generate an impossible long-term estimate of 120%.
3. Tables of risk percentages that reflect the constant multiplier assumption consistently reflect the adoption of other assumptions that lack adequate validation (Thornton, 2010a; Sachsenmaier, 2010). One is that the accuracy of existing five-year actuarial tables may be improved by subdividing samples into groups with "high risks and needs" versus "routine needs" on a post hoc basis, compiling new tables for these groups, and having evaluators apply whichever tables the evaluators themselves believe are most appropriate to their evaluees. Another is that the data from which these five-year tables are derived necessarily follow a logistic curve; since the scales are discrete, there is no "curve" and no reason to believe that a logistic function would fit the discrete points. Such assumptions convey the aura of science but may also create unjustified "illusions of certainty" (Wollert, 2007; Wollert & Waggoner, 2009) on the part of evaluators.
4. Data validating the constant multiplier assumption have never been published in a peer-reviewed journal and there is no reason to accept this assumption.
5. For low scale values, both P_5 and P_{15} are likely to be low, say .01 and .04, so that a relatively large value $k=4$ will be obtained. When P_5 is high, say .2, P_{15} would have to be .8 to achieve such a large k; such high recidivism rates do not occur. This suggests that the constant multiplier assumption is implausible.

We tested the constant multiplier assumption by calculating *k* for three cohorts of sex offenders who were tracked for at least 15 years and were scored on Static-99 (Hanson & Thornton, 2000), the Risk Matrix 2000/S (Thornton, 2007), and the Automated Sexual Recidivism Scale (Skelton, Riley, Wales, & Vess, 2006). The assumption was consistently rejected.

The next three sections summarize the results of our analyses. Their implications are discussed in a concluding section.

Static-99

The Static-99 risk item battery includes 10 items. These items record the number of sex offense charges and convictions for an evaluee, his age at release, whether he has been married for two years, whether he has victimized strangers, unrelated persons, and/or males, whether his criminal history includes violent offenses, and whether he has received a criminal sentence on five separate occasions. Most offenders obtain scores of 3 or less on Static-99, so a score of 4 or more is above average. Hanson and Thornton (2000) reported Static-99 score-wise recidivism rates for an aggregated data base compiled from three samples that included 677 Canadian sex offenders released between 1958 and 1993 and one sample of 531 British sex offenders who were released in 1979. The top panel of Table 1 presents 15-year sexual recidivism data for those with high Static-99 scores versus those with lower scores. The top panel of Table 2 presents the 5-year rates for the same offenders. Dividing the 15-year rate in the "high" row of the fifth column of Table 1 by the 5-year rate in Table 2 it is apparent that $k = .42/.32 = 1.33$ for the high group. For those with low scores, it is $.14/.09 = 1.67$. This difference is statistically significant ($z = 4.8$, two-tailed $p < .0001$).

Insert Tables 1 and 2 about here

The Risk Matrix 2000/S

The Risk Matrix 2000/S (RM 2000/S) risk item battery includes two sets of items. The first set records the number of times an evaluee has appeared for sentencing in court on sex offense charges, his number of court appearances on criminal charges, and his age at release. The second records whether he has been married for two years, whether he has victimized strangers and/or males, and whether he has committed a non-contact sex offense. Offenders are subsequently assigned to Low, Medium, High, or Very High risk categories. Most offenders obtain scores on the RM 2000/S that place them in the Low or Medium categories, so a classification of High or Very High risk is above average. Thornton (2007) reported 15-year RM 2000/S category-wise recidivism rates for a sample of 429 "adult males sentenced to prison in England and Wales for sex offences and released in 1979" that was "nationally representative" (p. 13). Although the data for these offenders were included in Hanson & Thornton's (2000) Static-99 article, we conducted a separate analysis of the RM 2000/S because its items are somewhat different than the Static-99 items and scoring it requires less in the way of clinical judgment. Also, unlike Static-99, the RM 2000/S data base was the result of representative rather than convenience sampling. The middle panel of Table 1 presents 15-year sexual recidivism data for those with an above average RM 2000/S score versus those with an average or below average score. The middle panel of Table 2 presents the 5-year rates for the same offenders. Dividing the 15-year rate in the "high" row of the fifth column of Table 1 by

the 5-year rate in Table 2 gives k = .44/.34 = 1.29. It is .15/.10 = 1.50 for those with low scores. This difference is statistically significant (z = 2.4, p < .05).

The Automated Sexual Recidivism Scale

The Automated Sexual Recidivism Scale (ASRS) risk item battery consists of seven items that tap the same general content areas as items from the Static-99 but require less in the way of clinical judgment because they are coded into the New Zealand Criminal History data base from "information captured routinely in an individual's criminal history by the New Zealand Department of Corrections" (Skelton et al., 2006, p. 280). The three Static-99 items that are not included in the ASRS include whether a person has been married and whether he has victimized strangers and/or non-relatives. In spite of this difference the predictive accuracy of the ASRS does not differ from that of Static-99 (Wollert, Cramer, Waggoner, Skelton, & Vess, 2011). Alex Skelton, developer of the ASRS, provided us with 20-year ASRS recidivism rates for an exhaustive sample of 698 sex offenders who were released from New Zealand prisons in 1990 and 1991. Most offenders in this data set obtained scores of 1 or less, so a score of 2 or more was above average. The bottom panel of Table 1 presents long-term sexual recidivism data for those with above average ASRS scores versus those with average and below average scores. The bottom panel of Table 2 presents the 5-year rates for the same offenders. Dividing the 20-year rate in the "high" row of the fifth column of Table 1 by the 5-year rate in Table 2 gives k = .32/.25 = 1.29. For those with low scores, k = .11/.06 = 1.86. This difference is statistically significant (z = 6.1, p < .0001).

Discussion

A number of psychologists have proposed sex offender risk assessment systems based on the assumption that the ratio of long-term sexual recidivism rates divided by short-term rates are the same for each scale value and that this generalizes over groups with different short-term recidivism rates. This paper has summarized data showing that this constant multiplier assumption is clearly invalid. On the contrary, low short-term rates are more likely to have larger recidivism ratios than high short-term rates and the actual multipliers are considerably lower than have been suggested by Doren and others. This is consistently the case. The consequences of using their suggested constant multipliers will have profound effects on commitment decisions. For example, in the case of the Static-99 the five and fifteen year rates are .32 and .42 respectively. Following Doren's recommendation that "*the least conservative evaluators can use a multiplier of 3.0"* any jury would commit someone with an estimated recidivism rate of .96 even though the correct rate of .42 does not meet a legal standard of more likely than not.

Our results rule out the use of risk assessment systems that rely on the constant multiplier assumption. Approaches that endorse the constant multiplier assumption should also be carefully scrutinized on the reasoning that one false assumption suggests the presence of others. Such approaches include the Structured Risk Assessment and some modifications of Static-99R that have been proposed for use in sexually violent predator civil commitment proceedings (see, for example, Thornton, 2010a). It is incumbent on forensic evaluators, in other words, to adequately appraise these and other procedures in the interest of providing the court with accurate information in high stakes

cases where an individual who has completed his prison term may be committed for an indefinite period.

Our results also indicate that there is no quick and dirty method for estimating long-term recidivism risk. The only recourse for test developers who wish to estimate long-term risk is to actually collect long-term data for 15, 20, or even 25 years. Test developers and users should also fully acknowledge the possibility – suggested here in the different rates reported for the ASRS versus Static-99 and the RM 2000/S – that tabled estimates of long-term recidivism may quickly become obsolete because of changes in rates due to "demographic factors … cultural factors … and criminal justice system factors" (Helmus, Hanson, & Thornton, 2009, p. 38).

One strategy for addressing both of these issues would be to develop "a large, representative, and continuously updated national data base on re-offending" (Mokros, Stadtland, Osterheider, & Nedopil, N., 2010, p. 437). This resource would ideally store recidivism data for a "range of outcomes," and "information from a new cohort of offenders should be added every couple of years, accompanied by the elimination of data for the oldest cohort, so that actuarials can be renormed" (Wollert, 2006, p. 73). The responsibility for pursuing such an initiative lies with the federal government because it has passed statutes for the civil commitment of sexually dangerous persons: It is only logical, given this history, that the government would have an interest in determining the scientific limits of these laws.

It is concerning that the constant multiplier assumption has not been tested since it was first formulated in 1997. We are also concerned that it and other assumptions – such as the combined use of highly selected samples and logistic regression for recidivism

estimation – continue to be promoted by actuarial researchers and used by practitioners on the grounds that they are "mathematically sound" without adequate justification.

The field of sex offender risk assessment, and particularly the subspecialty area that conducts sex offender civil commitment evaluations, stands in great need of critical inquiry, programmatic hypothesis testing, and mathematical analysis. The field also needs to avoid a proliferation of unwarranted assumptions that increases evaluator disagreement and jeopardizes the welfare of evaluees.

Developers of risk assessment systems should therefore collect and report data that clearly validate the assumptions that underpin their actuarial tables before they are disseminated or administered. The APA ethical standards also require forensic evaluators to acknowledge the limitations of their risk assessments when they testify, a practice that is invaluable to the trier of fact.

References

Doren, D. (2008). Empirically-based recidivism risk assessment estimate extrapolations across time and outcome measure. In A. Schlank (ed.)., The Sexually Violent Predator (pp. 18-1 to 18-14). Civic Research Institute.

Hanson, R.K. (1997). The development of a brief actuarial risk scale for sexual offense recidivism. Ottawa, Canada: Public Works and Govt. Services Canada. Retrieved from http://www.psepc-sppcc.gc.ca

Hanson, R. K. & Thornton, D. (2000). Improving risk assessments for sex offenders: A comparison of three actuarial scales. *Law and Human Behavior, 24*, 119-136.

Helmus, L., Hanson, K., & Thornton, D. (2009). Reporting Static-99 in light of new research on recidivism norms. *The Forum*, *21*(1), 38-45. Retrieved from http://www.static99.org/pdfdocs/forum_article_feb2009.pdf

Mokros, A., Stadtland, C., Osterheider, M., & Nedopil, N. (2010). Assessment of risk for violent recidivism through Multivariate Bayesian Classification. *Psychology, Public Policy, and Law, 16,* 418-450. doi: 10.1037/a0021312

Sachsenmaier, S. J. (2010). *The basis for extrapolation in sexual offender risk for recidivism assessment.* Paper presented at Project Safe Childhood Advanced Online Child Exploitation Seminar. Office of Legal Education Executive Office for United States Attorneys, Columbia, SC.

Skelton, A., Riley, D., Wales, D., & Vess, J. (2006). Assessing risk for sexual offenders in New Zealand: Development and validation of a computer-scored risk measure. *Journal of Sexual Aggression*, *12*, 277-286. doi: 10.1080/13552600601100326

Thornton, D. (2007). Scoring Guide for Risk Matrix 2000.9/SVC. Retrieved from http://www.cfcp.bham.ac.uk/Extras/SCORING%20GUIDE%20FOR%20RISK%20MATRIX%202000.9-%20SVC%20-%20(ver.%20Feb%202007).pdf

Thornton, D. (2010a). *Structured Risk Assessment: Using the Forensic Version of SRA in sex offender risk assessment.* Unpublished manuscript.

Thornton, D. (2010b). *Notes for interpreting the SRA-FV Need Assessment.* Unpublished manuscript.

Wollert, R. (2006). Low base rates limit expert certainty when current actuarial tests are used to identify sexually violent predators: An application of Bayes's Theorem. *Psychology, Public Policy, and Law*, *12*, 56-85. doi: 10.1037/1076-8971.12.1.56

Wollert, R. (2007). Poor diagnostic reliability, the Null-Bayes Logic Model, and their implications for sexually violent predator evaluations. *Psychology, Public Policy, and Law*, *13*, 167-203. doi: 10.1037/1076-8971.13.3.167

Wollert, R., Cramer, E., Waggoner, J., Skelton, J., & Vess, J. (2010). Recent research (N=9,305) underscores the importance of using age-stratified actuarial tables in sex offender risk assessments. *Sexual Abuse, 22,* 471-490. doi: 10.1177/1079063210384633

Wollert, R. & Waggoner, J. (2009). Bayesian computations protect sexually violent predator evaluations from the degrading effects of confirmatory bias and illusions of certainty: A reply to Doren and Levenson (2009). *Sexual Offender Treatment*, *4* (1), 1-23. Retrieved from http://www.sexual-offender-treatment.org/index.php?id=74&type=123

Table 1. Long-term Recidivism for Sex Offenders with Above Average ("High") versus All Other ("Low") Scores on Static-99, the Risk Matrix 2000/s, and the ASRS.

Scores	Number of recidivists	Number of non-recidivists	Total	Recidivism rate
On Static-99 (for 15 years):				
High	175	244	419	.42
Low	96	571	667	.14
On the Risk Matrix 2000/s (for 15 years):				
High	78	98	176	.44
Low	38	215	253	.15
On the ASRS (for 20 years):				
High	83	175	258	.32
Low	50	390	440	.11

Table 2. 5-Year Recidivism for Sex Offenders with Above Average ("High") versus All Other ("Low") Scores on Static-99, the Risk Matrix 2000/s, and the ASRS.

Scores	Number of recidivists	Number of non-recidivists	Total	Recidivism rate
On Static-99:				
High	132	287	419	.32
Low	57	610	667	.09
On the Risk Matrix 2000/s:				
High	59	117	176	.34
Low	25	228	253	.10
On the ASRS:				
High	64	194	258	.25
Low	27	413	440	.06