

The dynamic prediction of criminal recidivism: A three-wave prospective study

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This study examined the ability of dynamic risk assessment to predict adult criminal recidivism. A three-wave, prospective, research design involving 136 male offenders about to be released from federal institutions in the Ontario region was used. While static measures were assessed only once, prior to release, dynamic measures were assessed on three separate occasions: pre-release, 1 month post-release, and 3 months post-release. As predicted, the study found that the strongest time-dependent dynamic model outperformed the strongest static model in terms of predicting general revocation (81% vs. 85% predictive accuracy). However, the greatest predictive accuracy (89%) was achieved when both static and time-dependent dynamic measures were included.

Assessing an offender's risk to recidivate upon release from prison is one of the most important functions of a correctional organization. Traditionally, assessment protocols have included two types of risk factors: static and dynamic. Static risk factors are constant and unchanging, thus not amenable to treatment (such as, criminal history). In contrast, dynamic risk factors can change, and consequently are amenable to treatment (such as, criminal attitudes, criminal associates, employment, substance abuse).

To date, a considerable body of research has accumulated demonstrating the ability of dynamic risk factors to predict adult criminal recidivism. However, the vast majority of these studies have relied exclusively on "single-wave" research designs that assess dynamic risk factors only once, for example, prior to release. The assessment results are then used to predict criminal recidivism. Dynamic risk prediction studies have rarely been multi-wave in nature, that is, they have rarely examined whether or not recidivism can be successfully predicted from the systematic assessment and re-assessment of dynamic information. Additionally, multi-wave studies that do exist can be characterized by various shortcomings including statistical limitations as well as an over-reliance on retrospective research designs, single-method assessment strategies [for example, the Level of Supervision-Inventory (LSI-R)],⁴ small sample sizes, and provincial offender samples.⁵

Interestingly, despite the lack of research in this area, the systematic assessment and reassessment of dynamic risk has been unconditionally accepted as the desired mechanism for improving the manner in which offenders are supervised in the community. Similarly, contemporary treatment programs for sex offenders and more recently, violent offenders, are based largely on the theoretical premise that dynamic variables (such as, mood level, life stressors, high-risk situations) play a significant role in the recidivism process. However, empirical support for this position is weak, based entirely on a scattering of retrospective studies.⁶ As a result, the main objective of the study was to advance the theoretical development and practical utility of the assessment and reassessment of dynamic variables. Specifically, it examined whether the assessment and reassessment of prospectively rated dynamic risk measured while an offender is under community supervision can aid parole officers in the day to day management of offenders under community supervision.

Theoretical framework

The coping-relapse model of criminal recidivism provided the theoretical framework for the study. This theory seeks to explain the resumption or maintenance of criminal behaviour rather than its origins. The model posits that the recidivism process begins with a precipitating environmental trigger. This event can be highly variable ranging from chronic life stressors such as marital discord, job loss, or financial stress to relatively mundane daily hassles such as having to deal with crowded public transportation systems. Once the environmental trigger has occurred, the individual will invoke both a cognitive and emotional appraisal of the situation. Individuals who perceive the situation as threatening or problematic typically experience negative emotions (hostility, anger, fear), an elevated level of perceived global stress (such as, "I have no control over my life") and, lastly, some awareness regarding the severity of the environmental trigger(s). This in turn results in an attempt to deal with the situation, but given that most offenders are ineffective at coping with the original situation it will not be remedied. What follows is a worsening cycle of negative

emotions, maladaptive cognitions, and eventually the resumption of criminal conduct. The model further posits that whether or not an individual will initially experience an environmental trigger(s) or perceive a situation as threatening or problematic is mediated through two subsets of factors: individual influences and available response mechanisms.

Individual influences are relatively stable and include factors such as criminal history and enduring life traits (such as, temperament, emotional reactivity). These factors are indicative of an individual's propensity to react to and interpret situations in a maladaptive manner. One promising measure of this domain is Hare's Psychopathy Checklist-Revised (PCL-R). In contrast, available response mechanisms are more dynamic in nature, albeit not as labile as environmental triggers. They are best conceptualized as slow-changing behaviour patterns that may serve as treatment targets. The available response mechanism subset includes variables such as coping ability, substance abuse, criminal attitudes, criminal associates, social support, and motivation. Lastly, the theory proposes that the process is continuous and interactive such that each response generates a new sequence of events resulting in another precipitating situation, another appraisal, and eventually, another response (see Figure 1).

Methodology

One hundred and thirty-six male offenders about to be released from minimum-, medium- or maximum-security federal institutions located in Ontario participated in the study. Offenders were selected to participate if they consented to take part; they were scheduled to be released on either parole or statutory release within 45 days of the initial pre-release

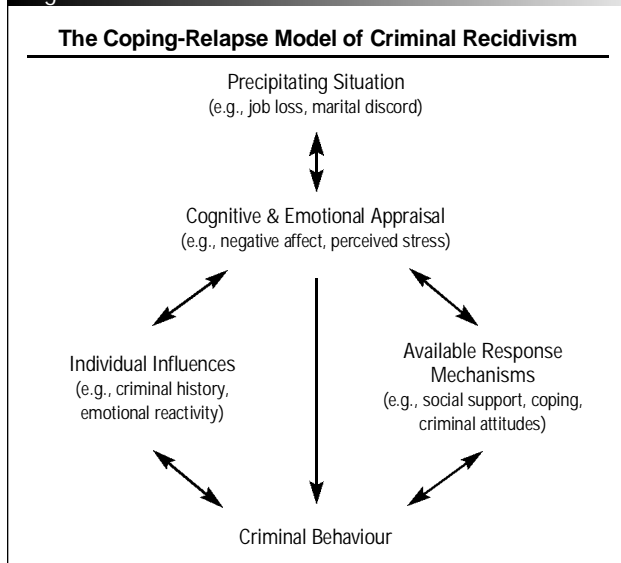
assessment; they understood English; they were neither actively psychotic nor eligible for deportation; and lastly, they would not reach warrant expiry for at least six months from the date of release. This final criterion was necessary to ensure that participants would be relatively easy to contact in the community once released, given that they would be required to report to a parole officer until they reached the end of their sentence.

The medium age of the sample was 33 years. On average, each offender was serving a four-year sentence for a variety of criminal offences including homicide, assault, sexual assault, robbery, drug offences, and property-related crimes. While 54.4% of the sample were released on parole, 45.6% were released on statutory release. Approximately two-thirds of the sample was Caucasian, while the remaining one-third was comprised of Black (15.4%), Asian (4.4%), Aboriginal (4.4%) or classified as Other (7.4%). Two-thirds of the sample was single at the time of release.

Each offender was initially assessed within 45 days of release. This assessment was subsequently followed by up to two additional assessments conducted after the offender was released to the community. The community assessment waves occurred at one and three-month post-release intervals, providing of course that the offender's release had not yet been revoked. Participation in the study was terminated once release had been revoked or the three-month data collection wave had been successfully completed. Unfortunately, community-based data were unavailable for approximately 20% of the participants who withdrew consent after release.

Currently, there is no single reliable and validated measure of the coping relapse model. As a result, a combination of pre-existing and newly developed static and dynamic measures were used to assess the various components of the model. Additionally, the study used a multi-method assessment process that involved interviews, file reviews, and self-report questionnaires. For example, a number of interview and file based measures such as the Problem Survey Checklist,⁷ the Perceived Problem Index,⁸ the Social Support Scheme,⁹ the Coping Situations Questionnaire¹⁰ and the Expected Value of Crime Questionnaire¹¹ were used to assess criminal associates, social support (number and quality of individual support systems), coping ability (ability to problem solve effectively), employment (positive attitudes towards employment, employment stability), marital stability, accommodations, financial management, leisure activities, health (physical & mental), parole supervision compliance, substance abuse, and expected value of crime. Similarly, a number of self-report questionnaires were used to assess

Figure 1



negative affect (angry, depressed), positive affect (happy, relaxed), perceived stress (“How often have you been able to control irritations in your life?”; “How often have you felt that you were on top of things?”), and criminal self-efficacy (for example, “If someone I knew wanted a score done, they would probably ask for my help”).

Results

Overall, 36.8% of the sample (50/136) was revoked during the follow-up period that ranged from 3 months to 19.2 months ($M = 10.2$, $SD = 3.9$). Approximately, one half of the revocations were for purely technical reasons (e.g., substance abuse violation, curfew violation) while the others were for new criminal charges and/or convictions.

The first phase of the analysis focused on determining whether or not the dynamic measures actually changed for individuals who were not revoked during the study period. The results indicated that these individuals demonstrated a steady decline in employment problems, marital support, financial problems, perceived global stress, perceived problem level, negative affect, criminal association, and substance abuse during the first three months of release. Similarly, successful releases not only demonstrated steady improvements in coping ability and social support but they were also able to generate a greater number of negative, crime-related consequences as the length of time in the community increased.

Unexpectedly, leisure-related problems actually increased during the first three months of release among the successes. At this stage it is difficult to explain this counter-intuitive result. However it is possible that it may simply be a measurement artifact. Prior to release, evidence for leisure problems was coded based on whether or not the offender expected to have leisure-related problems. In the community, evidence for leisure problems was based on whether or not the offender was actually experiencing difficulties in this area. More research is needed to further investigate this finding.

The successful cases also demonstrated an increased awareness regarding the positive consequences of crime (for example, make money) as the length of time in the community increased. This finding is somewhat counterintuitive given that one would expect that the positive consequences of crime would become less and less apparent as the amount of time an individual remains crime-free increases. However, alternatively, it is possible that individuals living a prosocial lifestyle, assumably working in a conventional job earning a conventional salary are acutely aware of the benefits of crime, namely fast and easy money accompanied by less responsibility.

This hypothesis is highly speculative in need of further validation. Lastly, it is important to note that the successful releases did not experience significant changes in accommodation problems, health problems, positive affect, criminal self-efficacy, or supervision compliance during the first three months of release.

The next phase of the analysis focused on identifying factors that distinguished successful releases from failures. Specifically, the relationship between static measures and revocation (with or without an offence) was examined. Similarly, the relationship between changes in dynamic measures and revocation was also explored. Two primary statistical analyses were used to accomplish this objective, Cox Regression Survival Analysis and Receiver Operator Characteristic analysis (ROC). Survival analysis is a statistical technique that estimates the time taken to reach some event (such as, revocation) as well as the rate of occurrence of that event. Cox Regression Survival Analysis is unique in that it allows the researcher to compare a number of variables simultaneously in terms of their ability to predict how long it will take to reach some event (i.e., survival time). It can also readily incorporate information about how variables change over time into the analysis.

A series of individual Cox Regression Survival Analyses demonstrated that all three static measures, the Statistical Information on Recidivism Scale (SIR-R1), the Hare Psychopathy Checklist — Revised (PCL-R) and recent prison misconducts were significantly related to survival time ($p < .05$). Similarly, for most of the dynamic measures that demonstrated significant change, this change was also significantly predictive of survival time ($p < .05$). Individuals who demonstrated improvements in coping ability, social support, and the ability to recognize the negative and positive consequences of crime were significantly less likely to fail than individuals who did not demonstrate similar improvements. Similarly, individuals who evidenced a decline in employment problems, marital support, perceived global stress, perceived problem level, negative affect, and substance abuse were less likely to fail than individuals who did not demonstrate comparable changes. Interestingly, changes in financial matters, leisure activities, and criminal associates were not related to survival time.

Although the majority of the predictor variables were statistically significant, further analyses revealed that only the following variables were particularly robust predictors of survival time: SIR-R1, prison misconducts, employment problems, marital support, negative affect, perceived problem level, substance abuse, social support, and expected positive consequences of crime.

ROC analysis was used to assess how accurate these variables were at predicting revocation. Specifically, three separate models were compared:

- static measures: SIR-R1 and prison misconducts;
- time-dependent dynamic measures: employment problems, marital support, negative affect, perceived problem level, substance abuse, social support and expected positive consequences of crime; and
- static and dynamic measures combined.

Briefly, ROC is an unbiased statistical technique that assesses the ability of a prediction method or person to accurately forecast a particular outcome. The primary statistical index of interest generated from ROC analysis is the Area Under the Curve (AUC). AUC values can range from .50 to 1.00, with higher values representing higher degrees of predictive accuracy. A value of .50 for example, is equivalent to the predictive accuracy that would be associated with tossing a coin: 50% of the time you would be right and 50% of the time you would be wrong. Conversely, an AUC of 1.00 is associated with 100% predictive accuracy.¹² AUC values can also be interpreted as the probability of correctly selecting a recidivist when asked to do so from a pair of individuals: a recidivist and a non-recidivist.

As Table 1 illustrates, each model examined in the present study generated AUCs that exceeded an 80% accuracy rate. While the static model was able to generate an AUC of .81, the dynamic model performed better (AUC = .85), although the difference was not statistically significant. Additionally, given that the confidence intervals overlapped substantially, one could argue that the static and dynamic models performed equally well.¹³ However, the performance of the combined static and dynamic model was notably (AUC = .89) better than the static model ($p < .05$). Although once again the confidence intervals overlapped, however, the extent of the overlap was not as extreme as in the previous case.

Table 1

Receiver Operator Characteristic (ROC) Predictive Accuracy Results: Area under the curve (AUC) and corresponding confidence intervals

Prediction Model	Area under the curve (AUC)	95% Confidence Intervals
1. Static model	.81	.73 – .88
2. Dynamic model	.85	.77 – .91
3. Static & dynamic model	.89	.81 – .93

*Note. Static model = Statistical Information on Recidivism Scale (SIR-R1) & prison misconducts.
Dynamic model = employment problems, marital instability, negative affect, perceived problem level, substance abuse, social support, expected positive consequences of crime*

Conclusion

To date, state of the art assessment protocols typically generate predictive accuracy rates in the range of 70 to 80%. This study demonstrates that we can improve our current accuracy rates by incorporating information about how dynamic factors change over time. Additionally, the study also underscores the importance of dynamic factors generally targeted within conventional relapse prevention frameworks, variables (e.g., negative affect and perceived problem level) generally not found in standard risk/needs assessment protocols. Furthermore, the study highlights the benefit of not only knowing an offender's weaknesses but also his/her strengths (e.g., social support). Lastly, it is important to emphasize that while the accurate assessment of both static and dynamic factors is necessary to facilitate the safe reintegration of offenders it is not wholly sufficient. Risk assessment must also guide individualized treatment programs and risk management strategies in order to maximize its utility. ■

¹ Extract of Brown, S. *The dynamic prediction of criminal recidivism: A three-wave prospective study*. Doctoral Thesis. Kingston, ON: Queen's University.

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⁴ Andrews, D. A., and Bonta, J. (1995). *The Level of Service-Inventory (LSI-R)*. Toronto, ON: Multi-Health Systems, Inc.

⁵ For a detailed review of previous multi-wave outcome studies please see *The prediction of adult criminal recidivism: A three-wave prospective research design*. Unpublished doctoral dissertation. Kingston, ON: Queen's University.

⁶ Pithers, W. D., Kashima, K. M., Cumming, G. F., Beal, L. S., and Buell, M. M. (1988). Relapse prevention of sexual aggression. In R. A. Prentky, & V. L. Quinsey (Eds.), *Human sexual aggression: Current perspectives* (pp. 244-260). New York, NY: New York Academy of Science.

⁷ Brown, S. L., and Zamble, E. (1998). *Problem Survey Checklist*. Unpublished Test. Queen's University, Kingston, ON.

⁸ Zamble, E. (1998). *Perceived Problem Index*. Unpublished Test. Queen's University, Kingston, ON.

⁹ Brown, S. L., and Zamble, E. (1998). *Social Support Scheme — Version 1*. Unpublished Test. Queen's University, Kingston, ON.

¹⁰ Zamble, E. (1989). *Coping Situation Questionnaire*. Unpublished Test. Queen's University, Kingston, ON.

¹¹ Harris, A. R. (1975). Imprisonment and the expected value of criminal choice. *American Sociological Review*, 40, 71-87.

¹² AUCs were derived from output generated during the survival analysis. For more information contact the author.

¹³ Confidence intervals represent the range of values that is likely to contain the statistical estimate of interest within a given probability level. For example, if the AUC is .81 and the corresponding 95% confidence interval is .73 – .88 this means that each time we replicated our study using a different sample selected from the same population, 95% of the time our obtained AUC value will range between .73 and .88.