An Examination of Predictive Validity and Change in Risk Factors for Stalking over Time

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This study investigates the predictive validity of two risk instruments for stalking, the Guidelines for Stalking Assessment and Management (SAM) and the Stalking Risk Profile (SRP), in a sample of 86 forensic psychiatric patients. We compare these tools against a well-validated violence risk assessment measure (Historical, Clinical, Risk Management-20, Version 3 (HCR-20V3)) for violent and stalking-related outcomes. Dynamic (mutable) components of each tool were rated at three annual intervals and revealed significant change across time. The HCR-20V3, SAM, and SRP measures showed comparable ability to classify those who recidivated with further stalking from those who did not (area under the curves = .72–.73, $P < .001$). Time-varying scores from the dynamic subscales of the HCR-20V3 and SAM contributed significantly to the prediction of stalking, whereas nonstalking violence was primarily forecast by the static (Historical) scale of the HCR-20V3. This suggests comparable validity of general violence and stalking risk tools for assessing the risk of stalking in forensic patients. Stalking-specific risk factors on the SAM and SRP will likely be of added clinical value in terms of tailoring risk management and treatment plans. Findings also emphasize the importance of attending to changes in risk status over time and incorporating time-sensitive methodologies into predictive models.

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Stalking is a crime that refers to repeated and unwanted communication with, following, or approaching other people in a manner that causes fear or concern.[1,2] Stalking victimization results in considerable psychological and social damage, irrespective of the presence or absence of physical harm,[3–5] and longer durations of stalking are found to be associated with greater psychiatric morbidity and a higher likelihood of physical harm to the victim.[3,6] Estimating both the prevalence of stalking and the likelihood of persistence is therefore important and is highlighted by high rates of reoffending (upwards of 50–60% within one year) among groups of stalking offenders.[7–9]

Stalking behaviors are also diverse in terms of the motives involved and the nature of the relationship with the victim. Stalking can be driven by themes of love and reconciliation, revenge, or predation,[10,11] and in some cases, motivated directly by symptoms of psychosis or other major mental disorders.[12,13] Victims are frequently former intimate partners, but are not infrequently family members, care providers, acquaintances, or strangers.[14–16] This diversity presents challenges in the context of risk assessment, as there are heterogeneous behaviors, motives, and relationships to capture within a single instrument.

Assessing Risk for Stalking

The past three decades have witnessed significant advancements in violence risk assessment.[13,17,18] Empirically supported risk factors for violence include static, or stable, historical variables (e.g., male gender, young age at first offense, history of substance use, or relationship problems), as well as dynamic, or

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theoretically modifiable, factors (e.g., active psychiatric symptoms, substance use, insight, mood, and treatment compliance).[19]

Many accepted definitions of interpersonal violence (e.g., "actual, attempted, or threatened harm to a person or persons" (Ref. 20, p 2)) would include stalking. Risk factors associated with stalking, however, are not necessarily the same as those for general violence,[21,22] and stalking recidivism rates appear elevated in comparison to rates of general or nonstalking violent reoffending among justice-involved persons in the community.[7–9] This raises the question of whether widely used violence risk assessment tools such as the Historical, Clinical, Risk Management-20 (HCR-20[20]) are suitable for assessing stalking risk, or whether there are additional, stalking-specific risk factors that could optimize the accuracy of risk estimates in this population. Greater knowledge of the dynamic (i.e., mutable) components of risk, including risk for stalking-related violence, is also needed. Given the high rates of persistence and recurrence that define the stalking episodes of some offenders (see Refs. 7 and 23, for example), attending to changes in risk status over time may be particularly important to evaluating stalking risk and focusing treatment effectively. The value of attending to changes in dynamic risk factors over time in relation to general violence has been well-documented.[24–26]

Two structured professional judgment (SPJ) tools have been developed to assess stalking risk: the Guidelines for Stalking Assessment and Management (SAM)[27] and the Stalking Risk Profile (SRP).[28] To date, six studies have examined the reliability and validity of the SAM. Three studies reported good to excellent interrater reliability (intraclass correlation coefficient $[ICC]_1$ = .63–.92) for the subscales on the SAM (i.e., the nature of stalking behavior, perpetrator risk factors, and victim vulnerability factors).[29–31] Reliability was somewhat weaker for the summary risk ratings (SRRs), which are overall judgments of low, moderate, or high risk for case prioritization (the level of effort or intervention required to prevent future stalking), continued stalking (risk that stalking will persist in any form), and serious physical harm (risk that stalking may involve lethal or life-threatening violence) (ICC_1 = .39–.71).

Predictive validity was assessed in three studies. Foellmi *et al.*[32] examined the SAM prospectively for 89 individuals convicted of stalking or harassment for an average of two and a half years (base rate of stalking recidivism = 34.8%), finding that SAM total and subscale scores modestly predicted stalking (hazard ratios [HR] = 1.11–1.15, $P < .05$) but not violence. The SRRs did not discriminate those who recidivated from those who did not. Shea[33] retrospectively scored the SAM on a sample of 146 individuals (90.4% men) charged with stalking-related offenses and referred to a community mental health program, finding that the SRR for continued stalking discriminated those who recidivated from those who did not (base rate of stalking = 30.1% over a median 320-week follow-up; area under the curve (AUC) = .76). Among Canadian offenders with mental illness (N = 100), Coupland *et al.*[34] found nonsignificant associations between the SAM SRRs and stalking at 5-, 10-, and 20-year follow-ups (base rate = 45.0%) but found some support for the predictive validity of individual SAM risk factors, as well as a composite total score of the items (HR = 1.36 at 20 years, $P < .01$).

Empirical investigations of the SRP are limited. McEwan *et al.*[35] followed a sample of 241 individuals engaged in stalking (92.3% men) and referred to a community mental health clinic for an average of 212 weeks. Interrater reliability for the domain scores (i.e., risk for stalking violence, persistence, recurrence, and psychosocial damage to the stalker) was satisfactory (ICC_1 = .65–.98), as was the reliability of the overall risk judgments for the domains (ICC_1 = .70–.90). Predictive validity for stalking recidivism (base rate = 26.4%) was good to moderate with AUCs between .68 and .73 depending on which risk judgment was assessed (e.g., risk of persistent stalking, risk of recurrence of stalking).

The Role of Mental Illness

Although rates of personality and substance use disorders are elevated among individuals who stalk, the prevalence of serious forms of mental illness (SMI) such as psychotic and major mood disorders are lower. Nijdam-Jones *et al.*[36] found that 72 percent of individuals convicted of stalking offenses and on probation (N = 137) met criteria for at least one mental disorder and 45 percent met criteria for two or more. Common diagnoses included personality (50%) and substance use (46%) disorders, whereas just 10 percent were found to have a psychotic disorder. In their review of over 1,000 stalking-related legal case files, Mohandie *et al.*[8] found that half (46%) of individuals had some type of psychiatric

diagnosis, whereas 14 percent were psychotic when they engaged in stalking.

Individuals who engage in stalking and have a mental illness may also represent a distinct group in terms of the nature of their stalking behaviors, motivation, and persistence.[23,37,38] Although psychosis typically confers a modest increase in risk for violence,[39,40] among samples of stalking offenders, those with psychotic disorders are generally less likely to perpetrate physical violence or target ex-intimate partners.[8,12,41,42] They are, however, more likely to engage in stalking for longer durations of time[43] and to stalk strangers or acquaintances.[43–45] Despite these findings, there has been little research to validate stalking risk assessment tools in groups characterized by high rates of SMI.

The Current Study

Although stalking is included in the definition of violence in risk assessment tools such as the HCR-20V3, there are no investigations of its ability to forecast stalking behaviors specifically. A handful of studies have examined the reliability and predictive validity of the SAM, with mixed results, whereas the SRP has only a single paper exploring its predictive validity for stalking recidivism. Because of base rate concerns, few studies have been able to investigate either tool's predictive capacity for general or stalking-related violence. Further, studies examining the SAM and SRP have been based on referrals from criminal justice and probation and rates of SMI have been low. The current study addresses these gaps by examining the predictive validity of the HCR-20V3, SAM, and SRP in a population of individuals with SMI with respect to violent and stalking-related outcomes. By using a repeated-measures design, the dynamic utility of these tools is also examined.

Method

Participants and Setting

The sample comprised 86 patients (82.6% male, M_{age} = 36.71, *SD* = 12.30) with a history of stalking who were receiving care from the forensic service of the Centre for Addiction and Mental Health, a large psychiatric hospital in Toronto, Ontario, Canada. The most frequent primary diagnosis was schizophrenia (61.6%), and 90.7 percent of the total sample was diagnosed with any psychotic disorder. Half of patients in the sample (53.5%) had a comorbid substance use disorder, and personality disorders were present in one-third (most commonly antisocial or borderline). Mood disorders were infrequent, with 5.8 percent of the sample diagnosed with bipolar disorder and no instances of major depression.

Most patients in the sample (93.0%) had been found not criminally responsible on account of mental disorder (not guilty by reason of insanity in other jurisdictions) under the Criminal Code of Canada, with the remainder being unfit to stand trial (UST). All forensic patients in Canada are managed under the legal oversight of provincial Review Boards (in Ontario, the Ontario Review Board (ORB)) until they are deemed to no longer represent a significant threat to public safety. The current sample included both inpatients and outpatients, with the understanding that patient status changes over time as patients move from higher to lower levels of security, and eventually into the community under supervision of the ORB.

All patients had a history of stalking that came to the attention of law enforcement. In most cases, this behavior resulted in a charge of criminal harassment. On occasion, the patient was charged with other offenses, though their behavior conformed to the definition of criminal harassment under Section 264(1) of the Criminal Code of Canada. Victims of the index stalking event were most often strangers (43.5%), but included former intimate partners (14.0%), family or friends (8.1%), professional service providers (10.5%), workplace contacts (3.5%), and casual acquaintances (18.6%). The average duration of stalking was six months (*M* = 187.00; *SD* = 229.85; range = 1–990 days), and physical violence was involved in 26.7 percent of stalking offenses.

Study Design

A repeated-measures design was used to assess the direction and magnitude of change in dynamic risk factors for violence and stalking. Risk instruments were coded at three annual intervals preceding each of the outcome collection time points (Fig. 1): baseline (12 months following forensic admission [*M* = 11.01, *SD* = 7.60, range = 0–37 months), and three subsequent follow-up points spaced at 12, 24, and 36 months following the baseline. The design was pseudoprospective, meaning that both the risk assessment instruments and outcomes were coded based on already available information, but the follow-up

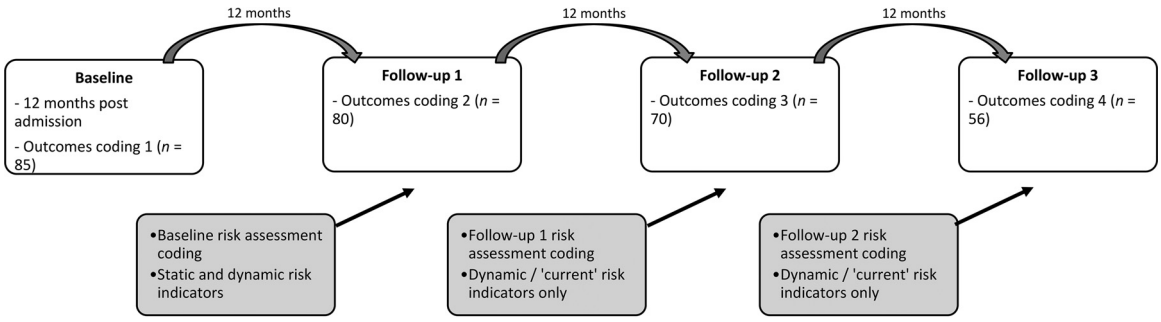

Figure 1. Study design.

period occurred later than the time frame for coding the risk assessment tools. This approach is common in risk assessment research[46] and is a reasonable alternative to a true prospective design if raters are blinded.

Measures

Risk assessment instruments

The Historical, Clinical, and Risk Management-20, Version 3 (HCR-20V3)[19,20] is a validated SPJ tool for assessing and managing violence risk in civil and forensic adult samples. It consists of ten items relating to historical factors (e.g., previous violence, substance use), five items describing current clinical concerns (e.g., insight, treatment compliance), and five items concerning areas for future risk management (e.g., future plans, social supports). Each item is scored on a three-point scale as N (not present), ? (possibly, or partially present), or Y (definitely present) (0, 1, 2, respectively, for research purposes). Three SRRs (for future violence, the imminence of such violence, and serious physical harm) are presented as low, moderate, or high. The current study focused on the first of these SRRs, reflecting the overall risk of violence. Dynamic (mutable) risk factors appear on the clinical (C) and risk management (R) subscales of the HCR-20V3. The entire HCR-20V3 was rated at baseline, while only the dynamic indicators were re-assessed at the two specified follow-up points.

The Guidelines for Stalking Assessment and Management (SAM)[27] is an SPJ instrument designed to assess stalking risk in adults with a history of stalking and considers items in three domains: the nature of stalking behavior, reflecting its pattern, complexity, and severity (10 items; e.g., communicates with, approaches, or intimidates the victim); perpetrator risk factors, reflecting the psychosocial adjustment and background of the perpetrator (10 items; e.g., angry, obsessive, substance misusing); and victim vulnerability factors (not used in the current study as in-depth victim information is typically unavailable). Both the nature of stalking and perpetrator risk factors are coded as previous (related to past patterns of stalking behavior) and current (related to the present or most recent pattern of stalking behavior). For this study, previous ratings reflected the status of the risk factor prior to the 12-month reporting period considered, while current ratings reflected the status of the risk factor during the current 12-month reporting period. This approach of rating items in a time-bounded manner is consistent with Shea *et al.*[33] and enabled a separation of distal versus recent manifestations of risk factors and permitted an examination of change in risk over time. Nevertheless, this represents a departure from the original scoring instructions that consider all behaviors as current so long as they are part of an ongoing stalking situation (but which can pose challenges to the extent that the characteristics of very lengthy but uninterrupted stalking episodes will all be subsumed under current ratings and will miss the opportunity to examine ebbs and flows in risk factors over time).

Like the HCR-20V3, risk factors on the SAM are scored as not present, possibly or partially present, or definitely present, and summary risk ratings regarding case prioritization, risk for continued stalking (same and different victims), and risk for serious physical harm are presented as low, moderate, or high. This study focused on the SRRs for case prioritization and continued stalking of the same victim (just three patients stalked exclusively new victims). All risk factors on the SAM were coded in their previous and current forms at baseline, while the current risk indicators were re-assessed at each follow-up point.

The SRP[28] is an SPJ instrument designed to assess risks associated with stalking. Using Mullen's[47] motivational typology, the first step in scoring is to establish the motivational category of the stalker, defined as the predominant initiating and maintaining motivation (i.e., rejected, resentful, intimacy seeking, incompetent suitor, and predatory). This categorization then informs how the remainder of the tool is scored. Each of four risk domains (i.e., stalking violence, persistence, or recurrence targeting either the same or a different victim), and psychosocial damage to the stalker (the likelihood that persons engaged in stalking will experience significant psychological and social harm related to their behavior) contain general items that apply to all stalkers as well as items that pertain only to specific motivational categories. Except for two dichotomous items, the presence of each SRP factor is rated on a three-point scale: N (absent), ? (possibly, or partially present), or Y (definitely present). The assessor then makes an overall judgment (i.e., SRR) of risk for future stalking violence, stalking behavior (persistence or recurrence, depending on if the individual is still engaging in stalking or not, respectively), and psychosocial damage.

As per McEwan *et al.*,[35] the persistence and recurrence$_{same}$ judgments were combined into a single "future stalking of the same victim" risk judgment (future stalking$_{same}$). Recurrence$_{different}$ judgments were not investigated further because of the low base rate of stalking exclusively new victims in this sample ($n = 3$). All risk factors on the SRP were assessed once, at baseline. Individual domain scores and SRRs were not re-assessed over the follow-up time points as the SRP contains a mixture of ostensibly static and dynamic risk factors and the user's manual does not provide direct guidance as to which should be treated in a static or dynamic manner.

Stalking-related outcomes

Health record information was reviewed at each data collection point (baseline and three follow-ups spaced at 12, 24, and 36 months subsequent to baseline; Fig. 1) to code for the incidence and frequency of stalking, defined as contact of any kind with a prior victim. For new victims, there needed to be a pattern of behavior (2+ contacts) that came to staff attention. Most often these incidents came to light based on victim self-report, but could also be discovered by staff, police, or patient self-report. We separated stalking behaviors that were carried out in person (e.g., visiting the victim's home) from those that were carried out via other means (e.g., contacting the victim by phone or social media), as well as incidents of physical or sexual violence against a previous stalking victim or associated persons. Because of sample size and base rate considerations, all stalking-related outcomes were collapsed into an overall count variable reflecting the number of new stalking incidents over the study window, and, as is common in recidivism study designs, this variable was dichotomized for the purposes of the Cox regression models described below.

Nonstalking related outcomes

Outcomes reflecting nonstalking violence (e.g., assaulting or threatening a nonstalking victim), medication noncompliance, substance use, and readmission to hospital were coded from the health record at the same time points as the stalking-related outcomes described above. Given that medication noncompliance and substance use are risk factors on the HCR-20V3, SAM and SRP, these were not included in the predictive models. The stalking and nonstalking violence outcomes were operationalized to be mutually exclusive events for the predictive validity analyses. Our third outcome, readmission to hospital, could occur independently of these other outcomes, although a new incident of stalking or violence in the community could also prompt readmission.

Procedure

As noted, the ORB oversees all people found not criminally responsible on account of mental disorder or UST and annually reviews the status of every person under its jurisdiction. For each annual hearing, a psychiatric report is provided, and the ORB hears evidence and produces a Reasons for Disposition document. These two documents were used to code the risk assessment measures used in this study. They are comprehensive and reference collateral and professional sources (e.g., family, police, and previous or current treatment providers).

All coding was carried out by the second author (R.U.), a forensic psychiatrist familiar with SPJ tools and the stalking risk assessment literature, and formally trained in the use of the HCR-20V3 and SAM (training in the SRP was unavailable outside of Europe and Australia at the time). All outcomes were coded in a time-bounded and chronological order, such that the coder was blinded to all outcomes for that particular coding window and the subsequent

Table 1 Prevalence of Outcomes Following Forensic Admission

	One year ($n = 86$)		Two years ($n = 80$)		Three years ($n = 70$)		Four years ($n = 56$)		All time periods ($n = 86$)	
Outcome variable[a]	*n*	%	*n*	%	*n*	%	*n*	%	*n*	%
Stalked previous victim	14	16.3	8	10.0	10	14.3	6	10.7	23	26.7
Stalked new victim	7	8.1	7	8.8	5	7.1	3	5.4	13	15.1
Stalking recidivism (any)	19	22.1	14	17.5	13	18.6	9	16.1	30	34.9
Nonstalking violence	10	11.6	11	13.8	5	7.1	5	8.9	22	25.6
Medication noncompliance	26	30.2	13	16.3	15	21.4	15	27.3	42	48.8
Substance use	10	11.6	11	13.8	11	15.7	10	17.9	24	27.9
Rehospitalization[b]	11	44.0	9	23.1	11	25.6	11	33.3	28	32.6

[a] All outcomes were coded from the health record and Ontario Review Board disposition documents at each time point.
[b] Of the 25, 39, 43, and 33 individuals with some duration of community tenure during these periods, respectively.

one(s), but not the previous one(s) (e.g., the outcomes coded at the first follow-up would be known to the coder when scoring the subsequent risk indicators at the second and third follow-up periods). This procedure was adopted to reflect how the tools are used in actual practice. This was also necessary as all subsequent scoring of the risk indicators would otherwise be based on the same clinical information, and would not allow for an examination of change over time.

Interrater reliability was assessed by having an additional rater (S.P.) independently score 12 cases. Because of the archival nature of the data, direct patient consent was not required. The study was approved by the Centre for Addiction and Mental Health ethics review board prior to the commencement of data collection.

Data Analysis

We calculated descriptive statistics to examine the prevalence of stalking and nonstalking outcomes during each discrete follow-up period and over the entire study window. We then assessed the direction and magnitude of change in dynamic (current) risk indicators across the three data collection points via dependent *t*-tests, and presented the proportions of the sample exhibiting positive, negative and no change on each scale. Classification accuracy for each tool for each dichotomized outcome (any new stalking, violence, or rehospitalization event) was evaluated using chi-square analyses and receiver operating characteristic curves. Cox proportional hazards regression was then conducted to test the predictive efficacy of the baseline static and dynamic risk indicators on each tool. Incremental utility of the dynamic indicators was tested by entering the static scales in the first block of the model, followed by the dynamic scales and observing the change in model fit. Separate models were run for each outcome, and the model predicting rehospitalization was restricted to patients with at least one period of community tenure during follow-up.

Finally, we extended the Cox model to include time-dependent covariates to investigate the utility of change in dynamic risk indicators in the context of predicting outcomes. The Cox model readily incorporates time-dependent covariates (variables whose values change over time) by measuring the hazard of the event at each time point and allowing it to depend on the value of the covariate at that measurement point.[48] All analyses were conducted using IBM SPSS Statistics 25 for Windows.

Results

Descriptive Statistics

As seen in Table 1, over one-third of the sample engaged in stalking behaviors with a previous or new victim. Of those patients who engaged in stalking, all but one did so on multiple occasions ($M = 2.80$; $SD = 6.60$; range = 0–40 events). Stalking events carried out via nondirect or remote means ($M = 2.31$; $SD = 6.28$) were more common than direct, in-person, forms ($M = .49$; $SD = 1.30$). One-quarter (25.6%) of the sample engaged in nonstalking related violence over the study window ($M = .68$; $SD = 1.46$; range = 0–6 events), while approximately one-third were readmitted to hospital on one or more occasions ($M = 1.29$; $SD = 2.41$; range = 0–12 events). We found elevated rates of medication noncompliance (48.8%) and substance use (27.9%) among patients in this sample.

Internal consistency, means, and standard deviations for each risk assessment tool appear in Table 2. As reported in Table 2, intraclass correlation coefficients ($ICC_{A,1}$) revealed excellent reliability for the

Table 2 Internal Consistency and Descriptive Statistics

	$ICC_{A,1}$/Kw (95% CI)	α	Risk coding (baseline)	Risk coding follow-up 1	Risk coding follow-up 2	Diff Paired *t* (Cohen's *d*)[a]
			M (SD)			
HCR-20V3						
Historical	.90 (.19, .98)	.75	13.26 (3.90)	—	—	—
Clinical	.94 (.42, .99)	.73–.82	6.76 (2.47)	5.05 (2.93)	4.93 (3.09)	**4.30 (.53)**
Risk management	.85 (.72, .98)	.57–.63	3.22 (1.50)	3.49 (1.69)	3.46 (1.85)	−1.47 (−.18)
Total	.86 (.74, .98)	.76	23.24 (5.72)	—	—	—
			% low / moderate / high			
SRR $_{\text{Future violence}}$	.68 (.26, 1.0)	—	36.0 / 40.7 / 23.3	56.0 / 21.3 / 22.7	32.8 / 37.3 / 29.9	z = −.72–.43
			M (*SD*)			
SAM						
Previous – Nature of stalking	.92 (.65, .98)	.44	13.63 (3.46)	—	—	—
Previous – Perpetrator factors	.98 (.93, .99)	.13	14.38 (2.47)	—	—	—
Current – Nature of stalking	.88 (.49, .97)	.80–.86	1.99 (3.52)	1.79 (3.63)	1.52 (3.17)	0.99 (.12)
Current – Perpetrator factors	.96 (.88, .99)	.61–.74	10.13 (3.33)	8.85 (4.10)	8.54 (4.36)	**3.78 (.47)**
			% low / moderate / high			
SRR $_{\text{Same victim}}$	.76 (.35–1.0)	—	39.5 / 41.9 / 18.6	44.0 / 36.0 / 20.0	43.3 / 37.3 / 19.4	z = −0.47–0.57
SRR $_{\text{Case prioritization}}$	.79 (.50–1.0)	—	36.3 / 43.8 / 19.9	42.1 / 35.7 / 22.2	39.2 / 37.4 / 23.4	z = −0.40–0.27
			M (*SD*)			
SRP						
Stalking violence	.75 (.48–.92)	.56–.59[b]	—	—	—	—
Recurrence	.75 (.39–.97)	.39–.52[b]	—	—	—	—
Persistence	.77 (.62–.99)	.66–.71	—	—	—	—
Psychosocial damage	.68 (.47–.98)	.47–.66	—	—	—	—
			% low / moderate / high			
SRR $_{\text{Stalking violence}}$	.31 (.00–.80)	—	93.1 / 6.9 / 0.0	—	—	—
SRR $_{\text{Future stalking same (Persistence + Recurrence same)}}$	.74 (.47–1.0)	—	42.5 / 39.1 / 18.4	—	—	—
SRR $_{\text{Psychosocial damage}}$	.60 (.10–.91)	—	28.7 / 44.9 / 26.4	—	—	—

Typology	Incompetent	Intimacy Seeking	Rejected	Resentful	Predatory
n (%)	1 (1.1)	40 (40.6)	12 (13.8)	30 (34.5)	4 (4.6)

HCR-20V3 = Historical, Clinical, Risk Management-20, Version 3. Maximum/minimum values = 0–20 (H), 0–10 (C & R). SAM = guidelines for Stalking Assessment and Management. Maximum/minimum values = 0–20 (Nature of stalking), 0–20 (Perpetrator risk factors). SRP = Stalking Risk Profile. SRR = Summary risk rating. $ICC_{A,1}$ = intraclass correlation coefficient, single measure (absolute agreement). Kw = weighted kappa.
Bolded items: $p \leq .001$.
[a] Difference scores calculated as the difference between the last follow-up and baseline risk scores.
[b] Scale reliability calculated on those items common across motivational types (n = 12 for Stalking violence; n = 4 for Recurrence). The Persistence (12 items) and Psychosocial damage (11 items) scales contain the same items across each typology.

subscale scores on the HCR-20V3 and SAM, and satisfactory concordance for the SRRs on these tools (assessed via weighted kappa [Kw]). ICC and Kw values were lower for the SRP but within the acceptable range, with the exception of the stalking violence SRR. Both raters agreed on all 12 cases regarding the typology of the stalker, permitting interrater reliability to be computed on the domain scores.

Alongside moderately elevated subscale scores on the HCR-20V3, there was a fairly uniform distribution in the SRRs across low, medium, and high risk categories, as well as stability in the proportion of patients rated as high risk over the three measurement intervals. There was a comparable distribution and stability in risk judgments for the SAM and SRP, but with fewer patients judged to be at high

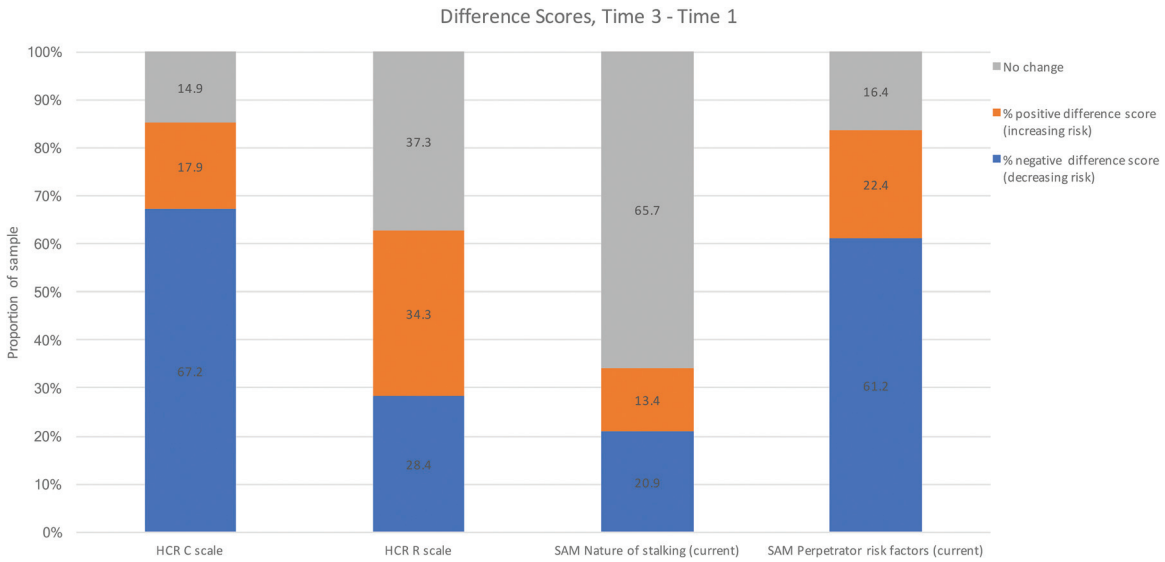

Figure 2. Change in dynamic risk scores over time.

risk for less frequently occurring outcomes (i.e., stalking-related violence). Examination of the mean subscale scores on the SAM revealed comparably lower scores on the current nature of stalking scale compared with the current perpetrator risk factors, reflecting that some patients were not engaged in stalking during the follow-up.

Results from dependent *t*-tests examining change in dynamic risk from baseline to the last follow-up (Table 2) demonstrated a decline in the C subscale of the HCR-20V3 (t [66] = 4.30, $P < .001$; Cohen's $d = .53$), signaling decreasing risk in clinical domains such as insight, active symptoms of illness, instability, and treatment adherence. There were no differences in the proportion of patients rated as low, moderate, or high risk on the HCR-20V3. Results also showed a decline in the current perpetrator risk factors appearing on the SAM (t [66] = 3.78, $P < .001$; Cohen's $d = .47$). As with the HCR-20V3, there were no significant changes in the proportion of patients rated as low, moderate, or high risk on the SAM over time. As depicted in Figure 2, a portion of the sample showed increases (i.e., worsening) in dynamic risk scores over time, while some showed decreases or no change. Domain scores on the SRP cannot be investigated in this manner because of

Table 3 Classification Accuracy Statistics for the HCR-20V3, SAM, and SRP Measures

	Stalking ($n = 80$)	Violence ($n = 80$)	Rehospitalization ($n = 65$)
	AUC (95% CI)		
HCR-20V3			
H scale	.54 (.39, .70)	.77 (.66, .87)[b]	.67 (.54, .80)[a]
C scale	.62 (.48, .77)	.67 (.52, .83)[a]	.61 (.47, .75)
R scale	.65 (.52, .78)[a]	.59 (.45, .74)	.65 (.52, .79)[a]
$SRR_{Future\ violence}$	.72 (.59, .86)[b]	.49 (.34, .65)	.58 (.43, .73)
SAM			
Previous – nature of stalking	.45 (.32, .58)	.48 (.34, .62)	.41 (.27, .55)
Previous – perpetrator risk factors	.63 (.50, .76)	.73 (.62, .85)[b]	.68 (.54, .81)[a]
Current – nature of stalking	.71 (.58, .84)[b]	.53 (.38, .67)	.65 (.51, .78)[a]
Current – perpetrator risk factors	.69 (.55, .83)[b]	.65 (.50, .80)[a]	.63 (.49, .76)
$SRR_{same\ victim}$	.73 (.61, .86)[b]	.52 (.37, .67)	.59 (.45, .74)
$SRR_{case\ prioritization}$	.72 (.60, 84)[b]	.54 (.38, .67)	.58 (.42, .71)
SRP			
$SRR_{future\ stalking\ same}$ (persistence + $recurrence_{same}$)	.72 (.59, .85)[b]	.53 (.39, .68)	.61 (.47, .76)

AUC = area under the curve.
[a] $p \leq .05$.
[b] $p \leq .01$.

Table 4 Cox Proportional Hazard Regression Testing the Predictive Validity of the HCR-20V3 Static and Dynamic Risk Indicators

	Stalking			Violence			Rehospitalization		
	β	SE	HR (95% CI)	β	SE	HR (95% CI)	β	SE	HR (95% CI)
Step 1									
H scale	.01	.05	1.01 (.92, 1.11)	.17	.06	1.19 (1.06, 1.34)[b]	.09	.05	1.09 (.99, 1.20)
Step 1									
H scale	−.01	.06	.99 (.89, 1.11)	.17	.07	1.19 (1.04, 1.34)[b]	.13	.06	1.14 (1.02, 1.27)[a]
C scale	.06	.11	1.06 (.86, 1.30)	.06	.11	1.07 (.86, 1.34)	−.14	.10	.87 (.72, 1.05)
R scale	.27	.16	1.31 (.95, 1.81)	.17	.19	1.19 (.83, 1.71)	.34	.16	1.40 (1.03, 1.92)[a]

HR = Hazard ratio. All scores reflect baseline ratings.
Model results: Stalking: χ^2 (3, n = 80) = 5.37, p = .15. Violence: χ^2 (3, n = 80) = 11.50, p = .009. Rehospitalization: χ^2 (3, n = 65) = 7.55, p = .05.
[a] $p \leq .05$.
[b] $p \leq .01$.

differing, typology-specific items that contribute to each scale.

Predictive Validity

Table 3 presents classification accuracy (AUC) values for the HCR-20V3 and SAM, as well as the SRRs from all three measures. All scores reflect baseline ratings. As seen, current risk factors on the SAM related to the perpetrator and the nature of stalking showed significant associations with future stalking. In contrast, historical/static risk factors on the HCR-20V3 (H subscale) and SAM (previous perpetrator factors) had the largest associations with nonstalking violence, and to a lesser extent, rehospitalization. The SRRs on the HCR-20V3 (future violence), SAM (risk of stalking same victim, case prioritization), and SRP (combined persistence and recurrence with same victim risk judgments) were significantly related to stalking. A greater proportion of patients rated as high risk (77.8, 75.0, and 75.0% on the HCR-20V3, SAM, and SRP, respectively) engaged in stalking over the follow-up period compared with low risk (20.1, 16.1, and 18.2%) patients (χ^2 [2, N = 80] = 21.75, 17.37, 16.89, $P < .001$). This corresponded to sensitivity (true positive) values of 53.9, 50.0, and 46.2 percent for the HCR-20V3, SAM and SRP, respectively, and specificity (true negative) values of 42.6, 48.2. and 50.0 percent. None of the SRRs across the tools was associated with nonstalking violence or readmission.

Building on these analyses, results from Cox regression models are presented in Table 4 (HCR-20V3) and Table 5 (SAM), and which test the incremental utility of dynamic risk markers (measured at baseline) while controlling for the contribution of static risk. Here, current risk factors on the SAM related to the nature of stalking were significantly and incrementally associated with stalking recidivism, over and above the (nonsignificant) contributions observed from the historical (previous) risk factors. In contrast, historical risk factors related to the perpetrator were significantly associated with nonstalking violence and the likelihood of readmission. Historical risk factors on the HCR-20V3 also predicted nonstalking violence, with no evidence of incremental contribution of the dynamic subscales. The H and R subscales on the HCR-20V3 each uniquely contributed to the prediction of hospital readmission.

Finally, the ability of change in dynamic risk indicators to predict outcomes was investigated using Cox regression with time-dependent covariates. Controlling for baseline risk as measured by the HCR-20V3 H scale, time-dependent scores on the C and R scales were associated with increased odds of stalking recidivism (HR = 1.21, 95% CI [1.00, 1.46] and 1.40, 95% CI [1.05, 1.88], $P \leq .05$, for the C and R scales, respectively). In contrast, time-dependent scores on the C and R subscales were not associated with increased odds of violence. As in the non time-dependent models, only the H scores were associated with violence in these models. Controlling for baseline static risk as measured by the previous risk scales on the SAM, current, time-dependent, risk factors related to the nature of stalking were incrementally associated with stalking (HR = 1.25, 95% CI [1.13, 1.38], $P < .001$), while perpetrator risk factors measured in this manner related to stalking at the trend level (HR = 1.13, 95% CI [.99, 1.29], P = .07). Current, time-varying perpetrator risk factors were also modestly incrementally related to violence (HR = 1.13, 95% CI [.99, 1.30], P = .07). There were no significant contributions from the time-dependent HCR-20V3 or SAM scales for hospital readmission.

Table 5 Cox Proportional Hazard Regression Testing the Predictive Validity of the SAM Static and Dynamic Risk Indicators

	Stalking			Violence			Rehospitalization		
	β	SE	HR (95% CI)	β	SE	HR (95% CI)	β	SE	HR (95% CI)
Step 1									
Previous – Nature of Stalking	−.06	.06	.95 (.84, 1.07)	−.07	.07	.93 (.82, 1.07)	−.13	.06	.88 (.78, .99)[a]
Previous – Perpetrator Risk Factors	.11	.08	1.12 (.95, 1.31)	.32	.11	1.37 (1.10, 1.70)[b]	.16	.08	1.18 (1.00, 1.39)[a]
Step 1									
Previous – Nature of Stalking	−.03	.06	.97 (.86, 1.10)	−.04	.07	.96 (.84, 1.11)	−.18	.07	.84 (.74, .96) *b*
Previous – Perpetrator Risk Factors	.09	.10	1.09 (.89, 1.33)	.28	.12	1.32 (1.05, 1.67)[a]	.23	.09	1.25 (1.04, 1.51)[a]
Current – Nature of Stalking	.14	.06	1.15 (1.03, 1.29)[b]	−.04	.07	.96 (.84, 1.11)	.11	.06	1.12 (.99, 1.27)
Current – Perpetrator Risk Factors	.07	.08	1.07 (.92, 1.26)	.11	.08	1.12 (.95, 1.31)	−.11	.07	.90 (.78, 1.03)

HR = Hazard ratio.

Model results: Stalking: χ^2 (4, $n = 80$) = 19.37, $p = .001$. Violence: χ^2 (4, $n = 80$) = 10.13, $p = .04$. Rehospitalization: χ^2 (4, $n = 65$) = 10.46, $p = .03$.

[a] $p \leq .05$.

[b] $p \leq .01$.

Discussion

Consistent with recent studies,[7,32,33] approximately one-third of patients in this sample engaged in stalking over the study period. This rate appears high when considering that patients in this sample were actively managed by the provincial review board and many were residing on secure hospital wards. In contrast to overt acts of physical violence, stalking behaviors can be more covert, and carried out without community access (e.g., access to a phone or computer may be all that is needed). Indeed, most patients in this sample who recidivated with stalking behaviors did so without having in-person contact with the victim, and made use of phones and the internet most often. Despite this, limiting patient access to phones and computers can be challenging from a practical perspective (particularly for outpatients), and poses ethics challenges given that most patients use these devices without concern. Further, restricting methods of communication could have the unintended effect of impeding patient access to their primary supports (e.g., family members), as well as educational or vocational programming (e.g., virtual courses). A middle ground may be in the form of enhanced supervision of phone and computer access for those patients with known instances of stalking. In our facility, for example, clinical teams will begin with a list of persons with whom a patient is not to have contact, as per their disposition order. As with other aspects of risk management, further modification of these restrictions will partially depend on the victims' ability to set safeguards for themselves (e.g., those in public-facing roles who cannot stop receiving messages, versus other circumstances where victims can block a number or change their contact information and there may be no immediate need for the team to act further).

Approximately one-quarter of the sample engaged in nonstalking violence, and this appears to align with the distribution of summary risk ratings across categories of low, moderate, and high risk on the HCR-20V3. In contrast, supplementary analyses revealed that no patients in the group were rated as high risk for engaging in serious physical harm on the HCR-20V3, and is consistent with the finding that stalking offenders with psychosis are less likely to perpetrate serious forms of physical violence compared with nonpsychotic stalkers.[8,12,41,42] Consistent with our prior work investigating reasons for rehospitalization among forensic patients,[49] we found elevated rates of medication noncompliance (48.8%) and substance use (27.9%) among patients in this sample.

As reflected in the framework proposed by Mullen,[47] current findings support the notion that motivations for stalking differ between groups with and without SMI. The most common motivational subtypes in this sample were intimacy seeking and resentful (40.6% and 34.5%, respectively), while studies of samples with less serious mental illness found the rejected subtype most often.[11,47,50] This aligns with the finding that stalking offenders with psychosis are less likely to target ex-intimates, and more likely to stalk strangers or acquaintances.[12,42,43] As noted in the SRP, victims of rejected stalkers are overwhelmingly past sexual intimates, whereas victims of intimacy seeking and resentful stalkers are more likely to be comprised of persons unknown or remotely connected to the individual. Almost two-thirds of patients in this

sample stalked either a stranger or casual acquaintance as part of their index offense.

Change Patterns in Dynamic Risk over Time

Much of the violence risk assessment literature continues to focus on static risk factors (or dynamic variables measured in a static manner), despite the suggestion that dynamic indicators can offer greater precision in risk assessment and management.[24,26,51] The repeated-measures design adopted in this study allowed for an examination of change in risk factors for violence and stalking at three discrete time points. Many of these variables fluctuated over time, and mainly signaled improvements in the form of lowering risk. Specifically, risk factors on the C subscale of the HCR-20V3 (e.g., insight, active symptoms of illness, treatment compliance) were observed to decrease, in addition to perpetrator risk factors on the SAM (e.g., level of current anger, distress, and obsession, current/recent substance use). It is reasonable to expect that these subscales of the HCR-20V3 and SAM would show a similar pattern of change given that they are both focused on clinical aspects of the individual. In contrast, fewer patients evidenced improvements on the R scale of the HCR-20V3. Rather than reflecting an increase in risk *per se*, R scale scores may reflect updated estimates of risk in the context of progressively less restrictive dispositions (e.g., moving from a medium to minimum secure unit, or being afforded greater community access), as well as systems-level factors beyond an individual's control (e.g., availability of housing and specific professional services). Notably, SRRs across the three tools did not change significantly over time. So, while subscale scores were observed to fluctuate, these fluctuations were not necessarily reflected in overall estimations of risk.

Incremental Validity of Dynamic Risk Scores

Examination of the relative contribution of static and dynamic risk factors to outcomes indicated that historical (static) factors on the HCR-20V3 and SAM fared better with respect to predicting violence and hospital readmission, while the current (dynamic) risk indicators on the SAM demonstrated incremental utility for stalking outcomes specifically. Further, SRRs on all three measures were significantly associated with stalking. Concerning the SRP, it was the combination of the Recurrence and Persistence SRRs that were associated with stalking, consistent with McEwan *et al.*[35] who also found that these combined ratings had greater predictive validity than either alone.

When the trajectory of change of the dynamic risk scales was accounted for, time-dependent scores on the dynamic subscales of the HCR-20V3 were significantly related to stalking recidivism after controlling for static risk. Furthermore, time-dependent scores on the SAM related to perpetrator risk factors were observed to predict stalking and violence, also after controlling for static risk. The contribution of the nature of stalking risk scale was also retained in the time-dependent models for stalking. The finding that both the HCR-20V3 C scale and perpetrator risk factors on the SAM became significantly related to stalking outcomes when measured in a time-dependent manner suggests that dynamic fluctuations in the clinical profile of individual patients (e.g., levels of insight, active symptoms of illness, recent anger, or distress) are particularly important to capture through regular reassessment.

Implications for Assessing Stalking Risk

Results of this study have implications for the assessment of stalking risk among patients with serious forms of mental illness. First, the finding that time-dependent scores on the HCR-20V3 and SAM were associated with stalking highlight the need to conduct regular reassessments of risk with a focus on patterns of change in dynamic risk factors over time. The HCR-20V3 manual suggests that reassessments occur approximately every 6 months, with shorter intervals warranted for higher-risk cases. This appears feasible given typically long lengths of stay in forensic care (e.g., in Canada, three to five years as inpatient, seven + years until absolute discharge[52]) but might require additional resources to carry out successfully. That said, it is also important to recognize that the rate of change will vary for different risk factors; for some (e.g., symptoms of major mood or psychotic disorders), change may manifest over days or weeks, while for others (e.g., insight), change may be more gradual (e.g., over months or even years). The summary risk ratings on all measures examined were also found to predict stalking recidivism. Given that these ratings are the most likely piece of information used in clinical practice, it appears that they will continue to offer valid information for the assessment of stalking risk.

Overall, results supported the use of the SAM and SRP in a forensic patient sample, though the literature supporting their use in the general stalking population is limited and mixed. Even with comparable predictive efficacy, however, clinical utility and ease of use are important factors influencing the uptake of tools into regular practice.[53,54] From this perspective, the somewhat more complex and lengthier nature of the SRP may hinder more widespread use compared with the SAM and HCR-20V3.

Interpretation of findings is tempered by certain limitations of the study. First, the modest sample size and follow-up period may have affected the prevalence of outcomes detected and overall statistical power to detect effects. Still, we note that this is one of the largest samples of forensic patients who have perpetrated stalking-related offenses, and who exhibited elevated base rates of stalking over the period examined. Second, data were collected retrospectively and the scoring criteria for the SAM were modified to align with the annual coding time points employed. Formal training in the SRP was also not completed by the study authors, and this could have contributed to the lower rater agreement observed for this instrument. While the records that we relied upon to code the risk assessment tools were comprehensive and generally of high quality, and the raters remained blinded to outcomes, it will be important to replicate these findings within a prospective design that includes patient and collateral interviews to comprehensively document stalking behaviors. Finally, because the sample was comprised of forensic patients with SMI, results may have limited generalizability to the larger population of stalking offenders, most of whom do not have a primary psychotic illness and more typically have diagnoses of personality and substance use disorders.

Notwithstanding these limitations, this is one of few studies to provide a comprehensive psychometric investigation of the SAM and SRP in a forensic patient sample, and the first to investigate these tools using a repeated-measures design. Although results suggest that motivations for stalking and victim profiles differ across samples with varying rates of SMI, many of the SAM and SRP risk domains showed validity in forecasting acts of stalking, and likely offer additional information above violence risk tools such as the HCR-20V3. The incorporation of stalking-specific instruments will help ensure that all relevant domains of risk are considered and can facilitate the production of comprehensive and relevant risk management plans.

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