Protective factors as uni- or bipolar factors and their incremental validity and accuracy in predicting general recidivism

Eisenberg, M.J.; van Horn, J.E.; van der Put, C.E.; Stams, G.J.J.M.; Hendriks, J.

DOI
10.1016/j.ijlp.2021.101772

Publication date
2022

Document Version
Final published version

Published in
International Journal of Law and Psychiatry

International Journal of Law and Psychiatry 81 (2022) 101772

Contents lists available at ScienceDirect

International Journal of Law and Psychiatry

journal homepage: www.elsevier.com/locate/ijlawpsy

Protective factors as uni- or bipolar factors and their incremental validity and accuracy in predicting general recidivism

M.J. Eisenberg [a,*], J.E. van Horn [b], C.E. van der Put [c], G.J.J.M. Stams [c], Jan Hendriks [d]

[a] de Waag, De Waag – Utrecht, Postbus 1362, 3500 BJ Utrecht, The Netherlands
[b] Research dep., de Waag, The Netherlands
[c] Department of Social and Behavioural Sciences at the University of Amsterdam (UvA), The Netherlands
[d] Department of Social and Behavioural Sciences at the University of Amsterdam (UvA) and the Faculty of Law, University Amsterdam (VU), The Netherlands

ARTICLE INFO

Keywords:
Forensic outpatients
Risk
Protective factor
Recidivism

ABSTRACT

This study examined whether protective factors are unique or the opposite of risk factors and whether they have incremental validity in the prediction of general recidivism. Using a sample of 3306 Dutch forensic outpatients, this study was the first large-sample study ever performed on this topic. Results from exploratory factor analyses demonstrated a relatively stable factor structure of 14 factors, consisting of 32 of the initially included 68 risk factors and 11 of the initially included 17 protective items. The protective factors were found to be either bipolar (i.e., mirror images of risk factors) or responsivity characteristics (i.e., motivation for treatment, cognitive disability). Incremental validity for the recidivism prediction was found in one factor with internal protective items (e.g., empathy, financial management, life goals). This factor decreased the recidivism risk by 6%. However, weak predictive accuracy was found for this factor. Implications for clinical forensic practice are discussed with special focus on the risk-need-responsivity model.

1. Introduction

Most studies on forensic patients focus on risk factors for offender treatment and risk management without accounting for the role of protective factors (O'Shea & Dickens, 2016; Rogers, 2000; Ward & Stewart, 2003). This deficits-focused approach is said to increase the chance of over-estimating the risk level and inherent bias towards the individual being assessed (Rogers, 2000). However, there is much debate on how protective factors must be defined and measured (Cording & Beggs Christofferson, 2017; Klepfisz, Daffern, Day, Lloyd, & Woldgabreal, 2020). Some researchers argue that protective factors are thought to be important in promoting therapeutic relationships (O'Shea & Dickens, 2016) and treatment motivation (Shiina, 2015). From this perspective, the definition of "protective factor" fits perfectly within the responsivity principle of Bonta and Andrews' risk-need-responsivity model (2017), one of three basic principles for effective offender rehabilitation. The responsivity-principle states that treatment delivery must match the patient's characteristics. This is referred to as specific responsivity (e.g., IQ-level, motivation, strengths, preferences), and it should aim to build rapport between the therapist and client, incorporating elements of cognitive behavioural therapy and social learning (general responsivity). Other views regarding how to define protective factors take either a unipolar or bipolar standpoint. Unipolar protective factors indirectly influence the impact of risk factors on the probability of reoffending (i.e., they "buffer" the effects of risk factors) (Guay, Parent, & Benbouriche, 2020), and their absence does not lead to increased risk (De Vries Robbé, de Vogel, Douglas, & Nijman, 2015; De Vries Robbé & Willis, 2017; Farrington, Ttofi, & Piquero, 2015). Bipolar protective factors are "mirror images" of risk factors, implying that they lie at the opposite end of the same continuum as risk factors (Klepfisz et al., 2020). To gain more insight into protective factors being distinct from risk factors, the present study aims to simultaneously investigate risk and protective factors using a large group of forensic outpatients.

Evidence from research among adult forensic patients supporting the uni- or bipolarity of the protective factors is diverse. While some researchers found support for the unipolarity of protective factors (usually investigated in terms of incremental predictive validity) (Abidin et al., 2013; Davoren et al., 2013; De Vogel, de Ruiter, Bouman, & de Vries Robbé, 2009; De Vries Robbé, de Vogel, & Douglas, 2013), in more recent studies, no evidence supports such an approach (Abbiati, Azzola,

* Corresponding author.
E-mail addresses: meisenberg@dewaagnederland.nl (M.J. Eisenberg), jvanhorn@dewaagnederland.nl (J.E. van Horn), C.E.vanderPut@uva.nl (C.E. van der Put), G.J.J.M.Stams@uva.nl (G.J.J.M. Stams), J.Hendriks1@uva.nl (J. Hendriks).

https://doi.org/10.1016/j.ijlp.2021.101772
Received 11 August 2021; Received in revised form 11 November 2021; Accepted 14 December 2021
Available online 18 December 2021

Palix, Gasser, & Moulin, 2017; Klepfisz et al., 2020; Neil, O'Rourke, Ferreira, & Flynn, 2020; Yoon et al., 2018). In fact, multicollinearity of risk and protective factors seems to be a common issue when investigating both risk and protective factors. In sum, these findings hardly underline the unipolarity of protective factors. In fact, they seem to favor the bipolarity standpoint that protective factors can be regarded as the negative equivalent of risk factors. As stated by Cording & Beggs Christofferson, 2017 regarding the bipolarity of protective factors, there seems little point in including protective factors in risk assessment procedures when they measure the same construct as risk factors.

According to the Risk Need Responsivity (RNR)-model, the leading forensic model in effective offender treatment, and the underlying General Personality and Cognitive Social Learning (GPCSL) theory, the Central Eight (C8) are assumed to lie at the core of the development of criminal conduct (Bonta & Andrews, 2017). In this theory, the following individual and contextual C8 criminogenic needs were empirically validated in several forensic subgroups as major determinants of criminality (Andrews et al., 2012; Eisenberg et al., 2019; Grieger & Hosser, 2013; Gutierrez, Wilson, Rugge, & Bonta, 2013; Hilton & Radatz, 2017). The individual criminogenic needs are history of antisocial behavior; anti-social personality pattern; anti-social cognitions; and substance abuse. The contextual criminogenic needs are anti-social network; family/marital circumstances; school/work problems; and leisure activities. Guay et al. (2020) argue that internal (individual) protective factors measuring personality traits can be more easily operationalized as bipolar because a person cannot be impulsive and self-controlled at the same time, whereas external (contextual) protective factors are more suitable for a unipolar operationalization because, for example, people can have both prosocial and antisocial friends.

In summary, an increasing amount of research has been published on the role of protective factors in forensic treatment, but there is much uncertainty regarding how these factors should be defined. To contribute to the discussion of risk and protective factors as unipolar or bipolar, the central aims of the present study were 1) to identify the most salient unique static and dynamic risk and protective factors and 2) to investigate the incremental validity and predictive accuracy of the protective factors in the prediction of general recidivism. It is expected that the C8 risk factors would emerge as the most salient unique factors and that the included protective factors would be mirror-images of those C8 criminogenic risk factors (favoring the bipolar standpoint). Furthermore, no incremental validity or predictive accuracy of protective factors was expected in the prediction of general recidivism. This study is unique because it is the first study that examines risk and protective factors simultaneously as predictors of recidivism in a large group of forensic outpatients ($n = 3306$ Dutch adult offenders). Moreover, this study contributes to the discussion on protective factors as uni- and bipolar by relating them to the C8 criminogenic needs. Clinically, this information is relevant regarding the question of whether protective factors should be incorporated in treatment planning and/or risk management.

2. Method

Data were collected from forensic outpatients who were accepted for treatment in a large Dutch forensic outpatient treatment center. Cognitive-behavioural therapy is offered to juvenile and adult offenders with a mental disorder. Following RNR-guidelines, treatment length and intensity are matched to the offenders' recidivism risk, and treatment modules, which include improving coping skills or recognizing and controlling (aggressive) impulses, are tuned to their treatment needs. Several exclusion criteria for treatment—clinically assessed at the registration and intake phase—are applicable. Offenders who commit offenses from a psychosis are referred to a center for general psychiatry or another forensic psychiatric (outpatient) clinic. In addition, severe addiction problems that require supervised detoxification must be addressed prior to forensic treatment. Patients enter treatment on a voluntary or mandatory base.

2.1. Sample

The sample consisted of 3306 adult offenders who were accepted for forensic outpatient treatment between 2008 and 2013. Their mean age was 33.8 years (*SD* 11.46; Range 18–77 years) at the time of their first risk assessment. The sample consisted of 11.7% women and 88.3% men. Most of the outpatients were born in the Netherlands (77.8%) and those born abroad (22.2%) were mainly from Surinam (5.8%), Dutch Antilles (3.1%), Turkey (2.5%), and Morocco (3.4%). Treatment was court-ordered for 58.8% of the outpatients and 41.2% of treatment was voluntary. Outpatients were referred for treatment because they had committed a domestic violence offense (37.1%), general violence offense (40.1%), property offense (9.9%), sex offense (8.8%) or another offense (e.g., arson) (4.1%). In 24% of outpatients, a clinical disorder was primarily diagnosed; ADHD, impulse control disorder, and PTSS appeared most frequently. As for personality disorders, in almost 30% of the sample, a personality disorder was diagnosed. Cluster B was the most frequently diagnosed disorder. The diagnoses were assessed by forensic psychiatrist or (clinical) psychologists with two to four years of experience in (forensic) psychology. The average treatment length was 8.5 months (*SD* 3.8; Range 0–58). Over half (59%) of the sample completed the treatment program, while 41% dropped out of treatment.

Risk assessments were included in the study if they were conducted by qualified therapists. Of the total of 333 forensic therapists, 56% provided information about their age, sex, and clinical experience. The majority (86%) was (clinical) psychologists, 2% psychiatrist and 12% systemic therapist. Most of them were female (64.5%) and the mean age of the total group was 37.8 years ($SD = 9.7$; Range 22.8–63.0). Therapists were trained in performing risk assessments and conducted on average 22 risk assessments at the time of our data collection ($SD = 19$; Range 1–75).

2.2. Measures

The Risk Assessment instrument for Forensic Mental Health (RAF MH) adult version was used to identify relevant risk factors and to assess the recidivism risk at treatment entry. The RAF MH is a structured professional judgment (SPJ) instrument scored by trained therapists, developed for adult offenders (≥ 18 years) for whom forensic outpatient treatment is indicated. RAF MH consists of 79 risk factors (overall clinical judgment excluded) divided into 12 domains: Previous and current offenses (8 risk factors), Education/Work (10 risk factors), Finances (2 risk factors), Accommodation/Living environment (2 risk factors), Family/Partner (5 risk factors), Social network (4 risk factors), Leisure time (2 risk factors), Substance abuse (8 risk factors), Personality and emotions (12 risk factors), Attitude (3 risk factors), Motivation for treatment (9 risk factors), and Sexual problems (14 risk factors). Risk factors within each domain are scored dichotomously (yes/no) or on a 3-point scale (0 = absent, 1 = in some degree present, 2 = present). The overall clinical judgment at the end of each domain is scored on a 6-point scale ranging from 0 "appropriate functioning" to 5 "dysfunctioning". The risk of re-offending is assessed for all types of offenses listed in the client's criminal history and they are classified into one of five risk classifications: low, low-medium, medium, medium-high or high risk. Two studies on the RAF MH showed good interrater reliability and moderate predictive accuracy of recidivism (Van Horn et al., 2016; Van Horn, Wilpert, Scholing, & Mulder, 2009).

The Structured Assessment of Protective Factors for violent risk (SAPROF) was integrated into the RAF MH as an extra domain of protective factors. The 17 protective factors are organized in the following three scales. *Internal factors*: Intelligence, Secure attachment in childhood, Empathy, Coping, and Self-control. *Motivational factors*: Work, Leisure, Financial management, Motivation for treatment, Attitude towards authority, Life goals, and Medication. *External factors*: Social

network, Intimate relationship, Professional care, Living situation, and External control. The protective factor "External control" was adapted to the outpatient population because the controlled situation described in score 2 "Forensic clinical treatment" does not apply to outpatient treatment. Score 2 on item 17 was reworded as "Intensive external supervision". Items are scored on a three-point scale, with "0" meaning the protective factor is absent, "1″ meaning the protective factor is possibly or to some extent present, and "2″ meaning the protective factor is present.

2.3. Recidivism

Recidivism was defined as a new conviction for any offense after the assessment with the RAF MH and SAPROF at treatment entry. Information was retrieved from the Research and Policy Database for Judicial Documentation (Onderzoek- en Beleidsdatabase Justitiële documentatie, OBJD) of the WODC (Wartna, Blom, & Tollenaar, 2011). OBJD data contains judicial information of all (legal)persons in the Netherlands.

2.4. Procedure

The RAF MH was scored by trained therapists using information from file records and one or more intake sessions. The intake sessions lasted approximately 60 min and consists of a screening of issues relevant to outpatient forensic care, including criminal history, the index offense, family situation, education, and work. File information typically consisted of police records, psychological reports, interview reports, and treatment evaluations. File information was used additionally to information obtained from sessions with the patient.

At intake, patients were informed by the therapist about the data collection process during their treatment, as well as how these data would be used for scientific purposes. Patients also received a flyer detailing the data collection procedure and were asked to sign an informed consent letter to consent to us using their data for scientific research. Patients were deleted from the datafile when they did not consent in using their data for scientific purposes. This procedure falls within the Dutch Data Protection Act (Dutch DPA) and other specific Dutch healthcare laws, which provide legal provisions on how to deal with the privacy of personal information within the context of, among others, mental health services. The Dutch DPA also states that all patients have the right to withdraw their previous consent during and after treatment. The research was approved by the Dutch Data Protection Act of the Research and Documentation Centre (WODC), the research department of the Dutch Ministry of Justice and Security.

2.5. Data analyses plan

Data were analyzed using IBM SPSS statistics version 23. The percentage of missing data varied between 0.1 and 2.1%. Little's MCAR test, $\chi^2 = 3271.90$, $df = 2746$, $p \leq .001$, showed that the data were not missing completely at random. However, since the percentage of missing data was <5%, missing data were replaced with mean scores. For the RAF MH, user-defined missing data (resulting from the option "does not apply") varied between 3.3 and 36.1% and were transformed into dichotomous scores, "0" and "does not apply" were coded as "0" (no risk), and scores "1" and "2" were coded "1" (risk).

To identify salient unique static and dynamic risk, and protective factors (Research Question 1), exploratory factor analyses (EFA with Promax rotation) were performed on a total of 68 out of 96 static, dynamic and protective factors. Twenty-eight factors of the RAF MH and SAPROF were excluded because they were only applicable to specific subgroups, such as sex offenders and medication users. To avoid confusion in terminology, risk and protective factors are hereafter referred to as items, and the term "factor" is used when describing the results of factor analyses. In the appendix, the items included in the study are listed.

To ensure sufficient power ($\beta = 0.80$) to perform an EFA, Osborne and Costello (2004) advise to include 10–25 times more observations than items because, in an EFA relationship, the individual and total (common and error) variances shared between items are also included. Based on the 68 included RAF MH and SAPROF items, the sample should contain between 680 and 1700 individuals. The EFA was conducted on a randomly selected 50% of the total sample ($n = 1660$), which is adequate given Osborne and Costello's (2004) advice.

To test the suitability of the correlation matrix for factor analyses, for each EFA, a Bartlett's test and the Kaiser–Meyer Measure of Sampling Adequacy (KMO) were performed. Adequacy of the model was reached when Bartlett's test of sphericity was significant ($p < .05$) and KMO values were equal to or higher than 0.70 (Bartlett, 1954 and Kaiser, 1974 in Watkins, 2018). The number of abstracted factors was based on the eigen-value-greater-than-one rule (K1). The next decision rules were applied to remove items with cross loadings and/or factor loadings of <0.50 (Costello & Osborne, 2005). An iterative EFA process was conducted applying these decision rules until the explained variance of the model was at least 60%. The final EFA model was cross validated using the other 50% of the dataset ($n = 1634$).

Recidivism rates were calculated using a Kaplan–Meier survival analysis, which considers the individual differences in follow-up periods (Wartna, 2000). The survival analyses were performed based on the date of the first recidivism offense; all subsequent re-offenses were excluded. The mean follow-up period for the sample under study was 964.89 days, or approximately 2.5 years ($SD = 519.44$, min 0, max 2211 days).

A hierarchical Cox regression analysis and receiver operating characteristics (ROC) analyses were performed to determine the incremental validity and predictive accuracy of the protective factors in the prediction of general recidivism (no/yes) (Research Question 2). To this end, mean sum scores were calculated for each factor from the final EFA model separately. Risk factors were entered in the first step and protective factors were entered next. Cox regression is a semiparametric statistical technique commonly used to explore the effects of various covariates on survival (Norušis, 2007). This model allows for the prediction of failure time (i.e., time to reoffend) with a provision for censored data (i.e., outpatients who did not reoffend). It can handle a mix of continuous, categorical, and ordinal variables. The probability of the endpoint (in our study, recurrence of offending behavior) is called the "hazard". Statistical programs that analyze survival time in Cox regression also protect against problems related to multicollinearity (Tabachnick & Fidell, 2007). The main assumption of any Cox regression is that the proportionality of hazards has been met (i.e., the ratio of the estimated hazard across time is a constant for any two cases) (Tabachnick & Fidell, 2007). To test this assumption, each covariate was tested separately before these variables were entered into the Cox regression model. The proportionality of hazards assumption was violated for 12 covariates, which are marked in Table 4. The variables measured at interval level were entered as time-dependent covariates. Based on graphical inspection, the categorical variables were split using the number of days at which the proportionality deviated.

Within the ROC analyses, the fundamental measures of diagnostic accuracy are sensitivity (true positive rate) and specificity (true negative rate). The ROC analysis produces *Area Under Curve* (AUC)-values that are a measure of accuracy of test performance. The AUC value is a summary measure that averages diagnostic accuracy across the spectrum of test values. An AUC value of 1 represents a perfect predictive performance, while a value of 0.5 indicates a prediction at the chance level and a value below 0.5 indicates negative accuracy (i.e., the variable is related to the outcome in the direction opposite of what was anticipated). In the ROC analysis, risk and protective factors (summation of scores) with a reliability coefficient of 0.60 or higher were included in the analysis as a subscale, and for the other factors with lower reliability coefficients, the individual items were included. For interpretation purposes, the protective factors were reversely included

in the ROC analysis. Similar to AUC values, the interpretation guidelines for the accuracy of risk prediction are weak when $0.556 \leq AUC < 0.639$, moderate when $0.639 \leq AUC < 0.714$, and high if $AUC \geq 0.714$, which correspond to small, moderate, and large Cohen's *d* values, respectively (Rice & Harris, 2005).

Pearson's correlation coefficients and Cronbach's alpha reliability coefficients were calculated for each EFA factor. Cronbach's alpha coefficients of >0.70 can be considered acceptable and coefficients of >0.80 are considered good (Nunally & Bernstein, 1994). Following the guidelines provided by Cohen (1988), the strength of the correlation is interpreted as follows: $r \geq 0.10$ = weak, $r \geq 0.30$ = moderate, $r \geq 0.50$ = strong.

3. Results

Exploratory factor analyses (EFAs) were conducted to identify salient unique static risk, dynamic risk, and protective items. In Table 1, summary results of the iterative EFA analyses are outlined. Model 1 included a total of 68 items: 18 static, 34 dynamic, and 16 protective. Detailed EFA results are available upon request from the first author.

After four EFA models, the prior model requirements (factor loadings <0.50, no cross loadings, and explained variance of at least 60%) were met. Moreover, Bartlett's test of sphericity is significant ($p < .05$) and KMO values were higher than 0.70. A total of 25 out of 68 items were removed: 9 static, 11 dynamic, and 5 protective items. The next three items were removed based on content validity. The static risk item "Escalation in frequency and intensity of offenses" was removed from factor antisocial personality, and two dynamic items (victim of bullying, having debt) loading on a single factor were both removed. The final model (Model 5) with 43 items (9 static, 23 dynamic, and 11 protective) generated 14 unique but related factors explaining 64% of the total variance. In Table 2, the factor loadings of the items and their related factors are displayed. The appendix lists the items included in the first EFA model, as well as the criteria on which items were removed.

Table 2 shows that the C8 criminogenic risk factors emerged from the analyses: F4 History of antisocial behavior (C1), F5 Antisocial personality (C2), F8 Family circumstances (C5), F9 Antisocial cognitions (C3), F11 Antisocial network (C4), F13 Marital circumstances (C5), F6 Work problems (C6), F7 Leisure time (C7), and F2 Substance abuse (C8). Four out of the 11 protective items can be considered bipolar since they negatively loaded on the same factor as their risk counterpart (F6 Work problems, F7 Leisure time, F10 Intelligence, and F13 Marital circumstances). The remaining seven protective items loaded on two separate factors: F1 Internal protective (5 items) and F14 External protective (2 items).

This final 14-factor model of risk and protective items was tested on the other half of the sample ($n = 1634$), initially resulting in 12 factors, KMO = 0.853; Bartlett's test: χ^2 (903) = 20,157.35, $p \leq .001$, explaining 59.78% of the variance. In this 12-factor model, two dynamic risk items (treatment non-cooperation and negative attitudes towards treatment) loaded on F3 Treatment; one dynamic risk item (criminal environment) loaded on F4 History of antisocial behavior; one dynamic risk item (living situation) loaded on F13 Marital circumstances; and one static risk item (previous treatment) had a loading <0.50. When forced to extract 14 factors, the factor analysis produced the same items loading on the 14 factors as the final 14-factor model from the first EFA, KMO = 0.853; Bartlett's test: χ^2 (903) = 20,157.35, $p \leq .001$, with an explained variance of 64.18%. Since this model met the prior criteria, further analyses were based on the 14-factor model as shown in Table 2.

Table 1
Exploratory factor analyses (EFA) of static and dynamic risk items and protective items

Model	# items	KMO	Bartlett's test	# factors extracted	% Explained variance	# items excluded in next model
1	68	0.881	χ^2 (2278) = 21,198.15, $p \leq .001$	18	60.24	16
2	52	0.863	χ^2 (1326) = 23,849.65, $p \leq .001$	15	60.15	6
3	46	0.848	χ^2 (1035) = 20,437.27, $p \leq .001$	15	63.73	3
4	43	0.849	χ^2 (903) = 19,505, $p \leq .001$	14	64.42	–

KMO = Kaiser–Meyer Measure of Sampling Adequacy.

3.1. Pearson's correlation and Cronbach's alpha coefficients

Table 3 shows that most of the EFA-factors were at most weakly correlated ($r = 0.002$ to $r = 0.281$). Moderate negative correlations were found between F1 Internal protective and F3 Treatment ($r = -0.324$), F4 History of antisocial behavior ($r = -0.300$), F5 Antisocial personality ($r = -0.369$), F6 Work problems ($r = -0.320$), and F9 Antisocial cognitions ($r = -0.326$), as well as between F3 Treatment and F9 Antisocial cognitions ($r = 0.437$), F7 Leisure time and F8 Antisocial network ($r = 0.341$), and F5 Antisocial personality and F11 Family circumstances ($r = 0.312$).

Table 3 also presents the reliability coefficients of items within each factor. As shown, the reliability of five out of 14 factors was low (< 0.60). In the next analysis, the following nine items from these factors were included as separate items: lack of social support, cognitive impairment, intelligence (reversely score), living situation, criminal environment, relationships, intimate relationships (reversely scored), professional care, and external control.

3.2. Incremental validity (Cox regression) and predictive accuracy (ROC analysis) of protective factors

Based on Kaplan–Meier survival analysis, 30.9% ($n = 843$) recidivated in approximately 2.5 years, of which 22 (2.6%) recidivated during treatment. To investigate the incremental validity of the protective items in the prediction of general recidivism, a Cox regression analysis was performed.

Results from the Cox regression analysis (Table 4) revealed that the first block of risk factors (F2–F12) significantly contributed to the baseline model, −2 Log Likelihood = 12,869.28, $\Delta\chi^2 = 326.52$, $df = 27$, $p \leq .001$, as did the second block of protective factors (F1 and F14), −2 Log Likelihood = 12,841.82, $\Delta\chi^2 = 27.46$, $df = 9$, $p \leq .001$. Table 4 shows that six risk factors (including four C8 factors) significantly contributed to the prediction of general recidivism; an increased hazard for recidivism was found among forensic outpatients with severe substance abuse (16%), a history of antisocial behavior (22%), poor prosocial leisure time (5%), below average intellectual disability (40%), and living in a criminal environment (29 to 42%) compared to outpatients without these problems. Against expectation, one risk factor (F5 Antisocial personality) decreased the recidivism risk by 6%. As for the protective factors included in the second block, the hazard for recidivism was reduced after 237 follow-up days by 26 to 44% when professional forensic care was more intensive. In contrast, the hazard for recidivism increased after 334 follow-up days by 34 to 80% when treatment was more restricted (score 1) or mandatory (score 2).

Results from the ROC analyses are presented in Table 5 as *AUC* values. As can be seen from the table, *AUC* values were in the weak to moderate predictive accuracy range for five factors: F1 Internal protective, F2 Substance abuse, F3 Treatment, F9 Antisocial cognitions, and F4 History of antisocial behavior. Other factors had lower than weak predictive accuracy. At a given cut-off point, F1 to F4 factors were better at predicting non-recidivism (specificity, i.e., true negatives) than

Table 2
EFA results of final model: factors and factor loadings static (S), dynamic (D), and protective (P) items, sorted by size.

	Items	Factors												
		1	2	3	4	5	6	7	8	9	10	11	12	13	14
1	Empathy (P)	0.725													
2	Coping (P)	0.716													
3	Attitudes towards authority (P)	0.693													
4	Financial management (P)	0.645													
5	Life goals (P)	0.637													
6	Alcohol abuse (S)		0.835												
7	Alcohol abuse (D)		0.816												
8	Substance abuse related to crime (D)		0.806												
9	Interpersonal problems due to substance abuse (D)		0.765												
10	No response to treatment (D)			0.832											
11	Treatment non-cooperation (D)			0.810											
12	Negative attitude towards treatment (D)			0.777											
13	Previous treatment (S)			0.633											
14	Prior detention (S)				0.810										
15	Prior convictions (S)				0.750										
16	Use weapons (S)				0.609										
17	Age first offense (S)				0.567										
18	Violations of regulations (S)				0.549										
19	Anger (D)					0.784									
20	Impulsivity (D)					0.654									
21	Coping (D)					0.619									
22	Stress (D)					0.610									
23	Welfare (D)						0.860								
24	Unemployment (D)						0.835								
25	Work (P)						−0.716								
26	Leisure time: contextual (D)							0.867							
27	Leisure time: individual (D)							0.858							
28	Leisure activities (P)							−0.611							
29	Network noncriminal friends (D)								0.849						
30	Isolation (D)								0.827						
38	Lack social support (D)								0.521						
39	Approval of offense behavior (D)									0.829					
40	Minimalizing offenses (D)									0.828					
41	Cognitive impairment (S)										0.862				
42	Intelligence (P)										−0.786				
43	Victim child abuse (S)											0.845			
44	Relationship parents (D)											0.794			
45	Living situation (D)												0.833		
46	Criminal environment (D)												0.776		
47	Intimate relationship (P)													−0.865	
48	Relationships (D)													0.739	
49	External control (P)														0.721
50	Professional Care (P)														0.686

NB. F1 Individual protective; F2 Substance abuse (C8); F3 Treatment; F4 History of antisocial behavior (C1); F5 Antisocial personality (C2); F6 Work problems (C6); F7 Leisure time (C7); F8 Antisocial network (C4); F9 Antisocial cognitions (C3); F10 Intelligence; F11 Family circumstances (C5); F12 Living situation; F13 Marital circumstances (C5); F14 Treatment protective.

NB. F1 Internal protective; F2 Substance abuse (C8); F3 Treatment; F4 History of antisocial behavior (C1); F5 Antisocial personality (C2); F6 Work problems (C6); F7 Leisure time (C7); F8 Antisocial network (C4); F9 Antisocial cognitions (C3); F10 Intelligence; F11 Family circumstances (C5); F12 Living situation; F13 Marital circumstances (C5); F14 External protective.

recidivism (sensitivity, i.e., true positives), with specificity values ranging from 58 to 65% and sensitivity values ranging from 53 to 61%. In contrast, F9 Antisocial cognitions proved to be more accurate in predicting recidivism (70%) than non-recidivism (45%). From the pairwise comparison of *AUC* values, results found that F4 performed significantly better in predicting recidivism than items from F1 Internal protective, $z = 6.273$, $p \leq .001$, 95% CI: 0.056–0.110; F2 Substance abuse, $z = 5.430$, $p \leq .001$, 95% CI: 0.048–0.103; F3 Treatment, $z = 6.828$, $p \leq .001$, 95% CI: 0.065–0.117; F9 Antisocial cognitions, $z = 6.950$, $p \leq .001$, 95% CI: 0.065–0.116.

4. Discussion

This study set out to identify the most salient unique static and dynamic risk, and protective items and to investigate the incremental validity and accuracy of the protective items in the prediction of general recidivism. Using a sample of 3306 Dutch forensic outpatients, to our knowledge, this study was the first large-sample study ever performed on this topic. Results from exploratory factor analyses demonstrated a relatively stable factor structure of 14 factors consisting of 32 of the initially included 68 risk factors and 11 of the initially included 17 protective items. The model explained 65% of the variance in recidivism. As expected, the factors in the final model largely confirmed the C8 criminogenic needs as unique but related constructs. Four protective items (work, leisure activities, intelligence, and intimate relationship) emerged as mirror-images of risk factors based on their negative loadings on the same factor as their risk equivalent, favoring the bipolar standpoint. These protective factors were also found to be opposites of risk items in other studies (e.g., Klepfisz, Daffern, & Day, 2017).

The seven other protective items loaded on two separate factors: F1

Table 3
Pearson correlations between risk and protective factors with Cronbach's alpha reliability coefficients in the diagonal

	F1	F2	F3	F4	F5	F6	F7	F8	F9	F10	F11	F12	F13	F14
F1	0.71	−0.163***	−0.324***	−0.300***	−0.369***	−0.320***	−0.247***	−0.199***	−0.326***	−0.280***	−0.169***	−0.259	−0.129***	0.100***
F2		0.83	0.108***	0.234***	0.180***	0.070***	0.122***	0.045**	0.091***	0.024	0.086***	0.109***	0.126***	−0.010
F3			0.75	0.264***	0.235***	0.182***	0.202***	0.137***	0.437***	0.146***	0.114***	0.189***	0.137***	0.039*
F4				0.66	0.193***	0.187***	0.152***	0.045**	0.259***	0.165***	0.140***	0.247***	−0.005	0.127***
F5					0.68	0.235***	0.269***	0.238***	0.199***	0.230***	0.312***	0.281***	0.231***	−0.083***
F6						0.76	0.246***	0.204***	0.155***	0.140***	0.140***	0.222***	0.086***	−0.014
F7							0.73	0.341***	0.146***	0.148***	0.183***	0.243***	0.131***	−0.057**
F8								0.52	0.073***	0.131***	0.218***	0.189***	0.170***	−0.011
F9									0.71	0.135***	0.047**	0.156***	0.073***	−0.052**
F10										0.58	0.041*	0.135***	0.002	0.048**
F11											0.63	0.198***	0.169***	−0.029
F12											.	0.50	0.154***	0.038*
F13													0.51	−0.072***
F14														0.34

*$p \le .05$; **$p \le .01$; ***$p \le .001$.
NB. F1 Internal protective; F2 Substance abuse (C8); F3 Treatment; F4 History of antisocial behavior (C1); F5 Antisocial personality (C2); F6 Work problems (C6); F7 Leisure time (C7); F8 Antisocial network (C4); F9 Antisocial cognitions (C3); F10 Intelligence; F11 Family circumstances (C5); F12 Living situation; F13 Marital circumstances (C5); F14 External protective.

Internal protective and F14 External protective. Regarding the former, as mentioned in the introduction, Guay et al. (2020) argued that protective factors measuring personality traits (such as items from F1 Internal protective) seem to be more suitable to be operationalized as bipolar items since a person cannot be impulsive and self-controlled at the same time. In our study, no support was found for the bipolarity of personality traits. In fact, the interpersonal protective factors included in our study did not contribute to the prediction of general recidivism (Cox regression) and had weak predictive accuracy (ROC analysis). As for the F14 protective items (professional care and external control), these items seem to be more about treatment policy than about treatment content. For instance, a reduction of the hazard for recidivism (a decrease of 26% to 44%) was seen when professional care was more intensive, and an increase in hazard (34% to 80%) was seen when treatment was more restricted (i.e., more supervision, mandatory treatment). Thus, based on the definition of unipolar protective factors, which states that these factors have incremental predictive validity, our findings do not corroborate this definition.

Taking a closer look at the content of the F1 Internal protective items, they seem to mirror the items from the F5 Antisocial personality factor, labeled as one of the central eight criminogenic needs. A negative correlation was found between the two factors; however, only at a moderate level. Apparently, the risk and protective factors have different semantic content, which makes it difficult to draw any firm conclusions about their added value to risk management and treatment planning. Even more so because none of these factors contributed to general recidivism and their predictive accuracy was weak at most. From other studies, it is known that this C8 criminogenic need is among one of the strongest predictors of recidivism in forensic outpatients (Eisenberg et al., 2019). Thus, additional research on forensic outpatients is needed to examine the contextual operationalization of protective and risk factors in further detail.

Overall, weak predictive accuracy was found for both dynamic risk and protective factors, with *AUC*s ranging from 0.585 to 0.599. The only factor with a moderate predictive accuracy was the static criminogenic factor History of antisocial behavior. This factor had a significantly better predictive accuracy compared to the dynamic factors. However, when taking the Cox regression results into account, increased risk was found for severe substance abuse, poor prosocial leisure time, below average intellectual ability, and living in a criminal environment. These factors increased risk by five to 42%. A history of antisocial behavior increased the risk by 22%, which is lower than the risk of living in a criminal environment (42% increase). Given that, in Cox regression analyses, failure time (i.e., time to reoffend) and proportional hazards are included, these outcomes produce more detailed information regarding the increased risk of offenders' subgroups.

4.1. Study limitations and future research

The risk and protective factors were cross sectionally assessed at treatment entry. As such, treatment progress was not accounted for in the analyses, which may have resulted in somewhat biased scores. It is possible that changes in dynamic risk and protective items (e.g., in personality traits such as impulsivity and coping skills) may have led to a better prediction of non-recidivism than recidivism. In future studies, it is recommended to include changes in risk and protective factors and relate them to recidivism. Few other studies, mainly among forensic inpatients (Daffern, Simpson, Ainslie, & Chu, 2018; De Vries Robbé et al., 2015) changes in dynamic risk and protective factors were found for varying follow-up periods and intermediary treatment targets (such as impulsivity and social problem-solving). However, they included small sub-samples of inpatients and need to be replicated using a larger sample of forensic outpatients. A meta-analytic study by Papalia, Spivak, Daffern, and Olgloff (2020) including 22 controlled studies underlined the necessity of linking changes in dynamic factors to recidivism instead of solely intermediary treatment targets.

Table 4
Cox regression: incremental validity of protective factors ($n = 3306$).

			General recidivism					
							95% CI	
	1st block		*B*	Wald	*p*	Exp(B)	lower	upper
F2	Substance abuse* (C8)		0.148	27.971	0.001	1.160	1.098	1.225
F3	Treatment*		0.030	1.593	0.207	1.030	0.984	1.079
F4	History of antisocial behavior* (C1)		0.195	86.324	0.001	1.216	1.167	1.267
F5	Antisocial personality* (C2)		−0.062	5.438	0.020	0.940	0.893	0.990
F6	Work problems* (C6)		0.024	0.451	0.502	1.024	0.955	1.099
F7	Leisure time* (C7)		0.052	4.041	0.044	1.053	1.001	1.108
F8	Isolation 6a (no/yes) C4		−0.066	0.375	0.541	0.936	0.758	1.156
	Social network noncriminal friends C4		0.058	0.321	0.571	1.060	0.866	1.297
	Lack social support C4	0[r]		4.365	0.113			
		1	−0.107	1.690	0.194	0.898	0.765	1.056
		2	−0.242	4.266	0.039	0.785	0.624	0.988
F9	Antisocial cognitions* (C3)		0.032	0.656	0.418	1.033	0.955	1.116
F10	Cognitive impairment (no/yes)		0.016	0.023	0.880	1.016	0.830	1.243
	Intelligence reversed	0[r]		6.684	0.035			
		1	0.193	2.486	0.115	1.213	0.954	1.541
		2	0.341	6.382	0.012	1.407	1.079	1.833
F11	Family circumstances* (C5)		−0.037	0.958	0.328	0.964	0.895	1.038
F12	Living situation (prior 100 days)*	0[r]		1.526	0.466			
		1	0.206	1.162	0.281	1.229	0.845	1.787
		2	0.228	0.934	0.334	1.256	0.791	1.993
	Living situation (after 100 days)*	0[r]		0.095	0.953			
		1	−0.024	0.070	0.791	0.976	0.815	1.169
		2	−0.029	0.063	0.802	0.971	0.772	1.222
	Criminal environment (prior 172 days)*	0[r]		2.389	0.303			
		1	−0.126	0.594	0.441	0.881	0.639	1.215
		2	0.195	1.112	0.292	1.216	0.846	1.748
	Criminal environment (after172 days)*	0[r]		10.786	0.005			
		1	0.255	6.561	0.010	1.290	1.062	1.567
		2	0.348	7.947	0.005	1.416	1.112	1.803
F13	Relationships C5	0[r]		3.312	0.191			
		1	0.015	0.020	0.886	1.015	0.825	1.250
		2	−0.126	1.328	0.249	0.882	0.712	1.092
	Intimate relationship reversed C5	0[r]		1.976	0.372			
		1	0.206	1.855	0.173	1.229	0.913	1.653
		2	0.195	1.777	0.182	1.216	0.912	1.619
	2nd block							
F1	Internal protective		−0.044	3.457	0.063	0.957	0.914	1.002
F14	Professional care (prior 237 days)*	0[r]		0.891	0.640			
		1	0.067	0.218	0.641	1.070	0.806	1.419
		2	−0.120	0.249	0.618	0.887	0.554	1.420
	Professional care (after 237 days)*	0[r]		12.537	0.002			
		1	−0.303	8.252	0.004	738	0.600	0.908
		2	−0.580	9.458	0.002	0.560	0.387	0.810
	External control (prior 334 days)*	0[r]		0.870	0.647			
		1	0.097	0.827	0.363	1.102	0.893	1.360
		2	0.089	0.190	0.663	1.093	0.732	1.634
	External control (after 334 days)*	0[r]		13.583	0.001			
		1	0.291	7.433	0.006	1.338	1.085	1.650
		2	0.589	10.084	0.001	1.801	1.253	2.591

NB. r = reference group; Exp(B) column shows the hazard ratio (HR). HR < 1 means predictor is associated with decreased recidivism risk; HR > 1 means predictor is associated with increased risk.
Protective items loading in the same factor as risk items were reversely scored. Factor 1 and Factor14 protective items were not reversed.
* Time depending covariates.

Our study focused on protective factors being either unipolar or bipolar. In the discussion regarding how protective factors work, there is some evidence that protective factors have a moderating or buffering effect (Guay et al., 2020). That is, they alter the direction or strength of the relationship between a risk factor and recidivism. Some protective factors, particularly those that could be defined as responsivity characteristics (e.g., motivation, treatment readiness, and cognitive functioning), may well serve as moderators.

4.2. Clinical implications

Clinically, the outcomes of this study are relevant for several reasons. Interventions in forensic patients are modeled after the RNR-principles. The protective factors work, leisure activities, intelligence, and intimate relationship were identified as opposites of risk factors (bipolar), indicating that they measure the same constructs as risk factors. As such their added value in clinical practice is absent. As for the protective factors professional care and external control, these unipolar protective factors might be relevant regarding treatment policies and responsivity. In terms of treatment policies, it seems that the increase of external control and a higher intensity of professional care buffers the risk of re-offending. This aligns with the risk principle form the RNR-model in which it is stated that therapists should match the frequency and intensity to the outpatients' risk level to decrease re-offending (Bonta & Andrews, 2017). In terms of balancing risk management and treatment planning by including protective factors, these non-bipolar protective factors seem more relevant after risk assessment completion. They provide answers to how treatment must be delivered rather than which criminogenic needs should be targeted in treatment.

Table 5
AUC values for the general predictive accuracy of risk and protective factors.

				95% CI	
		AUC	*p*	Lower	Upper
F1	Internal protective	0.592	< 0.001	0.564	0.612
F2	Substance abuse (C8)	0.599	< 0.001	0.571	0.616
F3	Treatment	0.584	< 0.001	0.558	0.605
F4	History of antisocial behavior (C1)	0.675	< 0.001	0.651	0.694
F5	Antisocial personality (C2)	0.523	0.049	0.500	0.545
F6	Work problems (C6)	0.546	< 0.001	0.523	0.568
F7	Leisure time (C7)	0.558	< 0.001	0.536	0.580
F8	Antisocial network (C4)	0.504	0.698	0.482	0.527
F9	Antisocial cognitions (C3)	0.585	< 0.001	0.557	0.599
F10	Intelligence	0.566	< 0.001	0.544	0.588
F11	Family circumstances (C5)	0.505	0.683	0.482	0.527
F12	Living situation	0.577	< 0.001	0.554	0.599
F13	Marital circumstances (C5)	0.496	0.723	0.473	0.518
F14	Professional care	0.465	0.003	0.442	0.489

Declaration of Competing Interest

None.

Appendix

Included items in the study, ranged by Static, Dynamic, and Protective Items, in order of appearance in RAF MH and SAPROF.

	Static items	**Model1**	**Model2**	**Model3**
1.	Prior convictions			
2.	Prior arrests	LFL		
3.	Non officially registered misconduct	LFL		
4.	Use weapons			
5.	Escalation freq and intensity offenses			CV
6.	Age first offense			
7.	Prior detention			
8.	Violations of regulations			
9.	Education	LFL		
10.	Suspension school		LFL	
11.	Problematic work history	LFL		
12.	Alcohol abuse			
13.	Drug abuse		LFL	
14.	Victim child abuse			
15.	Victim of bullying			CV
16.	Suicidal /homicidal thoughts	LFL		
17.	Cognitive impairment			
18.	Previous treatment			
	Dynamic items			
19.	Unemployment			
20.	Welfare			
21.	Depts			CV
22.	Living situation			
23.	Criminal environment			
24.	Relationships			
25.	Relationship parents			
26.	Relationship family	LFL		
27.	Relationship children	LFL		
28.	Criminality family		LFL	
29.	Isolation			
30.	Criminal social network		LFL	
31.	Social network noncriminal friends			
32.	Lack social support			
33.	Leisure time: individual			
34.	Leisure time: contextual			
35.	Alcohol abuse			
36.	Drug abuse		LFL	
37.	Substance abuse related to crime			
38.	Interpersonal problems due to substance abuse			
39.	Problems at work substance use related	LFL		
40.	Medical problems due to substance abuse		LFL	
41.	Lack of self-insight	LFL		

(*continued on next page*)

(*continued*)

	Static items	Model1	Model2	Model3
42.	Impulsivity			
43.	Stress			
44.	Coping			
45.	Anger			
46.	Approval of offense behavior			
47.	Minimalizing offenses			
48.	Stressors	LFL		
49.	Lack of future plans	LFL		
50.	Negative attitude towards treatment			
51.	No response to treatment			
52.	Treatment non-cooperation 11f			
	Protective items			
53.	Intelligence			
54.	Secure attachment in childhood	CL		
55.	Empathy			
56.	Coping			
57.	Self-control	CL		
58.	Work			
59.	Leisure activities			
60.	Financial management			
61.	Motivation for treatment	LFL		
62.	Attitudes towards authority			
63.	Life goals			
64.	Social network	LFL		
65.	Intimate relationship			
66.	Professional care			
67.	Living circumstances	LFL		
68.	External control			

NB CL = cross loading; LFL = Factor loading <0.50; CV=Content validity.

References

Abbiati, M., Azzola, A., Palix, J., Gasser, J., & Moulin, V. (2017). Validity and predictive accuracy of the structured assessment of protective factors for violence risk in criminal forensic evaluations: A Swiss cross-validation retrospective study. *Criminal Justice and Behavior, 44*(4), 493–510. https://doi.org/10.1177/0093854816677565

Abidin, Z., Davoren, M., Naughton, L., Gibbons, O., Nulty, A., & Kennedy, H. G. (2013). Susceptibility (risk and protective factors) for in-patient violence and self-harm: Prospective study of structured professional judgment instruments START and SAPROF, DUNDRUM-3 and DUNDRUM-4 in forensic mental health services. *BioMed Central Psychiatry, 13*, 197. Retrieved from.

Andrews, D. A., Guzzo, L., Raynor, P., Rowe, R., Rettinger, L. J., Brews, A., & Wormith, J. S. (2012). Are the major risk/need factors predictive of both female and male reoffending? A test with the eight domains of the Level of service/Case Management Inventory. *International Journal of Offender Therapy and Comparative Criminology, 56*, 113–133. https://doi.org/10.1177/0306624x10395716

Bartlett, M. S. (1954). A further note on the multiplying factors for various chi-square approximations in factor analysis. *Journal of the Royal Statistical Society, Series B, 16*, 296–298.

Bonta, J. L., & Andrews, D. A. (2017). *The psychology of criminal conduct* (6th ed.). New York, NY: Routledge.

Cohen, J. (1988). Set correlation and contingency tables. *Applied Psychological Measurement, 12*(4), 425–434. https://doi.org/10.1177/014662168801200410

Cording, J. R., & Besggs Christofferson, S. M. (2017). Theoretical and practical issues for the measurement of protective factors. *Aggression and Violent Behavior, 32*, 45–54. https://doi.org/10.1016/j.avb.2016.12.007

Costello, A. B., & Osborne, J. (2005). Best practices in exploratory factor analysis: Four recommendations for getting the most from your analysis. *Practical Assessment, Research, and Evaluation, 10*(7), 1–9. https://doi.org/10.7275/jyj1-4868

Daffern, M., Simpson, K., Ainslie, H., & Chu, S. (2018). The impact of an intensive inpatient violent offender treatment programme on intermediary treatment targets, violence risk and aggressive behaviour in a sample of mentally disordered offenders. *Journal of Forensic Psychiatry & Psychology, 29*(2), 163–188. https://doi.org/10.1080/14789949.2017.1352014

Davoren, M., Abidin, Z., Naughton, L., Gibbons, O., Nulty, A., Wright, B., & Kennedy, H. G. (2013). Prospective study of factors influencing conditional discharge from a forensic hospital: The DUNDRUM-3 programme completion and DUNDRUM-4 recovery structured professional judgement instruments and risk. *BMC Psychiatry, 13*, 185. https://doi.org/10.1186/1471-244x-13-185

De Vogel, V., de Ruiter, C., Bouman, Y., & de Vries Robbé, M. (2009). *SAPROF. Guidelines for the assessment of protective factors for violence risk*. English version. Utrecht, The Netherlands: Forum Educatief.

De Vries Robbé, M., de Vogel, V., & Douglas, K. S. (2013). Risk factors and protective factors: A two-sided dynamic approach to violence risk assessment. *Journal of Forensic Psychiatry & Psychology, 24*(4), 440–457. https://doi.org/10.1080/14789949.2013.818162

De Vries Robbé, M., de Vogel, V., Douglas, K. S., & Nijman, H. L. I. (2015). Changes in dynamic risk and protective factors for violence during inpatient forensic psychiatric treatment: Predicting reductions in post discharge community recidivism. *Law and Human Behavior, 39*(1), 53–61. https://doi.org/10.1037/lhb0000089

De Vries Robbé, M., & Willis, G. M. (2017). Assessment of protective factors in clinical practice. *Aggression and Violent Behavior, 32*, 55–63. https://doi.org/10.1016/j.avb.2016.12.006

Eisenberg, M. J., van Horn, J. E., Dekker, J. M., Assink, M., van der Put, C. E., Hendriks, J., & Stams, G. J. J. M. (2019). Static and dynamic predictors of general and violent criminal offense recidivism in the forensic outpatient population. A meta-analysis. *Criminal Justice and behavior, 46*(5), 732–750. https://doi.org/10.1177/0093854819826109

Farrington, D. P., Ttofi, M. M., & Piquero, A. R. (2015). Risk, promotive, and protective factors in youth offending: Results from the Cambridge study in delinquent development. *Journal of Criminal Justice, 45*, 63–70. https://doi.org/10.1016/j.jcrimjus.2016.02.014

Grieger, L., & Hosser, D. (2013). Which risk factors are really predictive: An analysis of Andrews and Bonta's "central eight" risk factors for recidivism in German youth correctional facility inmates. *Criminal Justice and Behavior, 41*(5), 613–634. https://doi.org/10.1177/0093854813511432

Guay, J.-P., Parent, G., & Benbouriche, M. (2020). Disentangling promotive and buffering protection: Exploring the interface between risk and protective factors in recidivism of adult convicted males. *Criminal Justice and Behavior, 47*(11), 1468–1486. https://doi.org/10.1177/0093854820945745

Gutierrez, L., Wilson, H. A., Rugge, T., & Bonta, J. (2013). The prediction of recidivism with aboriginal offenders: A theoretically informed meta-analysis. *Canadian Journal of Criminology and Criminal Justice, 55*, 55–99.

Hilton, N. Z., & Radatz, D. L. (2017). The criminogenic and non-criminogenic treatment needs of intimate partner violence offenders. *International Journal of Offender Therapy and Comparative Criminology, 1-13*. https://doi.org/10.1177/0306624X17740015

Kaiser, H. F. (1974). An index of factorial simplicity. *Psychometrika, 39*, 31–36. https://doi.org/10.1007/BF02291575

Klepfisz, G., Daffern, M., & Day, A. (2017). Understanding protective factors for violent reoffending in adults. *Aggression and Violent Behavior, 32*, 80–87. https://doi.org/10.1016/j.avb.2016.12.001

Klepfisz, G., Daffern, M., Day, A., Lloyd, C. D., & Woldgabreal, Y. (2020). Latent constructs in the measurement of risk and protective factors for violent reoffending using the HCR-20v3 and SAPROF: Implications for conceptualizing offender assessment and treatment planning. *Psychology, Crime & Law, 26*(1), 93–108. https://doi.org/10.1080/1068316X.2019.1634197

Neil, C., O'Rourke, S., Ferreira, N., & Flynn, L. (2020). Protective factors in violence risk assessment: Predictive validity of the SAPROF and HCR-20V3. *International Journal of Forensic Mental Health, 19*(1), 84–102. https://doi.org/10.1080/14999013.2019.1643811

Norušis, M. (2007). *SPSS 15.0 advanced statistical procedures companion*. Upper Saddle River, NJ: Prentice Hall.

Nunally, J., & Bernstein, L. (1994). *Psychometric theory*. MacGrow-Hill Higher, Inc.

Osborne, J. W., & Costello, A. B. (2004). Sample size and subject to item ratio in principal components analysis. *Practical Assessment, Research, and Evaluation, 9*(11), 1–9. https://doi.org/10.7275/ktzq-jq66

O'Shea, L. E., & Dickens, G. L. (2016). Performance of protective factors assessment in risk prediction for adults: Systematic review and meta-analysis. *Clinical Psychology: Science and Practice, 23*(2), 126–138. https://doi.org/10.1111/cpsp.12146

Papalia, N., Spivak, B., Daffern, M., & Olgloff, J. R. P. (2020). Are psychological treatments for adults with histories of violent offending associated with change in dynamic risk factors? A meta-analysis of intermediate treatment outcomes. *Criminal Justice and Behavior, 47*(12), 1585–1608. https://doi.org/10.1177/0093854820956377

Rice, M. E., & Harris, G. T. (2005). Comparing effect sizes in follow-up studies: ROC area, Cohen's d, and r. *Law and Human Behavior, 29*, 615–620.

Rogers, R. (2000). The uncritical acceptance of risk assessment in forensic practice. *Law and Human Behavior, 24*(5), 595–605. https://doi.org/10.1023/A:1005575113507

Shiina, A. (2015). Risk assessment and management of violence inpatients with mental disorders: A review. *Forensic, Legal & Investigative Sciences, 1*(002). https://doi.org/10.24966/FLIS-733X/100002

Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics* (5th ed.). New York, NY: Allyn & Bacon.

Van Horn, J. E., Bogaerts, S., Eisenberg, M. J., Van der Put, C., Dekker, J., Van den Hanenberg, F., & Bouman, Y. (2016). *Kernset K-factoren voor het ambulante forensische veld: Een multi-method onderzoek naar risico- en beschermende factoren in relatie tot algemene recidive, geweldsrecidive en seksuele recidive. [Core C-factors for the forensic outpatient field: A mult-method study of risk and protective factors related to general, violent and sexual recidivism.].* Utrecht: Kwaliteit Forensische Zorg.

Van Horn, J. E., Wilpert, J., Scholing, A., & Mulder, J. (2009). *WaagSchaal volwassenen. Risicotaxatie-instrument voor de Ambulante Forensische Psychiatrie. Handleiding. [RAF MH adult: Structured risk assessment instrument for outpatient delinquents. Manual].* Utrecht: De Waag.

Ward, T., & Stewart, C. (2003). Criminogenic needs and human needs: A theoretical model. *Psychology, Crime & Law, 9*, 125–143. https://doi.org/10.1080/1068316031000116247

Wartna, B. S. J. (2000). Recidive-onderzoek en survivalanalyse: Over het meten van de duur van de misdrijfvrije periode. *Tijdschrift voor Criminologie, 42*, 2–20.

Wartna, B. S. J., Blom, M., & Tollenaar, N. (2011). *The Dutch recidivism monitor 4th revised edition.* The Hague, WODC. Memorandum 2011-3a.

Watkins, M. W. (2018). Exploratory factor analysis: A guide to best practice. *Journal of Black Psychology, 44*(3), 219–246. https://doi.org/10.1177/0095798418771807

Yoon, D., Turner, D., Klein, V., Rettenberger, M., Eher, R., & Briken, P. (2018). Factors predicting desistance from reoffending: A validation study of the SAPROF in sexual offenders. *International Journal of Offender Therapy and Comparative Criminology, 62*(3), 697–716. https://doi.org/10.1177/0306624X16664379