A Theoretically Informed Meta-Analysis of the Risk for General and Violent Recidivism for Mentally Disordered Offenders

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A theoretically informed meta-analysis of the risk for general and violent recidivism for mentally disordered offenders ☆,☆☆

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ABSTRACT

Mentally disordered offenders (MDOs) pose a significant challenge for forensic and correctional staff charged with managing them in a safe and humane manner. As with non-disordered offenders, it is important to identify the factors that are predictive of recidivism and can serve as treatment targets for MDOs. The present meta-analysis evaluated the relative predictive validity of the risk/need domains from the General Personality and Cognitive Social Learning (GPCSL) perspective and variables taken from the clinical perspective. The search yielded a total of 126 studies reporting on 96 unique samples ($N = 23,900$). Results indicated that all risk/need domains under the GPCSL perspective were significantly related to both general and violent recidivism. In contrast, the majority of clinical variables (with the exception of antisocial personality/psychopathy) were not predictive of either outcome. These findings emphasize the importance of identifying appropriate risk factors for MDOs.

Contents

1. Introduction

For many correctional systems, the incarceration and supervision of mentally disordered offenders (MDOs) are significant issues that require substantial resources (Association of State Correctional Administrators, 2012). Acknowledging the difficulties in what defines a mental disorder, prevalence rates for mental illness among prisoners are considerably higher than the rates found among the general population (Fazel & Danesh, 2002). In Canada, the results from a computerized mental health screening inventory found that 38.4% of federal prison admissions reported both a history and current high levels of psychological distress (Stewart et al., 2010). Nowhere has this become a more serious problem than in the United States where the percentage of prison inmates with a "mental condition" has risen from 16% of state prison inmates in 1998 (Ditton, 1999) to 56% of state inmates in 2005 (James & Glaze, 2006). Setting aside substance abuse as a mental health issue (estimated at approximately 55% of state and jail inmates), 15.4% of state prison inmates and 23.9% of jail inmates reported symptoms that met the criteria for a psychotic disorder (James & Glaze, 2006).

The increasing number of MDOs within the correctional system creates a multitude of problems. These offenders may threaten the safety of others (e.g., inmates/patients and staff) and themselves (e.g., suicide). Particularly within correctional settings, ensuring that MDOs are appropriately identified and provided with proper care and treatment is a significant challenge (Eno Louden & Skeem, 2013; Wilper et al., 2009; Zinger, 2012). Additionally, MDOs with a comorbid substance abuse disorder have higher parole failure rates and recidivism rates compared to the general offender population which adds to the overcrowding found in many prisons (O'Keefe & Schnell, 2007; Swartz et al., 1998).

Assessing who should be supervised more closely, who should receive treatment, and what type of treatment they should receive is fundamentally a task of offender classification and risk assessment. Researchers and administrators of assessments for MDOs may hold markedly different views about the relevance of specific risk factors and risk instruments compared to those whose primary focus is non-disordered offenders. For example, some may argue that the risk assessment of MDOs should include indicators of delusions and depend on clinical judgment whereas this would not be the case with non-disordered offenders. Decisions regarding the relevance of particular risk factors for MDOs are often contingent on the type of risk assessment used.

1.1. Risk Assessment of Mentally Disordered Offenders

Evidence-based assessments of risk to re-offend can be divided into three categories: 1) purely actuarial, 2) structured professional judgment, and 3) theoretical-actuarial. A good example of the purely actuarial approach is the Violence Risk Appraisal Guide (VRAG; Harris, Rice, & Quinsey, 1993). The VRAG consists of 12 items that were selected based solely on their significant correlations with violent recidivism drawn from a sample of 618 MDOs. Structured professional judgment (SPJ) assessment instruments consist of items drawn from the general literature rather than a specific data sample. In addition, the overall assessment of risk is left to the professional's judgment and not a mechanistic formula (Heilbrun, Yasuhara, & Shah, 2010). An example of a SPJ instrument is the HCR-20 (Webster, Douglas, Eaves, & Hart, 1997). The HCR-20 is comprised of three scales: Historical (10 items), Clinical (5 items), and Risk Management (5 items). Upon reviewing the 20 items, the professional may rate the individual as low, moderate, or high risk and make subsequent recommendations on the services required.

The third type of evidence-based assessment is the theoretically informed assessment. A major model for the assessment of MDOs is the medical or clinical model (Bartlett, 2010; Otto & Heilbrun, 2002). What is common to many assessment strategies used with MDOs is the prevalence of clinical, psychopathological items. For example, the goal of a forensic interview is often to reach a diagnosis or to assess mood and cognitive function. Some clinical items are also included in SPJ and purely actuarial assessments. To illustrate, the HCR-20 has the items "active symptoms of major mental illness" and "lack of insight" and the VRAG includes a diagnosis of psychopathy.

The usefulness of the clinical model has been called into question for its weakness in both identifying relevant risk factors (Bonta, Law, & Hanson, 1998; Phillips et al., 2005) and informing treatment targets for MDOs that reduce recidivism (Morgan et al., 2012). In an early meta-analysis of risk predictors among MDOs, Bonta et al. (1998) found the presence of a mental disorder to be inversely related to both general and violent recidivism. Subsequent studies of risk factors for MDOs have also found this pattern of results although the evidence is not unequivocal (Burke, 2010; Fitzgerald, Gray, Taylor, & Snowden, 2011). Morgan et al. (2012) reviewed 26 treatment outcome studies that met certain methodological criteria (e.g., presence and composition of a control group). Twenty-four of the studies targeted psychopathology (e.g., anxiety, depression) and only two studies targeted both psychopathology and "criminalness" (e.g., prosocial skill training). Results indicated that although mental health symptoms decreased with treatment, there was no reduction in criminal recidivism. From both a risk prediction and a recidivism reduction perspective, symptoms of mental illness do not appear to play a major role. The reasons for this finding may be many but one possible explanation is that the factors that are a focus in the clinical model are inappropriate for the risk assessment and treatment of MDOs.

1.2. A General Personality Cognitive Social Learning approach to understanding the risk factors of MDOs

In 1994, Andrews and Bonta presented a social learning perspective of criminal behavior which subsequently developed into a General Personality and Cognitive Social Learning (GPCSL) model of criminal conduct (Andrews & Bonta, 1994; Andrews & Bonta, 2010a). GPCSL proposes that the causes of crime are to be found within the individual and his/her social learning environment. Although clinical models of crime also emphasize person factors, the clinical models and GPCSL differ in the *type* of psychological variables that are deemed important.

GPCSL recognizes that there are many routes to crime but some experiences in life are more influential than others. Fig. 1 presents an overview of the factors that may lead to crime according to GPCSL. Broad biosocial factors, such as the family of origin, ethnicity, mental health, and neighborhood demographics, are the most distally related to criminal behavior and, therefore, viewed as minor risk factors. Proximal to criminal behavior are the influences of rewards and punishments within the social contexts of education and employment, family, leisure and recreation, and substance abuse (the use of alcohol and/or drugs). For example, the lack of employment, poor use of leisure time, substance abuse, and having at least one criminal parent have a far greater impact on the likelihood of criminal behavior relative to one's socioeconomic conditions (although socioeconomic conditions may influence the contingencies governing employment, leisure/recreational activities, etc.). Such situations limit exposure to rewards for prosocial behavior (e.g., if one does not have a job there is a lost opportunity to be exposed to prosocial models and to be reinforced for prosocial behavior) and also diminish punishment for rule violating behavior (e.g., if unemployed there may be little to lose if put in jail). Within GPCSL, the domains of education and employment, family, leisure, and substance abuse are referred to as the Moderate Four risk/need factors.

The most proximal factors influencing criminal behavior are procriminal companions, attitudes and cognitions supportive of criminal behavior, an antisocial personality pattern (i.e., poor self-control, early onset and diverse criminal behavior, callous, hostile emotions, and a restless energy) and, operating in the background, a history of criminal behavior that reflects the reinforcement history for antisocial
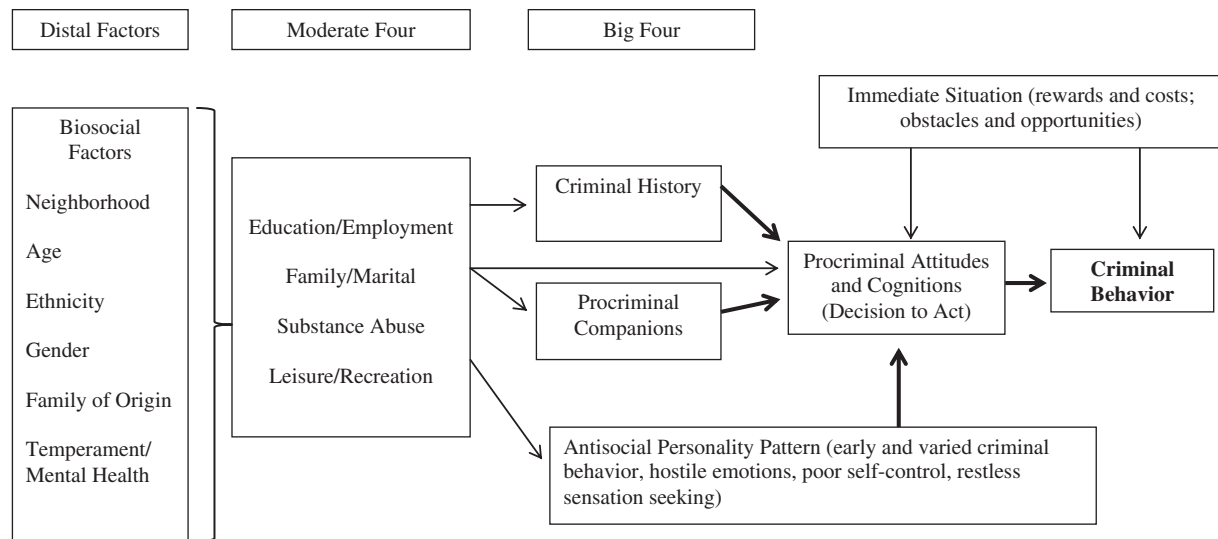
Fig. 1. A general personal and social cognitive perspective of criminal behavior. Bolded arrows represent stronger relationships between the variables.

behavior. The GPCSL theoretical perspective views these as major determinants of criminality and they are referred to as the Big Four risk/need factors. All of these factors facilitate the commission of a criminal act but external factors in the immediate situation may also affect the outcome (e.g., an offender prepares to break into a house but a police cruiser drives by setting the offender's plan on a different trajectory).

As already noted, the traditional clinical variables of anxiety, depression, mood, and major psychotic symptoms are salient in clinical perspectives of criminal behavior, however, in GPCSL, such variables are minor risk factors. Drawing from GPCSL, the major risk/need factors are what Andrews and Bonta (2010a) call the Central Eight risk/need factors. They are: 1) Criminal History, 2) Procriminal Companions, 3) Procriminal Attitudes and Cognitions, 4) Antisocial Personality Pattern, 5) Education/Employment, 6) Family/Marital, 7) Substance Abuse, and 8) Leisure/Recreation. The specificity of risk/need factors in GPCSL set it apart from other social learning models that emphasize criminal behavior as a learned behavior in accordance with the laws of operant, vicarious, and classical conditioning without providing detail on the specific behaviors and cognitions leading to crime.

The first Central Eight factor, Criminal History, is a static, unchangeable risk factor (one cannot eliminate criminal history, only add to it). The remaining seven factors are dynamic risk factors. That is, they can change in both directions (e.g., one can find employment or lose it). The importance of these dynamic risk factors is that, in addition to being predictive of criminal behavior, they can serve as targets for treatment programming. Treatments that successfully address these dynamic risk factors or criminogenic needs are associated with reduced recidivism (Andrews & Bonta, 2010a; Andrews et al., 1990; Smith, Gendreau, & Swartz, 2009).

A number of meta-analytic reviews have found evidence for the predictive validity of the Central Eight risk/need factors and for the primacy of the Big Four over the Moderate Four risk/need factors among general offenders (Andrews & Bonta, 2010a; Andrews, Bonta, & Wormith, 2006; Gendreau, Little, & Goggin, 1996). In all of these reviews, indicators of psychological distress/dysfunction performed relatively poorly compared to the Central Eight (average r of .03 compared to r's ranging from .17 to .26 for the Central Eight, as summarized by Andrews & Bonta, 2010a). Moreover, the Central Eight risk/need factors appear applicable to youth (Simourd & Andrews, 1994), women offenders (Andrews et al., 2012), Aboriginal offenders (Gutierrez, Wilson, Rugge, & Bonta, 2013), and sex offenders (Hanson, 2009). However, the primacy of the Big Four over the Moderate Four is not well established among these subsets of offenders. For example, in a review of the risk/need

factors for women offenders, Andrews et al. (2012) call for a Big Five that includes Substance Abuse. Despite the ongoing debate on the importance of the Big Four, the evidence to date supports the Central Eight risk/need factors as being applicable to a range of offenders.

One offender population on which the validity of the Central Eight has not been fully tested is the MDO population. The results from Bonta et al.'s (1998) meta-analysis of risk factors among MDOs found that clinical factors did not predict recidivism whereas risk/need factors did. They found criminal history and deviant lifestyle (consisting of the Central Eight risk/need factors of employment, family problems, and substance abuse) to be more predictive of both general and violent recidivism compared to clinical variables (e.g., psychosis, mood disorder). Unfortunately, the analyses were not clearly representative of the Central Eight as they have been defined in more recent literature (e.g., the original analyses did not clearly assess antisocial personality pattern or procriminal attitudes). In addition, research on MDOs has grown exponentially and analyses based on more recent research findings are needed.

The primary goal of the present review was to test the predictive validity of the Central Eight risk/need factors for general and violent recidivism among MDOs. Our secondary goal was to assess the predictive validity of variables hypothesized to be important by the clinical/medical model. Although GPCSL brings a specific perspective to criminal behavior, it stems from a general social learning theory of human behavior. For example, if one wished to predict success on a diet one could consider the Central Eight (e.g., history of success with dieting, attitudes towards dieting, social support for dieting). Therefore, the Central Eight is expected to generalize to a wide range of behaviors and offenders, including MDOs. Up to this point, reviews of the risk factors for MDOs have been largely atheoretical (Bonta et al., 1998; Phillips et al., 2005). The present study therefore more clearly situated the results within the theoretical framework of the GPCSL perspective.

2. Method

2.1. Study selection

Studies included in the present meta-analysis were taken from both published and unpublished (e.g., dissertations, government reports) sources dating from January 1959 to the end of June 2011 (published in English only). Studies were identified by combining search terms specifying a mentally disordered sample (i.e., *predictor*, dangerousness, maximum security psychiatric institution, mentally disordered offend*,*

mentally ill offend*, mentally ill inmate*), with terms restricting the search to studies with recidivism as the outcome measure (i.e., *recid*, violen**). Computer searches were conducted of the following databases: PsycINFO, Dissertations and Full Theses: Full text, Dissertations and Full Theses: UK and Ireland, National Criminal Justice Reference System (NCJRS), Web of Science, and Criminology. Forensic journals not included in PsycINFO at the time of the original search were searched individually: Psychology, Crime, and Law; International Journal of Comparative and Applied Criminal Justice; Crime and Justice; and Journal of Psychiatry and Law. Finally, the reference lists of accepted studies were searched for any additional studies.

In order to be selected, each study had to adhere to four inclusion criteria. The first criterion concerned controlling for study design quality. As meta-analyses are often criticized for including low-quality studies producing less than accurate results (Borenstein, Hedges, Higgins, & Rothstein, 2009), only studies with a prospective, longitudinal design were included. The second inclusion criterion specified that studies had to provide the statistical information necessary to calculate the effect size (Cohen's *d*). Third, in terms of sample characteristics, only studies identifying mentally disordered offender samples were included. This required that participants had been identified as offenders and subjected to some form of mental health identification or intervention. As a general rule, we accepted studies where at least two thirds of the total sample was identified as mentally disordered offenders. Studies that examined general offender samples but collected mental health information and studies of general non-forensic psychiatric patients were excluded. Finally, studies must have investigated the predictive accuracy of at least one variable of interest (e.g., age). The only exception to this criterion was the inclusion of studies reporting recidivism rates for samples of mentally disordered offenders compared to samples of general offenders. These studies were included in order to assess the specific effect of any mental diagnosis on recidivism even if they did not provide information on additional variables of interest.

Both general (any recidivism, including violent) and violent recidivism (including sexual) were specified as outcome measures. If type of recidivism was not specified, it was coded as general recidivism. Recidivism referred to any evidence of reoffending (arrests, convictions) including recommitment to a psychiatric facility due to a new (either general or violent) criminal offense.

In some cases, multiple studies reported information on the same sample of mentally disordered offenders or on various subsamples (e.g., isolating data on offenders with a primary diagnosis of schizophrenia). In order to avoid "double counting" predictors presented in multiple studies, the study with the largest sample and longest follow-up time was chosen as the primary source and only non-overlapping predictors presented in separate studies were coded. Unique identifiers were created in order to distinguish between different studies and number of unique samples. One-hundred and twenty-six studies reporting on 96 unique samples met all of the inclusion criteria.

2.2. Predictor domains and measures

The variables of interest were divided into two categories: variables related to the Central Eight risk/need factors (Andrews & Bonta, 2010a) and variables stemming from the clinical model. If a study reported two or more separate variables that represented the same underlying concept or predictor, they were aggregated into a factor score (e.g., the individual predictors of *property offense* and *violent offense* were aggregated into the factor *adult crime*). The factor scores relating to the Central Eight risk/need factors were aggregated into the eight separate domains according to the Level of Service/Case Management Inventory (LS/CMI; Andrews, Bonta, & Wormith, 2004; e.g., the factors of *adult crime* and *violent history* were aggregated into the domain *Criminal History*). When calculating factor and/or domain effect sizes, the average effect size and average base rate of all individual predictors or

factors was used. See Table 1 for a list of variables contributing to the analyses of the present study.

2.3. Procedure

The coding form used in the present study focused on two types of information. First, study information (e.g., year of publication, peer review status) and sample demographics (e.g., mean age, gender) were coded, followed by information relating to predictor variables. If Cohen's *d* was not originally coded, the raw statistics were converted into this effect size.

The task of coding studies was divided between the second and third author. In order to ensure consistent coding, 20 studies representing 23 unique samples were identified for inter-rater reliability. The kappa statistic was used when assessing the reliability of categorical variables and a two-way random effects model intraclass correlation coefficient (ICC; absolute agreement) was used when assessing the reliability of ordinal or continuous variables. When kappa could not be calculated, a percent agreement between raters was calculated. Inter-rater agreement for study and sample characteristics was perfect for seven variables ($k = 1.00$; ICC $= 1.00$; 100% agreement), high for 10 variables ($k > .86$; ICC $= .88$; higher than 84% agreement), and fair for one variable ($k = .64$). Agreement was low for two variables: attrition rate (ICC $= .06$) and percent of sample refusing to participate (ICC $= .46$). These two variables were excluded from further analyses.

Inter-rater reliability for effect sizes of individual predictors and factors was acceptable with ICC values ranging from .70 to 1.00 (83% of ICC values were above .90). All ICC values for the Central Eight domain categories were above .90 (range: .92–1.00). Any discrepancies in coding were corrected after a consensus between raters had been reached.

Findings were summarized using the standardized mean difference between two independent groups, recidivists and non-recidivists (Cohen's *d*; Hasselblad & Hedges, 1995). Cohen's *d* was chosen over other effect size indices (e.g., *r*) given that it is less affected by varying base rates. The standard convention for interpreting *d* values considers values of .20 to be "small", values of .50 to be "medium", and values larger than .80 to be "large" (Cohen, 1988). If the 95% confidence interval does not contain zero, the *d* value is considered to be significant at the .05 level. If the 95% confidence intervals for two separate predictors do not overlap, the effect sizes can be considered significantly different from one another at the .01 level. Only variables with at least three effect sizes were included in the analyses.

When aggregating results, the averaged *d* values were calculated by weighting each individual d_i by the inverse of its variance, giving more weight to studies with larger samples. The variance of the weighted mean was subsequently used to calculate 95% confidence intervals. When calculating d_i from 2 x 2 tables, Formula 19 from Sánchez-Meca, Marín-Martínez, and Chacón-Moscoso (2003) was used to calculate the variance with 0.5 added to each cell in order to avoid empty cells (Fleiss, 1994). When d_i was converted from other statistics (e.g., means, ROC areas, *t*), Formula 3 taken from Hasselblad and Hedges (1995) was used to calculate the variance.

Both fixed-effect and random-effects models were calculated. Fixed-effect meta-analysis assumes that all studies contain an identical estimate of one true effect size and any observed variance is attributed to sampling error. Conclusions are therefore restricted to the particular sample of studies included in the meta-analysis (Borenstein et al., 2009). Random-effects meta-analysis assumes that the observed effect sizes represent a random sample of all possible estimates of the true population effect. Under this model, observed effects vary as a function of study methodology (e.g., differences in samples) and this between-study variability is subsequently incorporated into the error term (Borenstein et al., 2009). Although both fixed-effect and random-effects estimates are presented, only random-effects are discussed. Given the diverse methodology represented in the current sample of

Table 1
Individual factors contributing to the Central Eight and clinical variables.

Domain	Factors
Central Eight	
Criminal History	Adult crime, early antisocial behavior, escape history, length of time in correctional setting, history of property offences, previous failure on parole/probation, adjustment problems in prison/hospital, general history of sexual dysfunction/offences (excludes variables related to index sexual offences), history of violent behavior
Antisocial Personality Pattern	Early antisocial behavior, antisocial personality pattern, antisocial attitudes, escape history, previous failure on parole/probation, history of violent behavior, financial problems
Procriminal Attitudes and Cognitions	Procriminal attitudes and cognitions
Procriminal Companions	Antisocial companions
Family/Marital	Generalized family dysfunction (past or present), marital status
Education/Employment	Level of education, employment status (includes work maladjustment)
Substance Abuse	Past or present substance abuse involving alcohol, past or present substance abuse involving drugs, general substance abuse (not specified)
Leisure/Recreation	Any predictor concerning how leisure time is spent
Clinical model	Time in psychiatric setting, prior psychiatric hospital, mood disorder, psychosis (includes schizophrenia, hallucination), treatment history, personality disorder (unspecified), Antisocial Personality Disorder or psychopathy, mentally disordered offender versus general offender

studies, the assumptions underlying the random-effects model provided a more conservative interpretation of the current results.

Both the Q statistic and the I^2 statistic were used to quantify and describe between-study variability. Whereas the Q statistic provides a measure of the significance of between-study variability, the I^2 statistic provides an indication of the magnitude of this variability. The Q statistic is distributed as a chi-square with k-1 degrees of freedom (k being the number of studies; Hedges & Olkin, 1985). I^2 is presented as a percentage with 25, 50, and 75 indicating small, medium, and large proportions of variability (Huedo-Medina, Sánchez-Meca, Marín-Martínez, & Botella, 2006).

When effect sizes contained significant variability (as measured by Q), the presence of outliers was considered by examining both the size of individual d_i values (specifically focusing on extreme d_i values) compared to the mean weighted effect size and the relative weight each d_i value was contributing to the mean weighted effect size (*wss*; weighted sum of squares). A study was removed if, by doing so, the total variability (Q) was reduced by 50%. To further explore significant variability in mean weighted effect sizes, moderator analyses of certain study and sample variables (i.e., publication status, primary sample diagnosis, and race) were conducted using the Q-change statistic ($Q\Delta$). A significant Q-change ($p < .05$) indicates that the moderator accounts for a significant proportion of the observed variability. Each level of the moderator variable required three effect sizes in order to be analyzed.

3. Results

The search yielded a total of 126 studies representing 96 unique samples (several studies reported on the same sample) and over 1700 possible effect sizes for analysis [2]. The majority of the studies were published (79%) and originated from the United States (49%), followed by the United Kingdom (23%) and Canada (15%). The median year of publication was 1999 with the largest number of studies being published in 2004 ($k = 12$). The average recidivism follow-up time was 4.90 years ($SD = 3.04$; five studies did not report the follow-up time). The unweighted recidivism base rate was 39% and 23% for general and violent recidivism respectively.

The average sample size for MDOs was 298 ($SD = 293$; range: 8–1175). It is important to note that several studies failed to report on pertinent demographic characteristics. When reported, the average age was 32.7 ($SD = 5.87$) and the majority of the samples contained both men and women (58.1%). The average grade level achieved was 10 and 26 of the 96 samples reported a 47% employment rate. On average, 41.1% of the participants were minority offenders and 88.6% were single. The majority diagnosis was schizophrenia and 51.6% of offenders had previously been admitted to a hospital. Finally, 63% of index offenses were violent in nature.

3.1. Predictive validity of domains for general recidivism

Table 2 displays the results for the Central Eight in predicting general recidivism among MDOs. All domain categories within the Central Eight predicted general recidivism significantly, ranging from small effect sizes (e.g., Education/Employment $d = .28$, 95% CI $= .07, .49$) to moderate effect sizes (Substance Abuse $d = .51$, 95% CI $= .37, .64$). Overall, the strongest predictors of general recidivism among the Central Eight were Substance Abuse (past and current), Procriminal Attitudes and Cognitions, and Antisocial Personality Pattern. We did not have a sufficient number of studies to calculate effect sizes for Leisure/Recreation or Procriminal Companions. There were significant Q values for all Central Eight domains, except Family/Marital and Procriminal Attitudes, indicating large between study variability in effect sizes. A relatively large effect size ($d = 1.30$) originating from the Harris et al. (1993) sample was identified as an outlier for Education/Employment and was subsequently removed substantially reducing the effect size (Table 2). No other studies were identified as outliers for the Central Eight domains.

Individual predictors contributing to the Central Eight domain categories were analyzed separately. Within the Education/Employment domain, problems with employment significantly predicted general recidivism ($d = .41$, 95% $= .09, .72$) while educational concerns ($d = .16$, 95% CI $= -.02, .34$) was not significant. Within the Family/Marital domain, both being single and having family problems were significantly predictive of general recidivism. Finally, examining the Substance Abuse domain, drug use was a significantly better predictor of general recidivism ($d = .60$, 95% CI $= .45, .74$) than issues related specifically to alcohol ($d = .28$, 95% CI $= .12, .44$), even though both predictors were significant. In cases where the type of substance abuse was not specified, having a substance abuse problem was moderately and significantly related to general recidivism ($d = .57$, 95% CI $= .36, .78$).

Results for variables stemming from the clinical model are presented in Table 3. The majority of these variables were not significant predictors of general recidivism (e.g., psychosis, mood disorder, prior admissions, psychiatric treatment). One exception was having an intellectual impairment which, after removing an outlying study, demonstrated a small positive relationship with recidivism ($d = .26$, 95% CI $= .04, .47$). Only two variables were moderately and significantly predictive of general recidivism: personality disorders (unspecified) and antisocial personality/psychopathy. In fact, across all individual predictors, having an antisocial personality disorder/psychopathic disorder was among the strongest predictors of general recidivism ($d = .54$, 95% CI $= .43, .65$). Although considered under the clinical model, antisocial personality was also aggregated into the Antisocial Personality Pattern domain in keeping with the underlying theory of the Central Eight risk/need factors. The relationship between mental illness and recidivism was also examined by comparing recidivism rates between MDOs versus general offenders. The presence of any mental

Table 2
Central Eight predictors of general recidivism.

Risk Factor	Fixed		Random						
	Mean d	95% CI	Mean d	95% CI	Q	I^2	k	n	Study ID
Criminal History	.32	.27, .37	.34	.21, .47	223.35***	83.88	37	8312	4, 9, 11, 14, 19, 19.01, 20, 22, 23, 24, 26, 27, 29, 31, 34, 35, 37, 38, 40, 45, 53, 54, 55, 59, 68, 70, 71, 72, 75, 76, 81, 82, 88, 92, 93, 94, 96
Procriminal Attitudes	.37	.22, .51	.37	.22, .51	3.08	2.67	4	976	22, 35, 42, 54
Antisocial Personality Pattern	.42	.36, .47	.41	.29, .54	107.71***	73.08	30	5578	4, 9, 11, 14, 22, 23, 26, 27, 29, 32, 35, 37, 40, 42, 46, 53, 54, 55, 57, 58, 59, 68, 69, 75, 77, 81, 82, 83, 84, 94
Education/Employment	.42	.31, .53	.41	.09, .73	69.17***	86.99	10	1521	4, 9, 22, 23, 27, 53, 55, 81, 93, 96
minus 22	.25	.13, .37	.28	.07, .49	21.66**	63.06	9	1268	4, 9, 23, 27, 53, 55, 81, 93, 96
Education only	.15	.03, .27	.16	−.02, .34	14.00	49.99	8	1440	4, 9, 22.6, 23.1, 55, 81, 93, 96
Employment only	.92	.75, 1.08	.74	−.04, 1.53	122.19***	95.09	7	937	4, 9, 22.6, 23.1, 27, 53, 55
minus 22.6	.38	.19, .58	.41	.09, .72	11.81*	57.65	6	684	4, 9, 23.1, 27, 53, 55
Family/Marital	.31	.22, .40	.38	.24, .52	17.69	43.46	11	2205	4, 9, 22, 23, 27, 35, 59, 68, 71, 81, 93
Marital status (single)	.35	.21, .49	.39	.16, .61	14.20*	50.70	8	1149	4, 22.3, 23, 27, 59.3, 68, 81, 93
Family problems	.26	.16, .37	.33	.09, .58	21.32**	71.86	7	1579	4, 9, 22, 23.1, 35, 68, 71
Substance Abuse	.48	.42, .54	.51	.37, .64	84.86***	75.25	22	4991	9, 22, 27, 29, 33, 34, 35, 37, 39, 40, 46, 47, 52, 53, 55, 59, 71, 75, 82, 88, 91, 93
Alcohol only	.24	.13, .35	.28	.12, .44	14.65	38.56	10	2223	9, 22, 27, 29, 35, 37, 53, 55, 59.4, 75
Drug only	.61	.49, .72	.60	.45, .74	11.46	21.50	10	1839	9, 27, 29, 35, 40, 47, 55, 59.4, 75, 82
Substance abuse (unspecified)	.60	.47, .72	.57	.36, .78	20.57**	61.11	9	2259	33, 34, 39, 46, 52, 71, 88, 91, 93

Notes: Criminal History includes previous deviant sexual behavior/offences and excludes violent/sexual index offence. Antisocial Personality Pattern excludes violent/sexual index offence; insufficient k to calculate effect size for Leisure/Recreation and Procriminal Companions.
*p < .05, **p < .01, ***p < .001.

disorder did not significantly predict general recidivism (d = -.09, 95% CI = -.29, .10).

3.2. Predictive validity of domains for violent recidivism

Table 4 displays the results for the Central Eight risk/need factors in predicting violent recidivism among MDOs. Consistent with the results for general recidivism, all domains that could be examined within the Central Eight predicted violent recidivism; the strongest predictors were Antisocial Personality Pattern (d = .57, 95% CI = .48, .67), Procriminal Attitudes and Cognitions (d = .51, 95% CI = .37, .65), and Criminal History (d = .50, 95% CI = .41, .59). There were not enough studies to calculate individual effect sizes for Leisure/Recreation and Procriminal Companions. Significant between study variability was also identified for all of the Central Eight domains analyzed. Examining

individual predictors within the Education/Employment domain identified problems with employment as a significant predictor of violent recidivism (d = .16, 95% CI = .03, .29) while level of education was not significant. Within the Family/Marital domain, both marital status (i.e., single; d = .44, 95% CI = .30, .58) and family problems (d = .24, 95% CI = .10, .37) were moderate predictors of violent recidivism. Finally, within the Substance Abuse domain, alcohol use (d = .22, 95% CI = .06, .38) and unspecified substance abuse (d = .28, 95% CI = .11, .44) were significant predictors of violent recidivism while drug use was not.

The results for variables under the clinical model are displayed in Table 5. Consistent with the results for general recidivism, the majority of these variables were non-significant. Once again, the only exceptions were personality disorders (unspecified) and antisocial personality/psychopathy, which were both moderate predictors of violent recidivism (d = .41, 95% CI = .26, .57 and d = .66, 95% CI = .52, .80

Table 3
Clinical predictors of general recidivism.

	Fixed		Random						
	Mean d	95% CI	Mean d	95% CI	Q	I^2	k	n	Study ID
Psychosis	.04	−.06, .13	.03	−.17, .23	61.26***	73.88	17	3003	4, 9, 14, 22.2, 23.1, 24, 33, 37, 38.1, 46, 50, 54, 55, 62, 78, 82, 93
Schizophrenia	−.03	−.18, .11	.01	−.33, .35	38.67***	79.31	9	1849	22.2, 24, 33, 37, 38.1, 55, 62, 82, 93
minus 37	−.17	−.33, −.02	−.14	−.35, .07	11.16	37.25	8	1232	22.2, 24, 33, 38.1, 55, 62, 82, 93
Mood disorder	−.14	−.24, −.04	−.16	−.48, .16	61.08***	85.26	10	2341	29, 33, 37, 38.1, 50, 54, 55, 62, 81, 93
Intelligence	.15	.01, .28	.15	−.14, .45	21.38**	71.94	7	2409	4, 22.5, 32, 33, 37, 59, 93
minus 59	.25	.11, .40	.26	.04, .47	7.80	35.90	6	1268	4, 22.5, 32, 33, 37, 93
Prior admissions	.09	.00, .18	.12	−.11, .35	46.05***	80.46	10	2660	4, 19, 19.01, 22.4, 23, 34, 55, 59.3, 71, 81
Length of hospitalization	−.06	−.15, .03	−.11	−.47, .25	138.75***	92.79	11	2352	4, 11, 19, 19.01, 22.2, 26, 34, 37, 53, 82, 94
minus 34	−.28	−.38, −.18	−.24	−.41, −.08	18.62*	51.66	10	1986	4, 11, 19, 19.01, 22.2, 26, 37, 53, 82, 94
Psychiatric treatment history	−.19	−.26, −.11	−.23	−.48, .02	213.25***	88.28	26	4142	4, 6, 23, 27, 32, 33, 35, 38, 40.1, 41, 45, 47, 53, 56, 62, 67, 68, 72, 80, 81, 82, 87, 89, 91.1, 92, 96
Mentally disordered vs. Non-mentally disordered	−.19	−.24, −.14	−.09	−.29, .10	275.75***	90.57	27	9504	2, 2.01, 3, 7, 10, 12, 13, 14.1, 16, 18, 19, 21, 21.01, 22.6, 27, 28, 29, 30, 43, 50.1, 52, 64, 66, 73, 78, 79, 85
NGRI vs. Non-mentally disordered	−.14	−.27, −.01	.01	−.26, .27	14.40*	58.34	7	1838	2, 3, 10, 13, 14.1, 16, 66
Personality disorders (unspecified)	.44	.32, .55	.44	.32, .56	8.40	4.71	9	1765	22.4, 24, 37, 43, 53, 55, 59.3, 82, 93
Antisocial Personality or Psychopathy	.54	.46, .62	.54	.43, .65	26.52*	43.45	16	3742	4, 22.6, 29, 32, 37, 42, 46, 54, 57, 58, 59.6, 69, 75, 77, 83, 84

Notes: Psychosis includes diagnosis of schizophrenia or a psychotic disorder and/or presence of hallucinations/delusions; having a mental disorder was coded as the risk factor for the variable mentally disordered vs. non-mentally disordered.
*p < .05, **p < .01, ***p < .001.

Table 4
Central Eight predictors of violent recidivism.

Risk Factor	Fixed		Random						
	Mean d	95% CI	Mean d	95% CI	Q	I^2	k	n	Study ID
Criminal History	.50	.43, .56	.50	.41, .59	30.32*	37.34	20	5337	1, 5, 5.01, 8, 9, 15, 22, 25, 37, 39, 40, 44, 53, 54, 60, 61, 63, 65, 75, 76.1
Antisocial Personality Pattern	.56	.50, .62	.57	.48, .67	57.05***	56.18	26	6760	1, 5, 5.01, 8, 9, 15, 22, 37, 39, 40, 43, 44, 46, 53, 54, 57, 58, 60, 61, 63, 65, 69, 75, 76.1, 77, 83
Procriminal Attitudes	.51	.37, .65	.51	.37, .65	0.16	0.00	3	1216	22, 54, 76.1
Education/Employment	.17	.08, .25	.14	.01, .28	19.57*	54.01	10	2881	5, 5.01, 9, 22, 44, 53, 55, 60, 61, 76.1
Education only	.18	.07, .29	.11	−.13, .34	18.15**	77.96	5	1660	5, 5.01, 9, 22, 61
minus 22	.04	−.09, .17	.02	−.19, .23	7.07	57.59	4	1042	5, 5.01, 9, 61
Employment only	.17	.07, .26	.16	.03, .29	15.43	41.67	10	2881	5.01, 5, 9, 22, 44, 53, 55, 60, 61, 76.1
Family/Marital	.26	.17, .35	.25	.09, .41	21.57**	62.91	9	2741	5, 5.01, 9, 22, 44, 60, 61, 65, 76.1
Marital status (single)	.38	.25, .51	.33	.07, .60	9.42*	68.14	4	1724	22, 44, 61, 65
minus 65	.44	.30, .58	.44	.30, .58	0.85	0.00	3	1512	22, 44, 61
Family problems	.23	.13, .33	.24	.10, .37	10.04	40.27	7	1972	5.01, 5, 9, 22, 60, 61, 76.1
Substance Abuse	.20	.13, .27	.20	.09, .31	26.66*	54.99	13	4134	5, 9, 22, 37, 39, 40, 46, 53, 55, 60, 61, 75, 76.1
Alcohol only	.33	.24, .43	.31	.08, .54	38.75***	81.94	8	2897	9, 22, 37, 53, 55, 61, 75, 76.1
minus 75	.21	.10, .31	.22	.06, .38	12.13	50.52	7	2178	9, 22, 37, 53, 55, 61, 76.1
Drug only	.21	.08, .34	.19	−.16, .54	19.87***	84.90	4	1433	9, 40, 55, 75
minus 40	.34	.19, .49	.32	−.02, .65	8.58*	76.69	3	1100	9, 55, 75
Substance abuse (unspecified)	.28	.11, .44	.28	.11, .44	2.10	0.00	4	877	5.1, 39, 46, 60

Notes: Criminal History includes previous deviant sexual behavior/offences and excludes violent index offence. Antisocial Personality Pattern excludes violent/sexual index offence; insufficient k to calculate effect size for Leisure/Recreation and Procriminal Companions.
*$p < .05$, **$p < .01$, ***$p < .001$.

respectively). Consistent with previous results, having any mental disorder was not predictive of violent recidivism ($d = -.16$, 95% CI = -.40, .09).

3.3. Moderator analyses

Three moderator variables were analyzed: peer reviewed (yes vs. no), offender type (MDO vs. Not Guilty by Reason of Insanity or NGRI vs. other), and race (white vs. other). For offender type, the "other" category comprised mostly of comorbid and personality disorders. Each level of the moderator variable required three effect sizes in order to be analyzed. Therefore, for general recidivism, moderator analyses were only conducted for Criminal History, Antisocial Personality Pattern, Education/Employment, Substance Abuse, and psychosis.

Results for peer reviewed were mostly non-significant or inconsistent: effect sizes for the Education/Employment domain were significantly larger for peer reviewed studies ($d = .38$ versus $d = .04$, $p < .05$), while effect sizes for Substance Abuse were significantly larger for non-peer reviewed studies ($d = .68$ versus $d = .35$, $p < .05$). In terms of offender type, Criminal History was a significantly better predictor of

general recidivism for samples of NGRI offenders ($d = .60$) compared to MDO ($d = .33$) or "other" samples ($d = .07$, $p < .01$). Also, the effect size for the "other" samples was significantly smaller compared to NGRI and MDO samples ($p < .01$). Antisocial Personality Pattern was significantly better at predicting general recidivism for "other" samples ($d = .55$) compared to samples of MDOs ($d = .32$, $p < .05$). For psychosis, effect sizes were significantly larger for samples of NGRIs than MDO samples ($d = .21$ versus $d = .00$, $p < .05$). When race could be analyzed, Criminal History predicted general recidivism significantly better for samples of predominantly white offenders ($d = .39$ versus $d = .15$, $p < .01$).

For violent recidivism, moderator analyses were conducted on Criminal History, Antisocial Personality Pattern, Substance Abuse, and psychosis. Results indicated that Substance Abuse was a stronger predictor for non-peer reviewed studies ($d = .46$ versus $d = .18$, $p < .05$), whereas the effect size for psychosis was significantly smaller in this case ($d = -.14$ versus $d = .09$, $p < .05$). In terms of offender type, Criminal History appeared to be a better predictor for NGRI offenders ($d = .67$) compared to MDOs ($d = .43$, $p < .05$), however overlapping confidence intervals made it difficult to ascertain the exact nature of this difference. Effect sizes for Antisocial Personality Pattern were

Table 5
Clinical predictors of violent recidivism.

	Fixed		Random						
	Mean d	95% CI	Mean d	95% CI	Q	I^2	k	n	Study ID
Psychosis	.04	−.04, .12	.09	−.07, .26	55.30***	74.68	15	4366	5.01, 8, 9, 22, 25, 37, 44, 46, 49, 54, 55, 60, 61, 65, 90
Schizophrenia	−.11	−.23, .01	.04	−.28, .36	32.25***	84.50	6	2507	8, 22, 37, 44, 49, 55
Mood disorder	.00	−.11, .11	.04	−.24, .31	23.96***	79.13	6	2417	5.10, 8, 37, 54, 55, 61
minus 54	−.11	−.24, .01	−.08	−.29, .13	8.87	54.88	5	1920	5.10, 8, 37, 55, 61
Intelligence	.04	−.07, .15	.00	−.21, .21	15.35**	67.42	6	3418	5.01, 8, 22, 37, 59, 61
Prior admissions	.05	−.06, .15	.10	−.15, .35	21.37***	81.28	5	1792	5.01, 5, 22, 55, 61
Length of hospitalization	−.46	−.62, −.30	−.20	−.92, .52	30.38***	93.42	3	913	22.2, 37, 53
Psychiatric treatment history	.10	−.08, .29	.23	−.23, .69	22.70***	82.38	5	801	49, 53, 61, 76.1, 95
minus 95	−.04	−.24, .16	.00	−.33, .33	7.44	59.66	4	685	49, 53, 61, 76.1
Mentally disordered vs. Non-mentally disordered	.44	.37, .51	−.06	−.47, .35	380.36***	96.32	15	49367	1, 12, 16, 19, 21, 21.01, 22.6, 29, 40, 43, 48, 74, 79, 85, 95
minus 74	−.07	−.16, .02	−.16	−.40, .09	78.62**	83.47	14	15036	1, 12, 16, 19, 21, 21.01, 22.6, 29, 40, 43, 48, 79, 85, 95
Personality disorders (unspecified)	.43	.33, .52	.41	.26, .57	24.04*	54.25	12	3513	8, 22, 37, 43, 53, 55, 60, 61, 63, 65, 76.1, 90
Antisocial Personality or Psychopathy	.64	.56, .72	.66	.52, .80	33.77**	61.50	14	4280	22, 37, 43, 46, 54, 57, 58, 60, 61, 63, 69, 75, 77, 83

Notes: Psychosis includes diagnosis of schizophrenia or a psychotic disorder and/or presence of hallucinations/delusions; having a mental disorder was coded as the risk factor for the variable mentally disordered vs. non-mentally disordered.
*$p < .05$, **$p < .01$, ***$p < .001$.

clearly larger for NGRI offenders ($d = .68$) compared to MDOs ($d = .47$, $p < .05$). Finally, psychosis was a better predictor for samples of MDOs ($d = .18$ versus $d = -.03$ [NGRI] and $d = -.13$ [Other], $p < .05$). Race was not a significant moderator when examining violent recidivism. Overall, very few consistent moderator effects were found for either outcome measure.

4. Discussion

The major purpose of the present meta-analysis was to test the validity of the theoretically derived Central Eight risk/need factors as applied to MDOs. In general, the Central Eight risk/need factors were better predictors of both general and violent recidivism than the clinical factors. It is important to note however that only six of the Central Eight risk/need factors could be assessed. There were only two studies that investigated the relationship between Procriminal Companions and general recidivism and none that examined this relationship with violent recidivism. No studies were identified for Leisure/Recreation for either general or violent recidivism. Future studies would certainly need to extend the current findings to the domains that could not be assessed.

4.1. The role of the Central Eight risk/need factors

Contrary to established findings among general offenders (Andrews & Bonta, 2010a; Andrews et al., 2006; Gendreau et al., 1996), we did not find the Big Four as standing apart from the other Central Eight risk/need factors, at least in the prediction of general recidivism; all of the confidence intervals (CIs) for the six risk/needs factors overlapped. Similar results have been reported for women offenders (Andrews et al., 2012) and for Aboriginal offenders (Gutierrez et al., 2013). In the prediction of violent recidivism, there appeared to be a separation between three of the Big Four (Criminal History, Procriminal Attitudes and Cognitions, and Antisocial Personality Pattern) and the three Moderate Four that could be tested (Education/Employment, Family/Marital, and Substance Abuse). The CIs for Education/Employment and Substance Abuse did not overlap with the Big Four risk/need factors of Criminal History, Antisocial Personality Pattern, and Procriminal Attitudes and Cognitions. However, Family/Marital evidenced a small overlap in CIs with Criminal History and Procriminal Attitudes and Cognitions. The overlap in the case of Family/Marital may be due to the item of marital status. When we removed marital status from the Family/Marital domain, leaving only family problems, a significantly lower predictive validity was found (see Table 4). Taken together, these results suggest that the primary status of the Big Four may be more important to the prediction of violent recidivism compared to the prediction of general recidivism among MDOs.

One factor that has often been cited as particularly important for MDOs is substance abuse (e.g., Bonta et al., 1998; O'Driscoll, Larney, Indig, & Basson, 2012). When we examined alcohol and drug abuse separately, we found that drug abuse was a significantly better predictor of general recidivism while alcohol abuse was a better predictor of violent recidivism. The differential importance of drug abuse as a risk/need factor for general recidivism may be due to the fact that drug possession and drug trafficking offenses would be categorized as non-violent offenses. On the other hand, there is a considerable body of experimental evidence showing a causal link between alcohol intake and aggressive behavior (Bushman & Cooper, 1990; Exum, 2006). There is also evidence, albeit correlational, that alcohol use may facilitate a wide range of antisocially violent behaviors ranging from sexual violence (Abbey, 2011; Kraanen & Emmelkamp, 2011) to intimate partner violence (Field, Caetano, & Nelson, 2004; Leonard, 2002) and, in the extreme case, to murder (Norström, 2011; Rossow, 2004; Shaw et al., 2006). This may help to explain the significant correlation between alcohol abuse and violent recidivism observed in this review.

Our general finding that Substance Abuse was predictive of recidivism is particularly relevant to the treatment of MDOs. Within the GPCSL perspective, Substance Abuse is a criminogenic need and therefore a promising target for treatment. However, in a meta-analysis of 26 treatment studies for mentally ill offenders, Morgan et al. (2012) found that the goals of treatment ranged from increasing insight to symptom reduction. Only two studies addressed substance abuse (Edinger, 1980; Zlotnick, Najavits, Rohsenow, & Johnson, 2003) and neither measured recidivism as an outcome. Similarly, in another meta-analytic review of 25 treatment outcome studies (Martin, Dorken, Wamboldt, & Wooten, 2012), only four studies targeted substance abuse. Both reviews suggest that targeting this risk/need factor in treatment occurs infrequently while our findings emphasize that substance abuse is an important treatment target to consider.

4.2. The role of clinical variables

The predictive validity estimates of the Central Eight risk/need factors were in direct contrast to those of the clinical variables, which were substantially lower. In the previous meta-analytic review by Bonta et al. (1998), psychosis showed no relationship with general recidivism and a very small inverse relationship with violent recidivism. In the present expanded review, psychosis was unrelated to either type of recidivism. Bonta et al. (1998) did not report specifically on schizophrenia as it was subsumed under their general variable of psychosis. We also included schizophrenia under psychosis, however, given that more recent reviews have focused on the predictive validity of schizophrenia specifically (e.g., Fazel & Yu, 2011) we conducted a post hoc analysis that separated schizophrenia from psychosis. These analyses indicated that schizophrenia was not a significant predictor of general or violent recidivism. Although there are certainly cases when a crime is committed during a psychotic state, the presence of psychosis does not appear to be a useful predictor of recidivism. The reasons for this may be because psychosis is transitory (as in the finding of NGRI, which was also not predictive of recidivism) and amenable to treatment. Similar to results for psychosis, the presence of a mood disorder (e.g., anxiety, depression) did not significantly predict general or violent recidivism. These results leave us to conclude that major mental illnesses are unreliable predictors of general and violent recidivism.

The only clinical variables that significantly predicted recidivism were intelligence for general recidivism and antisocial personality/psychopathy for both types of recidivism. Intelligence, after removal of an outlier (study 59; Gray, Fitzgerald, Taylor, MacCulloch, & Snowden, 2007), produced a d value of 0.26. Gray et al. (2007) was the only study that showed that lower intelligence was significantly predictive of less crime. However, the sample consisted of 145 mild to severely mentally retarded offenders representing an extreme end of the intelligence continuum. It has been known for some time that intelligence and crime are moderately correlated (Glueck & Glueck, 1950; Hirschi & Hindelang, 1977) and independent of factors such as race and class (Lynam, Moffitt, & Stouthamer-Loeber, 1993). Among general offenders, Gendreau et al. (1996) found a d value of 0.14 (converted from their reported r of .07) and Cullen, Gendreau, Jarjoura, and Wright (1997) reported a d of 0.35 (converted from $R^2 = .030$). Our findings fall between these two points but within the 95% CI. Thus, from the available evidence, intelligence, as a general risk factor for MDOs, appears to be of a similar magnitude as with non-disordered offenders.

Antisocial personality and psychopathy were the only other clinical variables that predicted recidivism. From our GPCSL perspective, this finding was expected as these variables include factors covered under Antisocial Personality Pattern (e.g., antisocial personality features such as impulsivity, failure on parole, criminal history). In addition, there is a substantive literature showing that structured assessments of antisocial personality/psychopathy, whether by the HCR-20 (Douglas & Reeves, 2010) or the PCL-R (Hemphill, Hare, & Wong, 1998; Salekin, Rogers, & Sewell, 1996), are predictive of criminal recidivism. From a forensic risk assessment perspective, assessments of antisocial personality

or psychopathy are the only relevant clinical risk factors. The other clinical variables (e.g., psychosis, schizophrenia, mood disorders) are important for identifying the individual symptomatology and personal suffering that occurs and what needs to be addressed before targeting criminogenic needs in the treatment of MDOs.

In our review, we found that, for offenders, having a mental disorder was no more predictive of recidivism than not having a mental disorder. Bonta et al. (1998) reported that non-mentally disordered offenders were more likely to recidivate than MDOs. The difference in findings may be due to the larger number of effect sizes available in the present review estimating this relationship compared to the Bonta et al. (1998) meta-analysis (i.e., the current review reports on nearly three times the number of effect sizes presented in Bonta et al., 1998). However, significant variability in the findings remained and further research needs to be conducted to understand why some studies vary in their results on this topic.

4.3. Conclusions

The Central Eight risk/need factors identified by a GPCSL perspective of criminal behavior are just as relevant for MDOs as they are for non-disordered offenders. Although no support was found for prioritizing the Big Four in the prediction of general recidivism and mild support in the prediction of violent recidivism, more research is needed before a final conclusion can be reached. In order to better evaluate the primacy of the Big Four, and in fact all of the Central Eight, studies are needed of the risk/need factors that could not be examined (i.e., Leisure/Recreation and Procriminal Companions). The results must also be interpreted cautiously given that there was considerable variability in study findings for many of the risk/need factors that was not attributable to outliers. Finally, few moderating effects were found. The only consistent effect was found for Substance Abuse, with lower effect sizes for both general and violent recidivism in peer reviewed publications, which is surprising given that unpublished reports are often more likely to report null findings (Gutierrez et al., 2013; Lipsey & Wilson, 1993).

Analyses of the clinical variables showed that, with the exception of antisocial personality/psychopathy, these factors were not predictive of recidivism. This result further demonstrates the limitation of the clinical model for risk assessment and treatment intended to reduce the likelihood of criminal behavior. From the 1950s to the early 1990s, risk assessments of MDOs relied on measures of psychological dysfunction (e.g., MMPI, Rorschach). With the development of the PCL-R and instruments such as the HCR-20, there has been a remarkable shift away from these traditional psychological tests. Traditional clinical assessments are still valuable in understanding the presenting mental health issues; however, they are largely irrelevant for the purpose of assessing risk and developing strategies to reduce that risk.

Finally, the validity of the Central Eight for risk assessment also suggests that targeting these risk/need factors in treatment would lead to reduced recidivism. There is little evidence to suggest that treatments for MDOs that focus on clinical variables reduce recidivism (Martin et al., 2012; Morgan et al., 2012). After all, if the clinical variables, with the exception of antisocial personality/psychopathy, do not predict recidivism, it should not be expected that targeting them in treatment would reduce recidivism. There is a large general offender treatment literature showing that targeting the risk/need factors proposed by the GPCSL theory reduces recidivism (Andrews & Bonta, 2010a, 2010b) and that these factors are also applicable to women (Dowden & Andrews, 1999a), youth (Dowden & Andrews, 1999b), and sex offenders (Hanson, Bourgon, Helmus, & Hodgson, 2009). We now need to extend this treatment research to the study of MDOs.

Acknowledgements

Appendix A. Supplementary data

Supplementary data to this article can be found online at http://dx.doi.org/10.1016/j.avb.2014.04.014.

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