DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

A Validation of the Dynamic Risk Assessment for Offender Re-entry (DRAOR) for use
with Offenders with Mental Disorder

by

Kaitlyn Wardrop

A thesis submitted to the Faculty of Graduate and Postdoctoral
Affairs in partial fulfillment of the requirements
for the degree of

Doctor of Philosophy

in

Psychology

Carleton University

Ottawa, Ontario

© 2020 Kaitlyn Wardrop

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Abstract

Persons with mental disorders face widespread challenges in their lives, including disproportionate involvement in the criminal justice system. As there has been ongoing scholarly debate regarding relevant criminal risk factors for offenders with mental disorders, better understanding their experiences with the criminal justice system is essential to ensure they are being managed appropriately. The goal of the current doctoral research was to validate the Dynamic Risk Assessment for Offender Re-entry (DRAOR) for use with offenders with a mental disorder. A sample of 961 parolees in the state of Iowa (49.7% being diagnosed with a mental disorder) was used to achieve this goal. Findings showed that, while offenders with a mental disorder were assessed as having higher dynamic risk and lower protective factors, they were equally likely to recidivate compared to those with no mental disorder. While the DRAOR had utility with offenders who were not diagnosed with a mental disorder, results were less positive for those with a diagnosis. Discrimination analyses found that the DRAOR was only able to weakly discriminate between those who did or did not violate the conditions of their release, while calibration analyses found that the DRAOR may be under-classifying lower-scoring offenders with a mental disorder and over-classifying higher-scoring offenders with a mental disorder. The consideration of current mental health-related problems augmented the prediction of technical violations over DRAOR assessments for offenders with mental disorder, pointing to the possibility that there may be other factors relevant to risk prediction for this sub-population. Analyses focused on assessments over time found that, regardless of the presence of a mental disorder, offenders' levels of dynamic risk, but not protective factors, changed over multiple assessments. Subsequent analysis found

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

that while DRAOR change scores significantly predicted future technical violations, they did not predict new charges. Overall, these findings point to the need for parole officers to exercise caution with using the DRAOR with clients who have a diagnosed mental disorder. Further research is needed to better understand the underlying reasons why the DRAOR does not work as well with offenders with mental disorders compared to those without mental disorders.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Acknowledgements

I would like to express my deepest thanks to my supervisor, Dr. Ralph Serin. Your enthusiasm and support over the past eight years of working together has been essential in developing my skills as a researcher. I am so grateful that you took me on.

I would also like to thank my committee members – Dr. Jeremy Mills, Dr. Rachel Burns, Dr. Michael Daffern, and Dr. Diana Majury – for their insightful feedback on this project. I am so appreciative that you took time out of your busy schedules in the middle of a pandemic (and at 3am for Dr. Daffern in Australia!) to discuss my research. These contributions made this project better and were greatly appreciated. I would also like to acknowledge and thank the early contributions of Dr. Andrew Smith at the planning phase of this dissertation. Further, I would like to thank the Iowa Department of Corrections and their staff for making this research possible.

I firmly believe that completing a PhD takes a village. Achieving this milestone would not have been possible without many people in my life. Family, friends, and colleagues provided much needed advice, encouragement, and diversion. I would particularly like to thank my parents, Mark and Judy. Your love and support have been instrumental to getting me to where I am today. Thank you for always believing in me.

Finally, I am immensely thankful for my husband, Eric. At times, academic commitments have taken me away from us. Your continual love, support, and encouragement provided me the space needed to take on the challenge of a PhD. Moving forward, I'm looking forward to embracing new adventures with you.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table of Contents

Abstract	ii
Acknowledgements	iv
Table of Contents	v
List of Tables	viii
List of Figures	xii
List of Appendices	xiv
Chapter 1: The Prevalence of Mental Disorder among Correctional Populations.....	2
Chapter 2: The Impact of Mental Disorder on Individuals in Contact with the Criminal Justice System	5
Disproportionate Involvement in the Criminal Justice System.....	8
Chapter 3: Assessing Offender Risk for those with Mental Disorder	10
Psychopathological Theories of Criminal Behaviour	11
General Personality and Cognitive Social Learning Approach	14
Further Examination of Empirical Evidence.....	17
Implications for Risk Assessment	20
Chapter 4: Dynamic Risk Assessment for Offender Re-Entry	24
Theoretical Underpinnings of the DRAOR.....	27
Initial Findings with the DRAOR	29
Suitability of the DRAOR for Offenders with Mental Disorder	37
Chapter 5: Study Purpose.....	39
Research Questions and Hypotheses.....	40
Chapter 6 Study 1: The Association between Mental Disorder Diagnosis and Recidivism Outcomes	44
Methods.....	44
Sample.....	44
Materials.....	46
Analytic Plan	50
Results.....	51

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Data Management	51
Association Between Mental Disorder Diagnosis and Recidivism Outcomes	52
Study 1 Summary	58
Chapter 7 Study 2: Utility of Baseline DRAOR Assessments	59
Methods.....	59
Sample.....	59
Materials.....	59
Analytic Plan	61
Results.....	72
Data Management	72
Psychometric Properties of the Baseline DRAOR.....	75
Level of Dynamic Risk by Mental Disorder Status	83
DRAOR Discrimination.....	84
DRAOR Calibration.....	90
Incremental Prediction of DRAOR Scores over Static Risk Scores	103
Incremental Prediction of Clinical Considerations over DRAOR Scores.....	110
Study 2 Summary	119
Chapter 8 Study 3a: Psychometric Properties of the DRAOR over Time.....	120
Methods.....	121
Sample.....	121
Materials.....	125
Analytic Plan	126
Results.....	127
Psychometric Properties of the DRAOR over Time	127
Study 3a Summary	134
Chapter 9 Study 3b: Changes in Risk and Protective Factors over Time.....	135
Methods.....	135
Sample.....	135
Materials.....	140
Analytic Plan	140
Results.....	145

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Data Management	145
Offender Change on Risk and Protective Factors	146
Change in Risk and Protective Factors in the Prediction of Recidivism	172
Study 3b Summary	187
Chapter 10: General Discussion.....	188
Summary of Results	188
Implications of Research.....	192
Limitations and Future Directions.....	206
Conclusion.....	210
References	211

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

List of Tables

Table 1 <i>A Summary of the Association Between Baseline DRAOR Subscale Scores on Various Recidivism Outcomes in Previous Research</i>	35
Table 2 <i>Prevalence of Mental Disorder Diagnoses for Iowa Offender Population in 2015 (N = 8,217)</i>	46
Table 3 <i>Study 1 Offender Characteristics by Mental Disorder Group Membership (N = 961)</i>	48
Table 4 <i>Proportion of Recidivism Outcomes by Mental Disorder Group Using a One-Year Fixed Follow-Up</i>	53
Table 5 <i>Bivariate Logistic Regression Analysis of Recidivism Outcomes as a Function Of Mental Disorder Group Using a One-Year Fixed Follow-Up (N = 961)</i>	54
Table 6 <i>Prevalence of Individual Technical Violations by Mental Disorder Group (N = 227)</i>	56
Table 7 <i>Prevalence of Type of Charges Occurring While on Community Supervision by Mental Disorder Group (N = 155)</i>	58
Table 8 <i>Inter-Correlations Among Risk Measures</i>	75
Table 9 <i>CFA Model Fit Indices by Mental Disorder Diagnosis Group</i>	77
Table 10 <i>Standardized Factor Loadings for Separate CFA by Mental Disorder Diagnosis Group</i>	79
Table 11 <i>Values of Selected Fit Statistics for Measurement Invariance Hypotheses for a Two-Factor Model of offender Risk Analyzed Across Offenders with and without a Mental Disorder Diagnosis</i>	80
Table 12 <i>Internal Consistency of the DRAOR by Mental Disorder Diagnosis Group</i>	81

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 13 <i>Association Between Static Risk Scores and Total DRAOR Scores by Mental Disorder Diagnosis Group</i>	83
Table 14 <i>Comparisons Between Offenders without a Mental Disorder and Offenders with a Mental Disorder on DRAOR Scores</i>	84
Table 15 <i>Discrimination Indices of the DRAOR Predicting Any Recidivism</i>	87
Table 16 <i>Discrimination Indices of the DRAOR Predicting New Charges</i>	88
Table 17 <i>Discrimination Indices of the DRAOR Predicting Technical Violations</i>	89
Table 18 <i>Logistic Regression of DRAOR Total Score and Mental Disorder Diagnosis Group Predicting Any Recidivism</i>	93
Table 19 <i>Logistic Regression of DRAOR Total Score and Mental Disorder Diagnosis Group Predicting New Charges</i>	95
Table 20 <i>Logistic Regression of DRAOR Total Score and Mental Disorder Diagnosis Group Predicting Technical Violations</i>	97
Table 21 <i>E/O Index Assessing the Calibration Between Observed and Expected Recidivism Numbers for Any Recidivism for Each DRAOR Risk Category</i>	101
Table 22 <i>E/O Index Assessing the Calibration Between Observed and Expected Recidivism Numbers for New Charges for Each DRAOR Risk Category</i>	101
Table 23 <i>E/O Index Assessing the Calibration Between Observed and Expected Recidivism Numbers for Technical Violations for Each DRAOR Risk Category</i>	102
Table 24 <i>Incremental Association of DRAOR Total Score in Predicting Any Recidivism Over Static Risk by Mental Disorder Group</i>	105
Table 25 <i>Incremental Association of DRAOR Total Score in Predicting New Charges Over Static Risk by Mental Disorder Group</i>	107

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 26 <i>Incremental Association of DRAOR Total Score in Predicting Technical Violations Over Static Risk by Mental Disorder Group</i>	109
Table 27 <i>Prevalence of Community Outcomes by Ratings of Ongoing Mental Health Problems for Offenders Diagnosed with a Mental Disorder</i>	111
Table 28 <i>Hierarchical Logistic Regression Analysis of the Incremental Contribution of Ongoing Mental Health-Related Problems Over DRAOR Total Score in Predicting Any Recidivism (N = 478)</i>	114
Table 29 <i>Hierarchical Logistic Regression Analysis of the Incremental Contribution of Ongoing Mental Health-Related Problems Over DRAOR Total Score in Predicting New Charges (N = 478)</i>	115
Table 30 <i>Hierarchical Logistic Regression Analysis of the Incremental Contribution of Ongoing Mental Health-Related Problems Over DRAOR Total Score in Predicting Technical Violations (N = 478)</i>	116
Table 31 <i>Prevalence of Individual Technical Violations by Current Mental Health-Related Problem Status (N = 124)</i>	117
Table 32 <i>Sample Sizes for Potential Time-Period Groupings</i>	122
Table 33 <i>Study 3a Sample Characteristics</i>	123
Table 34 <i>CFA Model Fit Indices by Time Point</i>	129
Table 35 <i>Standardized Factor Loadings for Separate CFAs by Time Point</i>	130
Table 36 <i>Values of Selected Fit Statistics for Measurement Invariance Hypotheses for a Two-Factor Model of offender Risk Analyzed Across Offenders with and without a Mental Disorder Diagnosis</i>	132
Table 37 <i>Internal Consistency of the DRAOR by Time Point</i>	133

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 38 <i>Association Between Static Risk Scores and Total DRAOR Scores Across Time</i>	134
Table 39 <i>Study 3b Sample Characteristics</i>	138
Table 40 <i>Multilevel Model Summaries: Total DRAOR Score</i>	150
Table 41 <i>Multilevel Model Summaries: Stable Subscale</i>	155
Table 42 <i>Multilevel Model Summaries: Acute Subscale</i>	160
Table 43 <i>Multilevel Model Summaries: Protective Factors Subscale</i>	165
Table 44 <i>Multilevel Model Summaries: Risk Factor (Stable + Acute subscales)</i>	170
Table 45 <i>Prevalence Rates of Recidivism Outcomes by Mental Disorder Group Membership</i>	173
Table 46 <i>Association Between DRAOR Total Score MLM Parameter Estimates and Recidivism Outcomes</i>	174
Table 47 <i>Association Between Stable Subscale MLM Parameter Estimates and Recidivism Outcomes</i>	178
Table 48 <i>Association Between Acute Subscale MLM Parameter Estimates and Recidivism Outcomes</i>	182
Table 49 <i>Association Between Amalgamated Risk Factor (Stable and Acute) MLM Parameter Estimates and Recidivism Outcomes</i>	185

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

List of Figures

<i>Figure 1.</i> Conceptual model of offender re-entry (Serin, Lloyd, & Hanby, 2010)	28
<i>Figure 2.</i> ROC Curve for the DRAOR Total Score Predicting Any Recidivism.	86
<i>Figure 3.</i> Logistic regression model lines of best fit (in black) and absolute base rates for any recidivism (in grey) by DRAOR total score and by mental disorder membership group	94
<i>Figure 4.</i> Logistic regression model lines of best fit (in black) and absolute base rates for new charges (in grey) by DRAOR total score and by mental disorder membership group	96
<i>Figure 5.</i> Logistic regression model lines of best fit (in black) and absolute base rates for technical violations (in grey) by DRAOR total score and by mental disorder membership group	98
<i>Figure 6.</i> Participant flow chart for Study 3b	136
<i>Figure 7.</i> Length of time between first and last DRAOR assessment in months for those with three or more assessments ($N = 542$).	137
<i>Figure 8.</i> Layout of data for the Multilevel Model.....	143
<i>Figure 9.</i> Mental disorder status as a predictor of rate of change in DRAOR total scores.	151
<i>Figure 10.</i> Mental disorder status as a predictor of rate of change in Stable subscale scores.....	156
<i>Figure 11.</i> Mental disorder status as a predictor of rate of change in Acute subscale scores.....	161

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

<i>Figure 12.</i> Mental disorder status as a predictor of rate of change in Protective Factor subscale scores.	166
<i>Figure 13.</i> Mental disorder status as a predictor of rate of change in Risk Factor scores.	171
<i>Figure 14.</i> Mean predicted probability of recidivism outcomes across DRAOR change scores.....	176
<i>Figure 15.</i> Mean predicted probability of any recidivism across Stable subscales change scores by mental disorder status	179
<i>Figure 16.</i> Mean predicted probability of new charges and technical violations across Stable subscale change scores.....	180
<i>Figure 17.</i> Mean predicted probability of recidivism outcomes across Acute subscale change scores	183
<i>Figure 18.</i> Mean predicted probability of recidivism outcomes across Risk Factor change scores.....	186

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

List of Appendices

Appendix A: Psychometric Properties of the Baseline DRAOR Assessment	244
Appendix B: ROC Curve Figures	250
Appendix C: Calibration Results	257
Appendix D: Psychometric Properties of the DRAOR over Time	263
Appendix E: Quadratic Hierarchical Modeling Results	270

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

A Validation of the Dynamic Risk Assessment for Offender Re-entry (DRAOR) for use with Offenders with Mental Disorder

On an international level there has been considerable attention levied against the criminal justice system with regard to the over-involvement of individuals with mental disorder, whether it be interactions with police forces (Coleman & Cotton, 2010; Lowery, Kindy, Alexander, Tate, Jenkins, & Rich, 2015) or the correctional system (Earley, 2017; Mackrael, 2017; Solomon, 2017; Zinger, 2012). Given these criticisms and concerns, the current research sets out to contribute to our knowledge and understanding of evidence-based case management strategies for offenders with mental disorders. This research aims to contribute to our theoretical understanding of mental illness and community supervision by focusing on four areas of exploration: (1) to study the relationship between mental disorder and recidivism; (2) to assess the applicability and utility of baseline assessments of a structured case management assessment tool (the Dynamic Risk Assessment for Offender Re-Entry; DRAOR) for use with offenders with a mental disorder on parole supervision; (3) to determine the impact of additional clinical considerations in the assessment of offender risk for recidivism; and (4) to study the utility of risk and protective factor change scores to enhance the prediction of recidivism outcomes over baseline assessments.

The proceeding review of the literature explores (1) the prevalence of mental disorder within correctional populations, (2) the impact mental disorder can have on individuals, (3) the complexities in assessing risk for criminal behaviour, and (4) a review of the DRAOR, a structured case management assessment tool used in the general offender population.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Chapter 1: The Prevalence of Mental Disorder among Correctional Populations

The presence of mental disorder diagnoses among justice-involved persons is high. Recent Canadian estimates of the current prevalence of mental disorder among newly admitted federal offenders ranged from 73% in men (Beaudette, Power, & Stewart, 2015) to 67% in women (Brown et al., 2018). Comparative statistics within the Canadian general public places only 10% of Canadians experiencing a current mental disorder (Pearson, Janz, & Ali, 2013). Lifetime estimates are even more elevated, with 81% and 79% of federally sentenced men and women offenders, respectively, meeting the diagnostic criteria for at least one mental disorder in their lifetime (Beaudette et al., 2015; Brown et al., 2018). American jurisdictions have found similar trends, albeit lower than their Canadian counterparts and measured differently. Bronson and Berzofsky (2017) found prisoners (14%) and jail inmates (26%) reported higher rates of serious psychological distress in the past 30 days¹ compared to the general population (5%). This disparity in the rate of mental disorder highlights both the complex needs of offenders and the case management concerns associated with appropriate assessment, management, and supervision of these individuals.

An important consideration when discussing mental disorders is to be clear regarding how mental disorder is being defined, as the types and nature of the included disorders can have a considerable impact on prevalence rates. One of the most common and widespread definitions currently in use originates from the Diagnostic and Statistical

¹ Notably, these prevalence rates are likely considerably lower due to the more acute symptoms that are associated with psychological distress, that may or may not signify a formal mental disorder diagnosis.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Manual of Mental Disorders, 5th Edition (DSM-5), a diagnostic tool published by the American Psychiatric Association (2013). This manual defines mental disorder as follows:

A mental disorder is a syndrome characterized by clinically significant disturbance in an individual's cognition, emotional regulation, or behaviour that reflects a dysfunction in the psychological, biological, or developmental processes underlying mental functioning. Mental disorders are usually associated with significant distress or disability in social, occupational, or other important activities. (American Psychiatric Association, 2013, p.20)

While the DSM-5 has moved away from the multiaxial categorization of mental disorders, classifying disorders into axis disorder designations, per the DSM-IV (American Psychiatric Association, 1994), placing focus on Axis I and Axis II disorders has practical utility when discussing the role mental disorder may play in the criminal justice system (Andrews & Bonta, 2010). In brief, Axis I disorders are clinical disorders, which include anxiety, cognitive, eating, mood, schizophrenia, and other psychotic disorders. Whereas, Axis II disorders encompass intellectual disabilities and personality disorders, including antisocial personality disorder and borderline personality disorder. The remaining axes do not necessarily contain mental disorders but assess the presence of conditions or characteristics that may affect mental status. Axis III includes general medical conditions that may be important in the comprehension and management of mental disorder (e.g., diseases of the blood and blood-forming organs, diseases of the respiratory system, congenital anomalies, etc.); Axis IV includes psychosocial and environmental problems that may impact the “diagnosis, treatment, and prognosis of

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

mental disorders” (e.g., death of a loved one, illiteracy, homelessness, incarceration, etc.); and finally, Axis V, a global assessment of functioning which may be helpful to inform treatment options.²

Certainly, the prevalence of mental disorders within correctional populations varies depending on the disorder of interest. Beaudette and colleagues (2015) assessed the current prevalence of numerous mental disorder diagnoses in a sample ($N = 1,110$) of newly admitted federally sentenced Canadian men offenders. They found that alcohol and substance use disorders (50%), antisocial personality disorders (44%), and anxiety disorders (30%) were much more common than others, such as mood disorders (17%), borderline personality disorder (16%), psychotic disorders (3%), and eating disorders (1%).

Research with Canadian federally sentenced women showed similar results (Brown et al., 2018). Although women had lower rates of mental disorders in comparison to men, many of the same disorders were common: alcohol and substance use disorders (62%), anxiety disorders (38%), and antisocial personality disorder (38%). While 67% of

² As discussed later in this and subsequent chapters, how clinicians and researchers operationalize the study of mental health functioning can have substantial affects on both prevalence rates and individual outcomes. Throughout this literature review, many terms including but not limited to “psychological distress”, “mental illness”, “mental disorder”, and “serious mental illness” are used in accordance to the terminology specified in the individual empirical articles; however, it is important to understand the sometimes subtle definitional differences between these terms. Often “mental illness” is used as a broad term referencing many of the same characteristics as a mental disorder (i.e., dysfunction in the psychological, biological, or developmental processes underlying mental functioning), but it may or may not be diagnosed by a clinician. Comparatively, “psychological distress” could refer to acute symptoms that are associated with a mental disorder (e.g., psychosis) or to that of a non-disordered individual experiencing poor mental wellness (e.g., those experiencing acute stressors). Further, “serious mental illness” is not consistently operationalized across research, but often includes mental disorders such as schizophrenia, major depression, bipolar disorder, and psychosis disorders. It is important to be clear that the current research examines offenders with any *mental disorder* as diagnosed by a prison psychiatrist per the DSM and which could include personality disorders.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

women experienced any current mental disorder, when excluding substance use disorders and personality disorders this rate decreased to 41%. Though still quite high, this difference highlights the impact of definitional variance. If substance use disorders and personality disorders (e.g., antisocial personality disorder) are included in the definition of “mental disorder” prevalence rates can greatly increase in offender samples.

Further research has explored the prevalence of comorbid mental disorder diagnoses among offenders and results indicate that individuals often suffer from more than one mental disorder concurrently (Beaudette et al., 2015; Stewart & Wilton, 2017). Results by Stewart and Wilton (2017) found that 68% of men offenders with a mental disorder also met the criteria for at least one other mental disorder. Interestingly, certain mental disorders appeared to go together – with 66% of offenders with a substance use disorder also having a personality disorder.

The disproportionate presence of mental disorders within the offender population is why this doctoral research is important. It is essential that we focus efforts on understanding this complex subset of the offender population to inform the development of empirically supported policies and practices to manage, and treat, offenders with mental disorders.

Chapter 2: The Impact of Mental Disorder on Individuals in Contact with the Criminal Justice System

There has been a plethora of research that has examined the negative effects mental disorders can have on a person, including an increased risk of stigma and victimization (Corrigan & O’Shaughnessy, 2007; Hinshaw, 2007; Naanyu, 2009). Research has shown that while there has been increased understanding of mental health

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

issues and increased acceptance of the need for professional help to address mental disorders over the years (Schomerus et al., 2012), the public still views individuals with mental disorders negatively (Angermeyer & Dietrich, 2006; Hinshaw, 2007; Naanyu, 2009; Schomerus, et al., 2012). Angermeyer and Dietrich (2006), for example, reviewed research focused on attitudes towards mental illness over the previous 15 years. They found that the public was remarkably uneducated about mental disorders, with many being unable to identify the symptomology of various mental disorders. As well, while most individuals initially had prosocial reactions to those with mental disorders and accepted that they required professional help, they attributed negative characteristics to these individuals. This included believing that they were unpredictable, violent, and dangerous. Interestingly, these negative beliefs were more commonly attributed towards individuals with substance use disorders and schizophrenia, in comparison to those suffering from depression or anxiety disorders.

More negative perceptions of mental illness can also be found within criminal justice professionals (Batastini, Lester, & Thompson, 2017; Lowder, Ray, & Gruenewald, 2019). In a study by Batastini and colleagues (2017), judges ($n = 29$), prosecutors ($n = 39$), and public defenders ($n = 70$) connected with the Mississippi Judiciary and the Mississippi Public Defenders Association were surveyed on their attitudes towards individuals with mental illness. Findings showed that, compared to judges and prosecutors, public defenders were more likely to endorse more compassionate attitudes about defendants with mental illness. Comparatively, judges and prosecutors endorsed more negative stereotypes about mental illness and perceived mentally ill individuals to be a greater risk to the community.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

The presence of mental disorder has been found to be associated with other social disadvantages, including employment concerns (Harris, Matthews, Penrose-Wall, Alam, & Jaworski, 2014; Luciano & Meara, 2014; Pratt, 2012), unstable accommodation (Nishio et al., 2017; Pratt, 2012; Shlay & Rossi, 1992), decreased physical health (Hardy & Thomas, 2012; Pratt, 2012), and problematic relationships (Jaffee, 2013; Perera, Short, & Fernbacher, 2014). For example, Pratt (2012) examined data obtained from 23,393 American adult respondents of the 2007 National Health Interview and found that, compared to individuals without a serious mental illness, those with a serious mental illness³ were more likely to be limited to a high school degree or less (55.2% vs. 44.3%), to live alone (26.5% vs. 17.1%), to have a history of homelessness or time in jail (35.6% vs. 4.8%), to have heart/lung problems (19.8-24.9% vs. 9.9-11.1%), to be a current smoker (51.4% vs. 19.1%), to never exercise (48.7% vs. 36.8%), to have physical limitations (16.7%-30.7% vs. 6.5%-12.5%), to be unable to work (50.0% vs. 5.6%) and to use food stamps (26.6% vs. 4.3%). Evidently, individuals with mental disorders have complex social and health needs.

Further, while the public may view individuals with mental disorders to be dangerous (Angermeyer & Dietrich, 2006), research has shown that these individuals experience disproportionate levels of victimization from others (Fitzgerald, de Castella, Filia, Filia, Benitez, & Kulkarni, 2005; Kamperman et al., 2014; Latalova, Kamaradova, & Prasko, 2014). For instance, Teplin and colleagues (2005) compared the prevalence of

³ Within this survey, serious mental illness was defined as schizophrenia, bipolar disorder, mania, or psychosis that was diagnosed by a mental health professional.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

experiencing crime victimization among individuals with severe mental illness⁴ to that of the general population, controlling for demographic differences. They found that individuals with severe mental illness were over 11 times more likely than the general population to be a victim of violent crime in the previous year.

Disproportionate Involvement in the Criminal Justice System

In contrast, other research has focused on the disproportionate contact individuals with mental disorders have with various components of the criminal justice system (Adler, 1986; Etter, Birzer, & Fields, 2008; Teplin, 1984; Valuri, Morgan, Jablensky, Ambrosi, & Morgan, 2019). Research has shown that individuals with mental disorders are more likely to be detained/arrested (Charette, Crocker, Billette, 2014; Steury, 1991; Teplin, 1984; 2000) and detained for longer periods of time (Steury, 1991) than their non-disordered counterparts. Some scholars postulate that this increased contact is a result of police officers using “mercy bookings” in an effort to facilitate access to mental health treatment available through the criminal justice system that may be otherwise unattainable through limited community-based services (Lamb, Weinberger, & DeCuir, 2002; Markowitz, 2006; 2011). However, others have argued that mental disorder symptoms have been “criminalized”, and the disproportionate police contact is a result of negative attitudes and stigma towards those with mental illness (Watson, Ottati, Lurigio, & Heyrman, 2005).

⁴ Individuals were considered to experience severe mental illness if they had taken psychiatric medications for the two previous years and if they had ever been hospitalized for psychiatric reasons.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

As discussed previously, individuals with mental disorders are disproportionately incarcerated (Beaudette et al., 2015; Bronson & Berzofsky, 2017; Brown et al., 2018; Derkzen et al., 2012; Pearson et al., 2013). Other research has found that, once incarcerated, individuals with mental disorders often experience negative institutional outcomes (Stewart & Wilton, 2017⁵; Stewart, Wilton, & Cousineau, 2012) and community outcomes (Messina, Burdon, Hagopian, & Prendergast, 2004; Porporino & Motiuk, 1995; Skeem, Winter, Kennealy, Eno Loudon, Tatar II, 2014; Stewart et al., 2012). Skeem and colleagues (2014), for example, followed 221 parolees with and without a serious mental disorder (i.e., schizophrenia, bipolar disorder, major depression, or other psychotic disorder) for one year in the community. They found that the presence of a serious mental disorder was associated with a 60% increase in the hazard of returning to custody.

Further, the stigma associated with mental illness may be compounded when the individual has been involved in the criminal justice system. Sachini and colleagues (2018) surveyed 627 Maryland psychiatric rehabilitation providers to assess their experiences and perceptions with individuals with serious mental illness, making comparisons between clients with and without involvement in the criminal justice system. Results showed that, while treatment providers generally had a great deal of respect for their clients, they were more likely to report having a great deal of respect for clients without criminal justice involvement compared to those with criminal justice

⁵ It is important to note that institutional outcomes were similar for offenders with no mental disorder compared to those with a current Axis I mental disorder only. However, the comorbid presence of a substance use disorder or personality disorder increased the likelihood of negative institutional outcomes (e.g., incidents, assault, involuntary segregation).

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

involvement (94% versus 79%). They were also less likely to report finding clients interesting, easy to understand, and likable when they had previous criminal justice involvement compared to those that did not have this involvement.

Based on the described research, it is clear that individuals with mental disorders are disproportionately represented in the criminal justice system and this may affect future rehabilitative efforts, but the reason for this over-representation remains unclear. While the current literature cannot make definitive statements regarding the causal role that mental disorder may have on criminal conduct, further research to explore the link between mental disorders and criminal behaviour could contribute to our understanding of the impact that mental disorders can have on individuals and may help correctional agencies better understand their path into and out of crime.

Chapter 3: Assessing Offender Risk for those with Mental Disorder

Increasingly, research has focused on offenders with mental disorders and what, if any, impact this diagnosis may have on their propensity of criminal behaviour (Markowitz, 2011; Michalski, 2018; Monahan, 1988; 1991; Ringhoff, Rapp, & Robst, 2013). Part of this process involves the development and critical evaluation of theories of criminal behaviour pertaining to offenders with mental disorders. Theories of criminal conduct seek to explain why individuals behave criminally and, for the purposes of the current research, why offenders with mental disorder behave criminally. A number of scholars have explored this question and have proposed two very different viewpoints. The proceeding section aims to describe both perspectives and then discusses the overarching empirical evidence, followed by the implications for risk assessment in correctional samples with mental disorders.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Psychopathological Theories of Criminal Behaviour

There are several interrelated psychopathological theories that place a great deal of importance on the presence of clinical psychiatric symptoms in the explanation of criminal conduct (Adler, 1986; Druhn, 2007; Etter et al., 2008; Ringhoff et al., 2013; Teplin, 1984). In particular, the criminalization hypothesis theory posits that individuals with mental disorders who were originally treated and warehoused in mental institutions are now being diverted into the criminal justice system following the mass closures of these institutions beginning in the 1960s (Teplin, 1984). The deinstitutionalization of these patients was established due to advances in the development of psychotropic medication treatments and the belief that out-patient treatment was preferable to in-patient care (Etter et al., 2008). However, there were three hypothesized consequences of this deinstitutionalization process (Teplin, 1984): (1) individuals who would historically spend extended time institutionalized were now being released into the community; (2) legal changes around the time of deinstitutionalization resulted in more stringent requirements for involuntary psychiatric commitments; and (3) government funding for community-based mental health treatment services did not see a matched increase in allocated resources. Therefore, there were increasing numbers of individuals in the community experiencing active mental disorder symptoms who were not receiving the services required to manage these symptoms.

Proponents of the criminalization hypothesis put forth that the criminalization of individuals with mental disorders has occurred for two reasons: (1) clinical symptoms of mental disorder, in effect, become criminal offences and (2) actively experiencing clinical symptoms may motivate criminal behaviour (Junginger, Claypoole, Laygo, &

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Crisanti, 2006). For these reasons, some individuals propose that the criminal justice system has become the “dumping ground” for individuals with mental disorders (Etter et al., 2008; Teplin, 1984; Toch & Adams, 1987) and that if these individuals received adequate mental health services, they would not become justice-involved (Council of State Governments, 2002).

Scholars point to empirical research that has found that individuals with mental disorder are disproportionately arrested (Charette et al., 2014; Steury, 1991; Teplin, 1984; 2000), imprisoned (Beaudette et al., 2015; Bronson & Berzofsky, 2017; Brown et al., 2018; Derkzen et al. 2012; Valuri et al., 2019), and failing on community supervision (Messina, Burdon, Hagopian, & Prendergast, 2004; Porporino & Motiuk, 1995; Skeem et al., 2014; Stewart et al., 2012) as support for this position.

As well, there has been some research that has observed an increase in crime and crime arrest rates with the decline in public psychiatric capacity (Markowitz, 2006; Yoon, 2011). Yoon (2011), for example, assessed the impact that increases in the privatization of inpatient psychiatric care had on the size of the jail inmate population across the United States between 1985 and 1998. Results showed that, even when statistically controlling for demographic and socio-economic differences across jurisdictions, for every 1% increase in the private for-profit psychiatric care, the jail inmate population grew by 2.3%. These findings suggest that decreases in the availability of mental health services can have significant impacts to the criminal justice system.

However, there is some research that contradicts the criminalization hypothesis. Evidence has shown that the relationship between individuals with mental disorders and

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

the likelihood of incarceration has not been related to the closure of psychiatric inpatient treatment beds (Erickson et al., 2008; Steadman et al., 1984), changes in financial support of mental health services (Norton et al., 2006), or decreases in the availability of community-based mental health services (Fisher et al., 2000).

Further, the link between mental disorder and criminal behaviour is somewhat unclear. There has been a plethora of research examining whether the presence of mental disorder makes someone more likely to be incarcerated, with some research finding support (Balyakina et al., 2014; Brennan, Mednick, & Hodgins, 2000; Cloyes, Wong, Latimer, & Abarca, 2010; Fazel, Gulati, Linsell, Geddes, & Grann, 2009; Short, Thomas, Mullen, & Ogloff, 2013; Swanson et al., 2006; Valuri et al., 2019). An example of supportive research would be a Danish longitudinal cohort study that followed 358,180 individuals from birth until age 44 (Brennan et al., 2000). Researchers were able to collect data for all mental health-related hospitalizations and all violence-related arrests to assess the relationship between the presence of schizophrenia and arrest for violence. Results indicated that both men and women hospitalized with schizophrenia were approximately 4.5 and 23 times more likely to be arrested for violent behaviour than individuals who were never hospitalized, respectively. This trend held even when differences in socioeconomic status, marital status, and concurrent substance use disorder or personality disorder were statistically controlled. While these results are certainly striking, it is important to acknowledge that this research focused solely on the link between schizophrenia and violence and individuals' disorders had to be severe enough that they were hospitalized. It is unclear how this research generalizes to less severe schizophrenia and other mental disorder diagnoses.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

In contrast, there has certainly been a considerable amount of research that has been unable to find this relationship, particularly when controlling for other variables such as comorbid substance use disorders (Appelbaum, Robbins, & Monahan, 2000; Bonta, Blais, & Wilson, 2014; Bonta, Law, & Hanson, 1998; Elbogen & Johnson, 2009; Junginger et al., 2006). Evidently, exploring other perspectives may clarify the role mental disorder could play in criminal behaviour.

General Personality and Cognitive Social Learning Approach

Postulating a decidedly different approach to explaining the criminal behaviour of offenders with mental disorder is the General Personality and Cognitive Social Learning (GPCSL) model of criminal conduct (Andrews & Bonta, 2010). This approach views the underlying cause of criminal behaviour to be a combination of characteristics within an individual, as well as their social learning environment. This model differs from the clinical approaches described previously in that the factors deemed important in the prediction of criminal behaviour are applicable to all offenders – not just those with mental disorders.

Andrews and Bonta (2010) put forth that, while there are many roads to criminal behaviour, certain personal characteristics and life experiences have a greater impact on the likelihood of someone behaving in a criminal manner. They postulate that the most predictive factors, termed the ‘big four’, include (1) having a *history of criminal behaviour*, (2) holding pro-criminal or *antisocial attitudes*, (3) surrounding oneself with *antisocial peers*, and (4) *antisocial personality pattern*. The ‘moderate four’ are factors that are still predictive of criminal behaviour, yet less so than the big four, are (5) a low

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

level of achievement and satisfaction in *education and/or employment*, (6) low quality *family/marital relationships*, (7) problematic *substance use*, and (8) low levels of participation and enjoyment of prosocial *leisure/recreation*. Together, these factors can globally be referred to as the central eight risk factors. The presence of these factors put an individual at increased risk of criminal behaviour, as well, certain immediate situational factors can also play a role in whether an individual acts out in a criminal manner (e.g., someone may be planning to shoplift, but upon seeing a loss prevention officer, decides to not to commit the crime).

While clinical models of criminal behaviour place importance on psychopathological factors in the prediction of criminal behaviour (e.g., psychological distress, psychosis, etc.), the GPCSL approach considers mental health indicators (along with age, ethnicity, gender) to be distal factors that are only weakly related to criminal conduct. Therefore, the presence of mental disorder would not be considered very related to criminal behaviour and individuals who do have mental health issues would have the same general risk factors as individuals without a mental disorder (Andrews & Bonta, 2010).

There has been significant research showing that the central eight risk factors are related to criminal behaviour for general offenders (Andrews & Bonta, 2010; Gendreau, Little, Goggin, 1996; Stewart et al., 2017), sex offenders (Hanson & Morton-Bourgon, 2004), Indigenous offenders (Gutierrez, Wilson, Rugge, & Bonta, 2013; Stewart et al., 2017), women offenders (Andrews et al., 2012; Simourd & Andrews, 1994; Stewart et al., 2017), and juvenile offenders (Onifade et al., 2008; Simourd & Andrews, 1994).

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Evidence has also been positive when assessing the applicability for offenders with mental disorders (Bonta et al., 1998; Bonta et al., 2014; Witt, van Dorn, & Fazel, 2013).

Bonta and colleagues' first meta-analysis (1998) reviewed the predictive ability of various predictors of recidivism for offenders with and without mental disorder, often focusing on studies that included lifetime diagnoses (as opposed to current diagnoses). The predictors of interest included personal demographics (e.g., age, socioeconomic status, race), criminal history (e.g., number of previous convictions, offence seriousness, etc.), deviant lifestyle history (e.g., education, employment, substance abuse, etc.), and clinical variables (e.g., antisocial personality, hospital admissions, psychosis, etc.). Researchers reviewed 58 empirical studies, reporting 64 unique samples and results indicated that the predictors of general and violent recidivism were typically the same for offenders with and without mental disorder. Variables relating to criminal history and criminogenic needs had relatively consistent relationships with general and violent recidivism; while some clinical variables (e.g., depression) showed no relationship with community outcomes. Other clinical variables (e.g., psychosis) had an inverse relationship. Notably, a clinical variable that was found to be associated with community outcomes was the presence of antisocial personality disorder. Given that this personality disorder is considered to be strongly related to the antisocial personality pattern domain of the "big 4" predictors of criminal behaviour, this finding is not surprising.

A more recent meta-analytic review (Bonta et al., 2014) assessed the predictive validity of risk areas identified through the GPCSL approach, as well as clinical variables in predicting general and violent recidivism. Of the 126 research studies, representing 96 unique samples, included in this meta-analysis dated from January 1959 to June 2011,

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

many of the same studies contained within Bonta and colleagues' first meta-analysis (1998) were also considered in this project; however, an additional 78 studies that had been completed since that time were included. Results were remarkably similar to that of Bonta and colleagues' earlier meta-analysis (1998), with central eight risk factors being significantly related to community outcomes, while clinical variables, excluding antisocial personality and psychopathy, being unrelated to outcomes. Clearly, this body of work supports the position that factors that effectively predict recidivism in general offenders are relevant and important in the risk assessment of offenders with mental disorders.

Further Examination of Empirical Evidence

By and large, the research that has examined the link between mental disorder and criminal conduct is mixed, with a considerable amount of research supporting the link (Brennan et al., 2000; Fazel et al., 2009; Short et al., 2013; Swanson et al., 2006; Valuri et al., 2019) and plethora of research finding no relationship (Appelbaum et al., 2000; Bonta et al., 1998; Bonta et al., 2014; Elbogen et al., 2009; Junginger et al., 2006). This has motivated further discussion about the difficulties associated with assessing this relationship, namely the impact that methodological diversity and confounding factors may have on findings (e.g., Bonta et al., 1998; Bonta et al., 2014; Douglas, Guy, & Hart, 2009).

There are a number of methodological considerations to be aware of when critically evaluating the association between mental disorder and criminal behaviour. The composition of samples included in research, for example, have been found to have an

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

impact on results. Research has shown that when comparing individuals with and without mental disorder in the general community, the presence of a mental disorder can be associated with criminal conduct (Brennan et al., 2000; Douglas et al., 2009; Fazel et al., 2009; Short et al., 2013). However, when assessing this same relationship within correctional samples, empirical evidence finds little to no relationship (Bonta et al., 1998; Bonta et al., 2014; Douglas et al., 2009).

There have been a number of correlates found to be associated with the presence of mental disorder and the likelihood of violence (Latalova et al., 2014; Swanson et al., 2006; Valuri et al., 2019; Witt et al., 2013). The presence of comorbid substance use disorders (Douglas et al., 2009; Elbogen et al., 2009; Fazel et al., 2009; Short et al., 2005; Valuri et al., 2019; White, Chafetz, Collins-Bride, & Nickens, 2006; Witt et al., 2013), comorbid personality disorders (Douglas et al., 2009; Hodgins, Cree, Alderton, & Mak, 2008; Volavka, 2013), a history of violence (Walters & Crawford, 2014; Witt et al., 2013), and a history of homelessness (White et al., 2006) has been found to increase the likelihood that someone with a mental disorder will experience arrest and/or violent behaviour. Given that these factors are related to criminogenic needs as identified in the GPCSL approach, it is difficult to parse out the impact mental disorder has on criminal conduct and certainly no conclusions can be made regarding the direct causal effect mental disorder may have on behaviour.

Other researchers speculate about the effect of the criminal justice system's response to individuals with mental disorder (Dauphinot, 1996; Eno Loudon & Skeem, 2012; Porporino & Motiuk, 1995). Porporino and Motiuk (1995) found that offenders with mental disorders had higher return to custody rates on community supervision than

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

their matched non-disordered counterparts. However, they also noted that offenders with mental disorders were provided fewer opportunities in the form of discretionary release (as opposed to statutory release) and were consistently more likely to have their release suspended or revoked, not for committing a new crime, but for failing to abide by the conditions of their release. This differential treatment by the criminal justice system may have been unwarranted; however, as Porporino and Motiuk also found that non-disordered offenders were more likely to have their release revoked for a new offence than those with a mental disorder. Further research has found that parole officers often view offenders with mental disorders to be a high-risk group (Eno Louden & Skeem, 2013) that are challenging to supervise (Van Deirse, Cuddleback, Blank Wilson, & Burgin, 2018). Parole officers have also been found to react more punitively to parole violations from offenders with mental disorders compared to those with no mental disorder (Eno Louden, Manchak, Ricks, Kennealy, 2018).

Additional research has explored how pathways to criminal behaviour among offenders with mental disorder may differ depending on whether they began criminally offending before or after the onset of their mental illness (Calhoun, 2018; Crocker, Martin, Leclair, Nicholls, & Seto, 2018; Dellazizzo et al., 2018). The presence of a mental disorder may be particularly relevant for individuals entering a criminal lifestyle around or after the onset of a mental disorder; while not relevant for individuals who were already criminal before developing a mental disorder (Crocker et al., 2018).

Overall, evidence seems to show that while the presence of mental disorder may be associated with criminal behaviour in some cases, it is certainly not the strongest factor. In fact, recent estimates show that only between 7% and 10% of crimes committed

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

by offenders with mental disorder can be directly or indirectly attributed to mental illness (Junginger et al., 2006; Peterson, Skeem, Hart, Vidal, & Keith, 2010; Skeem & Monahan, 2011). This notion has been further supported through qualitative interviews with offenders diagnosed with psychiatric disorders (Calhoun, 2018). While there is some empirical support for the psychopathological theories, the amount of high-quality and meta-analytic support for the GPCSL perspective (e.g., Bonta, 1998; 2014; Douglas et al., 2008) speaks to strength of this theory. Generally, this body of literature lends support to the position that risk assessment instruments that tap into the central eight risk factors outlined in the GPCSL perspective should have acceptable predictive utility in correctional samples of individuals with mental disorder.

Implications for Risk Assessment

Informed by these two theoretical perspectives, risk assessment of individuals with mental disorder has developed using a married approach, involving both the central eight risk factors and clinical factors. One such tool, the Short-Term Assessment of Risk and Treatability (START; Webster, Martin, Brink, Nicholls, & Middleton, 2004), is a structured professional judgement tool, intended to assess the risk of violence to others, suicide, self-harm, self-neglect, unauthorised absence, substance use, and victimization in patients with mental disorder. This assessment tool was initially developed to assess short-term risk and guide risk management and treatment options in forensic hospitals, but its use has expanded to a wide variety of clinical populations. The START is comprised of 20 items that are rated as both vulnerabilities and strengths on a three-point scale. Once all the items are rated, the assessor makes specific risk estimates (e.g., low, medium, or high) for each outcome of interest.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Risk assessment instruments specific for individuals with mental disorder, such as the START, differ from general risk assessment instruments in several ways. First, they contain items related specifically to an individuals' mental disorder (e.g., medication adherence, mental state, emotional state, etc.) to monitor psychopathological indicators deemed relevant for behaviour. Second, the outcomes of interest can often go beyond violent or criminal behaviour and are also concerned with threats towards individuals' personal safety (e.g. risk for self-harm, victimization).

Research assessing the utility of the START has found that it has adequate predictive validity in a wide variety of samples, including forensic inpatients (Chu, Thomas, Ogloff, & Daffern, 2011; Desmarais, Nicholls, Wilson, & Brink, 2012; Hewawasam, 2017; Nichols, Brink, Desmarais, Webster, & Martin, 2006; Nonstad et al., 2010; Quinn et al., 2014; Wilson, Desmarais, Nicholls, & Brink, 2010), forensic outpatients (Troquete et al., 2015; van den Brink et al., 2015), civil inpatients (Braithwaite, Charette, Crocker, & Reyes, 2010), and mixed samples (Blanchard, 2010; Gray et al., 2011). This body of research also highlights the variety of outcomes that are predicted by START assessments (O'shea & Dickens, 2014).

Nichols and colleagues (2006), for example, assessed the reliability and validity of the START in a sample of 137 forensic inpatients who had been found Not Criminally Responsible on Account of Mental Disorder. They found the START assessment had good interrater reliability ($ICC = .87, p < .001$) and internal consistency (Cronbach's $\alpha = .87$). Further, they found that START ratings were significantly associated with verbal aggression towards others (Area under the Curve (AUC) = .67), physical aggression towards objects (AUC = .69), physical aggression towards others (AUC =

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

.65), self-harm behaviour (AUC = .66), and unauthorized leave attempts (AUC = .77).

This research highlights the importance of considering criminogenic needs, clinical factors, and strength-based factors when assessing individuals with mental disorder.

However, the research related to the START has predominantly focused on clinical patients, with relatively little research focused on offenders with a mental disorder who are incarcerated or supervised in the community. Viljoen and colleagues (2012) examined the utility of the adolescent version of the START on a sample of 90 adolescent probationers and found that assessments had good internal consistency, inter-rater reliability, concurrent validity, and were related to criminal behaviour, substance use, and victimization. Other research (Blanchard, 2010) focused on the changeability of dynamic risk ratings over time on a combined sample of civil psychiatric inpatients ($n = 149$) and correctional offenders who were either in custody or on community supervision ($n = 86$). Results showed that change in the START Strength scale over the course of three months was associated with serious violence, but not any general violence, while the START Vulnerability scale was not associated with either type of violence. Adding in sample type as a covariate did not change the results – suggesting that the START has partial utility with correctional samples.

More recently, the reliability and validity of the START has been assessed with a sample of 95 individuals participating in mental health jail diversion programs located in a southern U.S. county (Lowder, Desmarais, Rade, Johnson, & Van Dorn, 2019).

Findings showed that the START had good interrater reliability, convergent validity with the Level of Service Inventory-Revised, and generally predicted arrests and days spent in jail over short and long follow-up periods. There were also some preliminary indications

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

of racial bias in the Vulnerability subscale during the 3-month follow-up period. The researchers call for additional research to examine this finding further.

The limited amount of research focusing on the utility of the START with correctional samples restricts the conclusions that can be made. In particular, scholars have questioned the relative importance of conceptualizing mental health symptoms as risk-relevant needs in comparison to general criminogenic needs (Bonta et al., 1998; Skeem et al., 2014).

Unfortunately, research focusing on risk assessment instruments for offenders with mental disorders has suffered from small sample size concerns, resulting in limited examinations of the relevance of clinically based items. However, research by Skeem and colleagues (2014) was able to explore this issue further. They used the LS/CMI (Andrews, Bonta, & Wormith, 2004) and the HCR-20 (Webster, Martin, Brink, Nicholls, & Middleton, 1997) to compare general criminogenic risk factors and clinical factors in a matched sample of 221 parolees who did or did not have a mental disorder. Results showed that offenders with a mental disorder had significantly higher risk profiles compared to those without a mental disorder and, predictably, were more likely to return to custody (although not more likely to be rearrested). Of considerable interest, however, they found that general risk factors were as predictive for offenders with a mental disorder than those without a mental disorder and, once you account for the impact of general risk factors, clinical factors did not incrementally predict recidivism. These findings suggest that offenders, regardless of the presence of mental disorder, likely embody general criminogenic needs and incorporating the assessment of these needs in

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

criminal behaviour predictions is essential for increased accuracy. Accordingly, it may not be necessary for correctional staff to incorporate clinical factors into prediction.

Chapter 4: Dynamic Risk Assessment for Offender Re-Entry

As there are an estimated 6,613,500 individuals currently being supervised in the community in the United States, representing 1 in 38 adults (Kaeble & Cowhig, 2018), the way offenders are supported within the community is of paramount importance. One such method of supporting community reintegration focuses on the way community supervision agencies manage parolees and probationers and the tools available to community supervision officers to achieve these goals. The Dynamic Risk Assessment for Offender Re-Entry (DRAOR; Serin, 2007) is a structured case management assessment aimed at informing community supervision officers (e.g., probation and parole officers) about the present experiences and orientation faced by the offender. The DRAOR requires community supervision officers to assess, and reassess, offenders in three areas: (1) stable risk factors (slow changing factors associated with criminal behaviour; items include peer associations, attitudes towards authority, impulse control, problem-solving, sense of entitlement, and attachment with others); (2) acute risk factors (fast changing factors associated with criminal behaviour; items include substance abuse, anger/hostility, opportunity/access to victims, negative mood, employment, interpersonal relationships, and living situation); and (3) protective factors (factors associated with desistance from crime; items include responsive to advice, prosocial identity, realistic expectations, costs/benefits, social supports, and social control). These 19 items are assessed on a three-point scale (0, 1, 2). For the two risk-based subscales, a score of 0 represents no problem while a score of 2 represents a definite problem. A score of 1

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

reflects a slight problem in the area. For items within the protective factors subscale, a score of 0 represents that the item does not have a protective effect; whereas a 2 represents the item to be a definite asset. A score of 1 indicates a slight asset or strength.

The DRAOR is implemented through a structured interview with the probationer or parolee by the community supervision officer at every substantive client contact. The information garnered through this assessment provides community supervision officers evidence of changes in risk state and, depending on the areas deemed to be at elevated risk, provides targets that must be addressed (i.e., increased frequency of contact, interventions, and/or services) (Serin, 2015).

Community supervision officers are provided multi-day training sessions to learn how to effectively use the DRAOR. This training involves an in-depth description of the theoretical background of the DRAOR, how the items are scored, and how this information should be used in case-management efforts. Community supervision officer competencies are assessed using a number of case study evaluations, where officers must read case summaries and score them using the DRAOR. The training facilitator is then able to evaluate performance and provide additional instruction, when necessary.

This structured case management assessment further informs case planning and risk management by providing correctional staff with risk prediction information. Including a dynamic risk assessment in the case management approach of community supervision can enhance the quality of supervision by providing real-time risk-relevant information to the community supervision officer. While static risk estimates provide information about the likelihood of an offender committing a new crime, dynamic risk

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

estimates can provide information about *when* the offender might re-offend. This relates to work by Douglas and Skeem (2005) who considered the role of risk assessment in the monitoring and treatment of offenders or forensic patients. They maintain that assessing an individual's *risk status* – with an emphasis on static risk factors – allows clinicians or correctional staff to determine which individuals are at increased risk of criminal behaviour. However, this information often does not allow for individuals to decrease their risk level over time and does little to direct specific intervention or case management strategies at strategic times. Dynamic risk information, however, contributes to our understanding of an offender's *risk state*. These assessments, which may include the consideration of rapidly changing factors (e.g., emotion) or more gradually changing factors (e.g., attitudes), contribute to a comprehensive determination of an individual's risk for criminal behaviour and allows for more effectual offender management efforts.

The DRAOR has the additional benefit of considering protective factors in the assessment of dynamic risk. Emerging from the rise of positive psychology, desistance literature, and strength-based theories (e.g., Good Lives Model; Ward, 2002), correctional researchers have begun to explore why some offenders have been able to turn away from criminal behaviour and become pro-social, contributing members of society (Maruna, 2010; Rogers, 2000; Serin, Chadwick, & Lloyd, 2016; Serin & Lloyd, 2009; Shepherd, Strand, Viljoen, & Daffern, 2018; Ward, 2017; Woldgabreal, Day, & Ward, 2014). Factors such as having a pro-social identity, pro-social life goals, family and peer support, and emotional stability have all been hypothesized as important in the process of crime desistance and are beginning to be incorporated into dynamic risk assessment tools (de Vries Robbe, de Vogel, Koster, & Bogaerts, 2015; Farrington, Ttofi, & Piquero,

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

2016). However, there is ongoing disagreement among correctional scholars regarding how protective factors should be conceptualized and how they related to dynamic risk (for in-depth reviews, see Klepfisz, Daffern, & Day, 2017; Serin et al., 2016; Ward, 2017). In the development of the DRAOR, protective factors were conceptualized to be independent from risk; signifying that an individual may demonstrate multiple risk factors and protective factors concurrently.

Theoretical Underpinnings of the DRAOR

The underlying goal of the DRAOR is to conceptualize and assess how an offender transitions from active offending to desisting from crime and becoming a law-abiding citizen. By understanding this process, the criminal justice system will be better situated to assist offenders, supporting community reintegration goals. As seen in Figure 1, Serin and colleagues (2010) describe the integrated model for enhancing offender re-entry being situated in a life-course perspective that integrates risk factors and desistance correlates in explaining the transition from a criminal to prosocial lifestyle.

Consistent with the GPCSL perspective and considerable meta-analytic evidence (Andrews & Bonta, 2010; Bonta et al. 1998; 2014), there are certain personal attributes, such as holding pro-criminal attitudes and having a history of criminal behaviour, that increases one's propensity for criminal conduct. For brevity, risk factors that have shown some of the strongest associations with crime have been included in Figure 1.

Considering research showing the majority of crime being committed by individuals in their adolescent and early adult years and usually ceases between the ages of 30 and 40 (Blumstein & Cohen, 1987), young age is also included in this model.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Figure 1. Conceptual model of offender re-entry (Serin, Lloyd, & Hanby, 2010)

Some scholars have postulated that the process of both entering and leaving the criminal lifestyle are not opposite processes, but unique processes (Serin & Lloyd, 2009; Serin et al., 2010). They propose that the transition from active offending to desisting from crime is activated by a cognitive shift consistent with a commitment to change. Certainly, qualitative research completed by Giordano and colleagues (2002) has highlighted the impact that cognitive transformation can have on fostering desistance correlates (e.g., making the conscious decision to live a prosocial life can promote legal employment and the development of a prosocial support network as important goals to pursue).

Making the conscious decision to desist from criminal behaviour, however, is not sufficient, as research has shown that, while many offenders may want to lead prosocial lives, this does not always result in prolonged behavioural change (Dhami, Mandel, Loewenstein, & Ayton, 2006). It is hypothesized that internal (e.g., having a prosocial

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

identity, self-efficacy) and external change factors (e.g., having appropriate support from the criminal justice system, prosocial relationships) are necessary to sustain a commitment to change. These change factors then impact factors that are correlated with desistance from crime (e.g., developing stable employment and relationships, believing that the associated costs of crime outweigh the benefits, etc.), leading to successful community reintegration. Serin and colleagues (2010) propose that a structured case management assessment tool, like the DRAOR, provides pertinent information needed to provide appropriate proactive supervision to assist offenders in successfully reintegrating into society.

There has been considerable research separately investigating the components of the integrated model for enhancing offender re-entry: the role of risk factors (Andrews & Bonta, 2010; Bonta et al. 1998; 2014), cognitive transformation (Casey, Day, Howells, & Ward, 2004; Giordano et al., 2002; Serin, Mailloux, Kennedy, 2007; Ward, Day, Howells, & Birgden, 2004), internal and external change factors (de Vries Robbe et al, 2015; Farrington et al., 2016; Maruna, 2001), and desistance correlates (Blumstein & Cohen, 1987; Giordano et al., 2002; Maruna, 2001). However, further research is needed to assess the utility of this model in a holistic and integrative manner.

Initial Findings with the DRAOR

The DRAOR has been implemented and validated in several international jurisdictions. Consequently, evidence regarding its utility has been growing. Previous research has validated the DRAOR in general offenders (Chadwick, 2014; Hanby, 2013; Lloyd, 2015; Tamatea & Wilson, 2009), high-risk offenders (Yesberg & Polascheck,

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

2015), Maori offenders (Hanby, 2013), women offenders (Yesberg, Scanlan, Hanby, Serin, & Polaschek, 2015), and sex offenders (Smeth 2013). The proceeding section provides an overview of the preliminary research pertaining to the DRAOR with a focus on the psychometric properties and predictive validity of the tool.

Reliability. Research has shown that DRAOR scores are normally distributed and change over the supervision period (Tamatea & Wilson, 2009). In an effort to assess the inter-relatedness of the items contained within each subscale of the DRAOR, Hanby (2013) examined their internal consistency using a sample of 3,498 New Zealand parolees. She found that the Stable ($\alpha = .81$) and Protective Factor ($\alpha = .84$) subscales had good internal consistency, while the results were less favourable for the Acute subscale ($\alpha = .62$). American-based examinations found strikingly similar results (Chadwick, 2014).

Further inspection of the relationship between individual DRAOR items and their respective subscale scores show that they are significantly associated with each other (Chadwick, 2014; Hanby, 2013). Generally, Stable and Protective Factor items were strongly related to their respective subscale scores; while some Acute items had weaker relationships (e.g., substance abuse, $r = .28$; employment, $r = .30$; Chadwick, 2014).

A limitation of previous DRAOR research is the absence of inter-rater examinations to determine the consistency that community supervision officers assess offenders. It is important to note, however, that a related assessment tool, the Structured Dynamic Assessment Case-Management – 21 item (Serin & Wilson, 2012), that assesses offenders while incarcerated with considerable overlap in individual items has seen

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

acceptable reliability (ICC values ranging from .54 to .96; Smeth, 2019). Nevertheless, future research should prioritize inter-rater reliability investigation.

Validity. As expected, research has found significant associations between DRAOR subscales (Chadwick, 2014; Tamatea & Wilson, 2009). Chadwick (2014) found that Stable and Acute subscales were highly correlated with each other ($r = .73$), suggesting that these subscales are associated with the broader concept of dynamic risk. Further, the Stable and Acute subscales were inversely correlated with the Protective Factors subscale ($r = -.53$, $r = -.49$, respectively), suggesting that this domain is measuring factors that are unrelated to dynamic risk.

Further, DRAOR assessments have been found to be related to other measures of offender risk (Chadwick, 2014; Hanby, 2013; Tamatea & Wilson, 2009; Yesberg & Polaschek, 2014). For example, Hanby (2013) found that Stable ($r = .35$), Acute ($r = .30$) and Protective Factor ($r = -.31$) subscales were significantly related to static risk scores. These results support the use of the DRAOR as a valid measure of offender risk.

Factor Structure. There have also been a number of examinations of the internal structure of the DRAOR with results showing a debatable factor structure (Chadwick, 2014; Hanby, 2013; Yesberg & Polaschek, 2014). The first examination, conducted by Hanby (2013), involved exploratory factor analysis using a sample of 3,498 New Zealand parolees and found a structure that generally approximated the intended three-category system to classify items and explained 38.2% of the variance. Within the three-factor model, 17 of the possible 19 items were included; the exceptions being two Acute subscale items: “Interpersonal relationships” and “Employment”. She labelled these

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

factors as “Mostly Stable”, “Mostly Acute”, and “Protective”, with many of the Stable and Acute items cross-loading on their respective factors. These cross-loadings were not necessarily surprising given the medium correlation between the “Mostly Stable” and “Mostly Acute” factors ($r = .49$). The “Protective Factor” was found to have medium to large inverse correlations with the “Mostly Stable” ($r = -.39$) and “Mostly Acute” ($r = -.66$) factors.

Subsequent work by Chadwick (2014) used exploratory factor analysis to examine the factor structure of the DRAOR for a sample of 391 probationers and parolees on supervision in the state of Iowa. Results showed that a two-factor solution fit the data well. Nearly all of the Stable and Acute subscale items loaded onto Factor 1, referred to collectively as the “Risk” factor, and all of the Protective factors loaded onto Factor 2. There were three Acute items (“Negative mood”, “Employment”, and “Interpersonal relationships”) that only approached the factor loading cut-off (.40). However, as they were moderately to highly correlated with Factor 1, they were incorporated into this factor. The two factors were highly correlated with one another ($r = -.54$).

Finally, Yesberg and Polaschek (2015) examined the factor structure of the DRAOR in a sample of 299 high-risk male New Zealand parolees. They began with confirmatory factor analysis to assess the suitability of the original three-factor structure of the DRAOR. However, results showed that this model provided poor fit ($\chi^2(19) = 394.21, p < .001$; CFI = .84; RMSEA = .076). Researchers then used principle components analysis to determine the component structure of the data. A four-component solution was found to have the best fit for the data and this solution explained 51.3% of

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

the variance. The four components were specified as “Protective”, “Stable”, “Internal acute”, and “External acute”.

Predictive validity. As summarized in Table 1, DRAOR assessments have generally been found to be predictive of recidivism. Hanby (2013), for example, found that DRAOR total and subscale scores were significantly predictive of any reconviction (AUC values ranged from .66 to .72) and any criminal reconviction (AUC values ranged from .62 to .67). As well, it was found that the DRAOR added incremental value to the prediction of any reconviction and any criminal reconviction, over static risk scores.

Results within an American jurisdiction have been more modest (Chadwick, 2014). It was found that DRAOR total and subscale scores were not predictive of reoffences; however, were predictive of technical violations (AUC values ranged from .57 to .61) and any recidivism (AUC values ranged from .58 to .62). Further, support was not found for the hypothesis that the predictive validity of the DRAOR would be improved at higher levels of static risk.

Repeat DRAOR assessments. There have been a small number of examinations of the utility of multiple DRAOR assessments. Hanby (2013), using a sample of 3,498 New Zealand parolees, found that the factor structure of the DRAOR was invariant across time. Multilevel growth modeling was used to assess how scores in the DRAOR changed across assessments and findings showed that offenders decreased in risk over time (Stable subscale change = .003 per day, Acute subscale change = .01 per day, and Protective Factor subscale change = .004 per day). She also found that rates of change on the DRAOR differed for recidivists compared to non-recidivists. Those who experienced

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

recidivism while on community supervision scored higher on the Stable subscale, although the average rate of change did not differ across recidivism status. Protective Factor subscale scores showed a similar trend, with recidivists beginning with a lower Protective Factor score (e.g., they had fewer protective factors) than non-recidivists with a similar increase in Protective Factors over time. When examining group differences on the Acute subscale, recidivists scored higher on acute risk at the start of their supervision period and experienced a significantly slower decrease in acute risk over time compared to their non-recidivating counterparts.

Hanby (2013) went on to assess whether the DRAOR was a predictor of recidivism at each time point (12 time points over 12 months) using a series of cox regression survival analyses. While this analysis did not account for changes in risk that occurred from one month to the next, results generally showed that earlier assessments had a stronger relationship to community outcomes than later assessments. Hanby hypothesizes that the DRAOR may be more predictive for higher risk offenders who likely would have already recidivated prior to 12 months of supervision. This could possibly explain why later DRAOR assessments were less predictive compared to the initial baseline assessment.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL ILLNESS

Table 1

A Summary of the Association Between Baseline DRAOR Subscale Scores on Various Recidivism Outcomes in Previous Research

Source	Sample	Outcome	Stable		Acute		Protective	
			<i>r</i>	<i>AUC</i> [95% CI]	<i>r</i>	<i>AUC</i> [95% CI]	<i>r</i>	<i>AUC</i> [95% CI]
Serin & Prell (2012)	General offenders [I]	Technical violations or new offences	.23	.60 [.56, .64]	.25	.65 [.61, .69]	-.28	.67 [.63, .70]
		New offences only	.12	-	.11	-	-.15	-
Hanby (2013)	General offenders [NZ]	Technical violations or new offences	.29	.66 [.65, .68]	.38	.72 [.70, .74]	-.29	.67 [.65, .68]
		New offences only	.21	.62 [.60, .64]	.29	.67 [.65, .69]	-.21	.62 [.60, .64]
	Maori offenders	Technical violations or new offences	.26	.65 [.62, .67]	.35	.70 [.68, .72]	-.26	.65 [.62, .67]
		New offences only	.21	.61 [.59, .64]	.27	.66 [.63, .68]	-.20	.61 [.58, .64]
Smeth (2013)	Male sex offenders [I]	Technical violations	.33	.69 [.62, .78]	.27	.65 [.57, .74]	-.18	.61 [.52, .69]
		Sexual recidivism	.01	.51 [.26, .75]	.05	.46 [.30, .75]	.01	.46 [.21, .71]
Yesberg & Polaschek (2014)	High-risk male offenders [NZ]	Technical violations or new offences	-	.59 [-,-]	-	.60 [-,-]	-	.62 [-,-]
		New offences only	-	.61 [-,-]	-	.57 [-,-]	-	.60 [-,-]
Chadwick (2014)	General offenders [I]	Technical violations or new offences	-	.62 [.56, .67]	-	.59 [.54, .65]	-	.58 [.52, .64]
		New offences only	-	.52 [.42, .62] ^{ns}	-	.53 [.43, .63] ^{ns}	-	.56 [.47, .66] ^{ns}
Fergusson (2015)	Adolescent offenders [NZ]	Criminal reconviction						
Averill (2016)	Sexual offenders [NZ]	Technical violations or new offences	.33	-	.39	-	-.33	-
		Sexual recidivism	.02 ^{ns}	-	.07	-	-.06 ^{ns}	-
Muirhead (2016)	Adolescent offenders [NZ]	Any reconviction	-	.70 [.64, .76]	-	.69 [.63, .74]	-	.68 [.62, .74]

Note. There are four additional studies focused on the DRAOR that were omitted due to incompatible statistics (Lloyd, 2015; Lowenkamp, Johnson, Trevino, & Serin, 2016; Tamatea & Wilson, 2009; Yesberg et al., 2015). *r* = point-biserial correlations; *AUC* = area under the curve statistics; 95% CI = 95% confidence intervals; [I] = Iowa sample; [NZ] = New Zealand sample; “-” = statistic absent. *p* < .05 unless otherwise specified (*ns*).

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Lloyd (2015) also examined the utility of repeat DRAOR assessments for 4,321 New Zealand offenders on parole supervision (97,185 assessments). Results showed that when comparing the absolute change between the baseline assessment and the last assessment, non-recidivists experienced about twice as much decrease in risk relative to those who did recidivate, though even recidivists experienced some decrease in risk levels. Interestingly, when all reassessments were considered, individuals who recidivated had higher risk scores, but more frequently changing scores, compared to non-recidivists who generally slowly decreased in risk over time.

A further examination into the predictive utility of including repeat DRAOR assessments was assessed by adding the time-varying scores of the DRAOR subscales when controlling for the baseline assessments (Lloyd, 2015). Univariate results showed that including time-varying scores incrementally predicted recidivism over baseline assessments. While the magnitude of the increased predictive accuracy was small, including time-varying scores increased the variance accounted for by the model by 4% for the Stable subscale model, 8% for the Acute subscale model, and 4% for the Protective Factors model.

Special populations. There has been a limited amount of research assessing the utility of the DRAOR in correctional sub-populations and this research has largely focused on predictive validity indicators. Hanby (2013) conducted a validation study of the DRAOR on 3,372 offenders in New Zealand. Of these, 52% ($n = 1,755$) were Maori offenders. She found that Maori offenders with a reconviction had significantly higher levels of dynamic risk and lower levels of protective factors in comparison to those who did not experiencing a revocation. DRAOR total and subscale scores had the ability to

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

predict both any reconviction (AUC values ranging from .65 to .70) and any criminal reconviction (AUC values ranging from .61 and .66); therefore, it was concluded that the DRAOR worked well for this ethnic sub-population.

Moreover, Yesberg and colleagues (2015) investigated the predictive validity of the DRAOR in 266 offenders, half of which were women. Results, somewhat surprisingly, showed stronger predictive validity among women than for men. Although DRAOR total scores were predictive of recidivism (measured as the presence of a new offence leading to conviction and includes parole breaches) for both men and women, the three subscales considered together were only predictive for women. Other analysis found that DRAOR total scores incrementally predicted recidivism, over static risk scores. These results show support for the use of this gender-neutral assessment tool with women offenders.

Finally, Smeth (2013) examined the use the DRAOR in 203 male sex offenders. Results showed that DRAOR scores significantly predicted parole violations (AUC values ranged between .61 and .69) and incrementally predicted parole violations over static risk assessments. Nonetheless, DRAOR assessments were, perhaps unsurprisingly, not predictive of sexual recidivism.

Suitability of the DRAOR for Offenders with Mental Disorder

While the psychometric support for the DRAOR is mixed, evidence shows the DRAOR provides generally sufficient utility in the prediction of a variety of offender outcomes in the community. Further examination, however, is warranted to assess the utility of the DRAOR with justice-involved persons with a mental disorder. The items

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

contained within the DRAOR were developed to be appropriate for all types of offenders. Therefore, beyond the substance abuse item within the Acute subscale, there are no items that directly assess an offender's mental health status. However, research by Peterson and colleagues (2010) has found that the offence patterns of individuals with serious mental illness⁶ are typically reactive in nature – characterized by hostility, impulsivity, and low emotional regulation.

This aligns with other research focusing on acute risk factors that can predict violence in general offenders and forensic inpatients (Lowenkamp et al., 2016; Ogloff & Daffern, 2006; Rosenfeld et al., 2017). Ogloff and Daffern (2006), for example, assessed the predictive accuracy of a variety of acute risk variables to determine which were the most effective in identifying forensic inpatients ($n = 100$) at risk of violent behaviour in the subsequent 24 hours. Results showed that characteristics such as irritability, impulsivity, being easily angered when requests are denied, and negative attitudes were all highly associated with physical aggression. Therefore, it would be expected that several DRAOR items (e.g., impulse control, anger/hostility, and negative mood) would capture these factors; however further research is necessary to determine its suitability for offenders with mental disorder diagnoses.

It is hoped that the results of this doctoral research will inform the applicability of the psychopathological theories of criminal behaviour and the GPCSL theory of criminal

⁶ Serious mental illness in this study was defined as having “an officially designated serious mental illness” assigned by correctional staff members as part of a specialized re-entry program. The majority of participants had a primary diagnosis of schizophrenia or other psychotic disorder (59%), followed by major depressive disorder (18%), other disorder (18%), and bipolar disorder (17%).

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

behaviour for offenders with a mental disorder diagnosis. Support for psychopathological theories of criminal behaviour would be evidenced by the presence of a mental disorder diagnosis increasing the likelihood that an individual will experience a negative community outcome (e.g., a technical violation or new charge), scores on the DRAOR being not predictive of negative community outcomes for offenders with mental disorders, and clinically-relevant information augmenting the prediction of community outcomes. Comparatively, support for the GPCSL theory would be demonstrated by the presence of a mental disorder diagnosis not affecting an individual's risk of criminal behaviour, the DRAOR would be predictive of negative community outcomes regardless of mental disorder status, and additional clinical considerations would not improve this prediction.

Chapter 5: Study Purpose

The goal of the current research is to validate the use of the DRAOR with offenders with mental disorder diagnoses. As such, there are four broad aims of the current research: (1) assess the association between the presence of mental disorder in the prediction of recidivism outcomes (Study 1); (2) investigate the utility of using the DRAOR as a structured case management assessment for those offenders with a mental disorder (Study 2); (3) explore the potential of incorporating clinical considerations into dynamic risk assessments (Study 2); and (4) assess the utility of risk assessment change scores in the prediction of recidivism outcomes (Study 3a and Study 3b). The following research questions will be investigated.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Research Questions and Hypotheses

Research question 1 (Study 1): Are individuals with a mental disorder diagnosis on file significantly more likely to experience recidivism outcomes (i.e., technical violations, new charges, any recidivism) than offenders without a mental disorder diagnosis on file?

Hypothesis 1: Previous research has found the presence of a mental disorder may be related to parole failure but not for new crimes (Skeem et al., 2014). Therefore, it is expected that individuals with mental disorders will not be more likely to experience a new charge but may be more likely to experience technical violations in comparison to those without mental disorders.

Research question 2 (Study 2): Does the DRAOR have acceptable psychometric properties for offenders with mental disorder diagnoses? Does the DRAOR have comparable psychometric properties for offenders with a mental disorder diagnosis compared to offenders with no mental disorder diagnosis?

Hypothesis 2a: Based on previous research (Chadwick, 2014; Hanby, 2013; Tamatea & Wilson, 2009; Yesberge & Polaschek, 2015), it is expected that the DRAOR's psychometric properties (factor structure, internal consistency, item-total correlations, convergent validity) will be acceptable for individuals with a mental disorder diagnosis.

Hypothesis 2b: It is expected that the DRAOR will have comparable psychometric properties for individuals with a mental disorder diagnosis compared to those with no mental disorder diagnosis.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Research question 3 (Study 2): Do DRAOR scores differ by mental disorder group membership?

Hypothesis 3: Based on previous research (Skeem et al., 2014), it is expected that offenders with a mental disorder diagnosis will have significantly higher stable and acute risk scores and significantly lower protective factor scores in comparison to offenders with no mental disorder diagnosis.

Research question 4 (Study 2): Are DRAOR scores able to reliably discriminate between recidivists and non-recidivists for those offenders with a mental disorder diagnosis? Are discrimination indices comparable to those offenders with no mental disorder diagnosis?

Hypothesis 4a: It is expected that DRAOR scores will be able to reliably discriminate between offenders with a mental disorder diagnosis who do and do not recidivate.

Hypothesis 4b: It is expected that the ability of the DRAOR to discriminate between offenders who do and do not recidivate will be comparable regardless of mental disorder group membership.

Research question 5 (Study 2): Do DRAOR scores demonstrate comparable absolute predictive accuracy for recidivism for offenders with a mental disorder diagnosis compared to those with no mental disorder diagnosis?

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Hypothesis 5: It is expected that the DRAOR will be similarly calibrated between offenders with a mental disorder diagnosis and offenders without a mental disorder diagnosis.

Research question 6 (Study 2): Do DRAOR scores predict recidivism outcomes over and above static risk scores for offenders with a mental disorder? Are results comparable to those offenders with no mental disorder diagnosis?

Hypothesis 6a: It is expected that DRAOR scores will incrementally predict unsatisfactory community outcomes over static risk scores for offenders with a mental disorder diagnosis.

Hypothesis 6b: It is expected that DRAOR scores will incrementally predict unsatisfactory community outcomes over static scores regardless of mental disorder group membership.

Research question 7 (Study 2): For offenders with a mental disorder diagnosis, does the presence of ongoing mental health-related problems incrementally improve the prediction of recidivism outcomes over and above DRAOR total scores?

Hypothesis 7: Previous research has found the presence of a mental disorder may be related to parole failure but not for new crimes (Skeem et al., 2014). Therefore, it is expected that the presence of ongoing mental health-related problems will incrementally improve the prediction of technical violations, but not new charges, over DRAOR total score.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Research question 8 (Study 3a): Does the DRAOR demonstrate sufficient psychometric properties and stability in factor structure over time?

Hypothesis 8: Based on previous research (e.g., Hanby 2013; Lloyd, 2015) It is expected that the DRAOR's psychometric properties (factor structure, internal consistency, item-total correlations, convergent validity) will be acceptable over time.

Research question 9 (Study 3b): Do offenders demonstrate change in risk and protective factors? Does this change in risk and protective factors differ depending on whether offenders have a mental disorder diagnosis?

Hypothesis 9a: Based on previous research (Hanby, 2013; Lloyd, 2015), it is expected that offenders will demonstrate a decrease in risk and an increase in protective factors over time.

Hypothesis 9b: It is expected that change in risk and protective factors will not differ depending on mental disorder group membership.

Research question 10 (Study 3b): Does the inclusion of changes in risk and protective factors enhance the prediction of recidivism over baseline models? Do these results differ depending on whether offenders have a mental disorder diagnosis?

Hypothesis 10a: It is expected that changes in risk and protective factors will be significantly associated with recidivism outcomes.

Hypothesis 10b: It is expected that these results will not differ depending on whether offenders have a mental disorder diagnosis.

Chapter 6

Study 1: The Association between Mental Disorder Diagnosis and Recidivism Outcomes

The purpose of Study 1 was to assess whether the presence of a mental disorder diagnosis was significantly associated with recidivism outcomes.

Methods

Sample

This sample consists of 961 offenders ($n = 785$ men; $n = 176$ women) with a valid risk assessment being supervised on parole in the state of Iowa. Upon admission to custody, or upon transfer to another institution, offenders are screened for mental health concerns.⁷ Based on the results of the screening, offenders can be referred to a prison psychiatrist for further assessment and possible diagnosis. In the current sample, 49.7% ($n = 478$) were diagnosed with a mental disorder (e.g., any axis I or axis II disorder) during their incarceration; while 50.3% ($n = 483$) of offenders were not diagnosed with a mental disorder.⁸

Due to the need to maintain the privacy of health-related information, the specific diagnose(s) for each offender were not provided by the Iowa Department of Corrections; however, Table 2 outlines the prevalence of mental disorders within the Iowa offender

⁷ It is not known what proportion of offenders are referred to a prison psychiatrist because of this screening process.

⁸ It is important to note that parole officers may not be aware of the presence of an on-file mental disorder diagnosis. All offender information is contained within the Iowa Correctional Offender Network (ICON), an administrative data collection system, but parole officers can only access medical information if they sign a confidentiality agreement. If the parole officer does not elect to sign the confidentiality agreement, they would only be aware of the presence of mental disorder diagnoses if the offender chose to disclose this information to them (S. Fineran, personal communication, February 6, 2020).

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

population for 2015. This information is a reasonable approximation of the likely mental disorder profile of the current sample as the present offenders were released from prison between July 2013 and June 2015, with just over half of offenders (54.9%) being released in 2015. It appears that substance use disorders (25.6%) and anxiety, dissociative, and somatoform disorders (18.2%) were the most common diagnoses for the 2015 offender cohort.

It is important to note that the focus of this research is on individuals with mental disorder who have been convicted of a crime, imprisoned for varying lengths of time, and released onto community supervision. These are *not* individuals who have been found not guilty due to mental disorder or not guilty by reason of insanity.

Other sample characteristics described in Table 3 provide additional information on the offenders being supervised through the Iowa Department of Corrections and how offenders differ by mental disorder group membership. Offenders were predominantly men, white, in an intimate relationship, holding at least a high school diploma, and convicted for a drug or property offence. When comparing the mental disorder diagnosis groups, offenders with a mental disorder were more likely to be female (23.2% vs. 13.5%), white (82.0% vs. 70.4%), single (23.3% vs. 12.3%), to hold a high school diploma (88.7% vs. 83.7%), and to have higher static risk scores than offenders with no mental disorder diagnosis.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 2

Prevalence of Mental Disorder Diagnoses for Iowa Offender Population in 2015 (N = 8,217)

Diagnosis Category	% (n)
Substance use disorders	25.9 (2,131)
Depression and major depressive disorders	14.2 (1,168)
Posttraumatic stress disorder	6.6 (545)
Anxiety, dissociative and somatoform disorders	18.2 (1,494)
Developmental disabilities	8.8 (725)
Bipolar disorders	8.6 (710)
Personality disorders	10.5 (862)
Psychosis/Psychotic disorders	3.6 (295)
Schizophrenia	3.9 (324)
Sleep, movement, & eating disorders	0.4 (31)
Dementia/organic disorders	1.0 (85)
Impulse control disorders	1.8 (147)
Pervasive developmental disorders	0.1 (11)
Sexual disorders/paraphilias	0.02 (2)

Note. Percentages do not sum to 100 as offenders may have more than one mental disorder concurrently.

Materials

Demographic information. Demographic information is routinely collected through the Iowa Department of Corrections information management system. This includes gender, race, age, highest education level, and marital status. Other information pertaining to their criminal behaviour is collected, including the index offence type (i.e., violent, property, drug, public order, other offences).

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Recidivism. Records of new charges and technical violations were recorded within the Iowa Department of Corrections information management system. A one-year fixed follow-up period was used. These individual community outcomes, as well as an amalgamated outcome variable combining any new charge or technical violation was used to assess any recidivism while on release.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 3

Study 1 Offender Characteristics by Mental Disorder Group Membership (N = 961)

	Offenders without mental disorder (N = 483)	Offenders with mental disorder (N = 478)		
	% (n)	% (n)	χ^2 (df)	Cramer's V/Phi
Gender			15.3 (1)***	0.13
Male	86.4 (418)	76.8 (367)		
Female	13.5 (65)	23.2 (111)		
Race			17.9 (2)***	0.14
White	70.4 (340)	82.0 (392)		
Black	27.1 (131)	16.3 (78)		
Other	2.5 (12)	1.7 (8)		
Marital Status ^a			19.6 (1)***	0.14
Does not have significant other	87.7 (421)	76.7 (363)		
Does have significant other	12.3 (59)	23.3 (110)		
Education ^b			6.5 (1)*	0.08
Has high school diploma	82.9 (398)	88.7 (423)		
Does not have high school diploma	16.3 (77)	11.3 (54)		
Convicting offence			1.7 (4) ^{ns}	0.04
Violent	13.9 (67)	11.9 (57)		
Drug	38.9 (188)	37.9 (181)		
Property	27.5 (133)	30.8 (147)		
Public Order	12.4 (60)	11.9 (57)		
Other	7.3 (35)	7.5 (36)		

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 3 *Continued.*

	Offenders without mental disorder (<i>N</i> = 483)	Offenders with mental disorder (<i>N</i> = 478)		
	M (SD)	M (SD)	t(df)	Cohen's d
Iowa Static Risk				
Violence Risk	9.1 (3.5)	9.7 (3.5)	-2.6 (959)*	0.17
Victimization risk	9.5 (3.9)	10.5 (3.8)	-3.9 (959)***	0.26

^a Eight individuals were missing marital status age. ^b Four individuals were missing education information.

^{ns} not significant, * *p* < .05, ** *p* < .01, *** *p* < .001.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Analytic Plan

Several statistical software packages were used to complete the comprehensive screening (e.g., data cleaning, assumption checks, etc.) and proposed analyses including SAS (Version 9.4) and SPSS (Version 20).

Research question 1: Are individuals with a mental disorder diagnosis on file significantly more likely to experience recidivism outcomes (i.e., technical violations, new charges, any recidivism) than offenders without a mental disorder diagnosis on file?

Logistic regression was used to assess the association between mental disorder group membership (e.g., having or not having a mental disorder diagnosis) and recidivism. This type of approach allows for an examination of the relationship between predictor variables with a discrete outcome variable (Tabachnick & Fidell, 2013). This analysis also has the benefit of producing the odds ratio effect size, which characterizes the difference in the odds of experiencing the discrete outcome (e.g., experiencing recidivism) when the value of the predictor variable increases by one unit (e.g., having a mental disorder versus not having a mental disorder) (Tabachnick & Fidell, 2013). In combination with the significance level and confidence intervals, an odds ratio of 1.0 would indicate no difference in the odds of experiencing recidivism between mental disorder status groups. Whereas, an odds ratio greater than 1.0 would indicate increased odds of recidivism occurring for one group compared to the other and an odds ratio of

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

less than 1.0 would indicate decreased odds. This analysis will be modelled for each outcome of interest (technical violations, new charges, any recidivism).⁹

Supplementary analysis used chi-square tests to assess whether there were mental disorder group membership differences in the reasons for community failure (e.g., the type of technical violation, the type of new charge experienced).

Results

Data Management

Logistic regression analyses have a number of statistical assumptions or practical considerations necessary to assess prior to analysis (Tabachnick & Fidell, 2013). First, all variables were assessed for data entry accuracy and presence of missing values. There were no apparent data entry errors or missing data specific to mental disorder diagnoses or recidivism outcomes. Second, there must be a linear relationship between any continuous predictors and the logit of the outcome variable. As there were no continuous predictor variables, this assumption was not relevant to the current study. Third, the multicollinearity assumption requires that predictor variables are not too highly correlated. As there was only one predictor variable of interest, this assumption was not

⁹ As extant literature shows that the relationship between mental disorder and crime requires an understanding of the complex interaction of neurobiological, sociological, and psychological factors (Bartholomew & Morgan, 2015), if one wanted to isolate the precise association between the presence of a mental disorder diagnosis and recidivism outcomes then one would need to control for many covariates (e.g., socioeconomic status, race, gender, personality characteristics, etc.). The current research, however, wanted to examine the association between mental disorder diagnosis and recidivism outcomes to inform and contextualize the results of the subsequent findings (e.g., to determine whether it seems sensible for supervision officers to assess offenders with a mental disorder as lower, the same, or higher risk compared to those who do not have a mental disorder diagnosis). Thus, covariates were not included in the statistical models.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

relevant to the current study. Fourth, problems can occur when combinations of variables result in a significant number of cells with no cases (e.g., if all offenders with a mental disorder diagnosis did not recidivate while on community supervision) or when outcome groups are perfectly separated (e.g., if all offenders with a mental disorder diagnosis did not recidivate while on community supervision, while all offenders without a mental disorder diagnosis did recidivate while on community supervision). When examining the data, it was evident that there were no combinations of variables with no cases and no perfect separation.

Summary. There were no statistical or methodological issues in the data that would adversely affect the research conclusions.

Association Between Mental Disorder Diagnosis and Recidivism Outcomes

Hypothesis 1: Previous research has found the presence of a mental disorder may be related to parole failure but not for new crimes (Skeem et al., 2014). Therefore, it is expected that individuals with mental disorders will not be more likely to experience a new charge but may be more likely to experience a technical violation in comparison to those without mental disorders.

Table 4 displays the rates of recidivism outcomes within the first year of community supervision for offenders with and without a mental disorder diagnosis. Nearly one-quarter of offenders experienced a violation of release conditions within the first year, with offenders with mental disorder diagnoses experiencing slightly higher rates of technical violations (25.9% versus 21.3%, respectively). Rates of new criminal behaviour were lower, with 16% of offenders with and without a mental disorder

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

diagnosis being charged with a new offence. Finally, a composite variable of any technical violation or any new charge, titled any recidivism, showed that around one-third of offenders experienced any recidivism in the community.

Table 4

Proportion of Recidivism Outcomes by Mental Disorder Group Using a One-Year Fixed Follow-Up

	All offenders (<i>N</i> = 961)	Offenders without mental disorder (<i>N</i> = 483)	Offenders with mental disorder (<i>N</i> = 478)
	% (<i>n</i>)	% (<i>n</i>)	% (<i>n</i>)
Technical violation	23.6 (227)	21.3 (103)	25.9 (124)
New charge	16.1 (155)	16.1 (77)	16.2 (78)
Any recidivism	33.2 (319)	31.5 (152)	34.9 (167)

Note. Any recidivism is the combination of any technical violations or new charges. The percentage of offenders who experienced new charges and technical violations are not mutually exclusive and, thus, will not sum to that who experienced any recidivism.

A series of bivariate logistic regression analyses were conducted to examine the association between the presence of a mental disorder diagnosis and each recidivism outcome. As shown in Table 5, none of the models were statistically significant, meaning the odds of experiencing recidivism outcomes were equal between offenders with a mental disorder diagnosis and without a mental disorder diagnosis.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 5

Bivariate Logistic Regression Analysis of Recidivism Outcomes as a Function Of Mental Disorder Group Using a One-Year Fixed Follow-Up (N = 961)

				95% Confidence Interval	
				for Odds Ratio	
	β (SE)	Wald χ^2 (df)	Odds Ratio	Lower	Upper
Model 1: Technical violations					
Constant	1.18 (0.08)	238.64 (1)***	-	-	-
Mental disorder status	-0.12 (0.08)	2.83 (1) ^{ns}	0.77	0.57	1.04
Model 2: New charges					
Constant	1.65 (0.09)	353.34 (1)***	-	-	-
Mental disorder status	0.00 (0.09)	0.00 (1) ^{ns}	1.00	0.71	1.42
Model 3: Any recidivism					
Constant	0.70 (0.07)	104.24 (1)***	-	-	-
Mental disorder status	-0.08 (0.07)	1.30 (1) ^{ns}	0.86	.065	1.12

Note. Not having a mental disorder diagnosis was the reference category. ^{ns} not significant, * $p < .05$, ** $p < .01$, *** $p < .001$.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

While the rate at which offenders fail in the community did not differ by mental disorder group membership, it was of interest to explore whether the reasons for failure were different. At times, this was difficult to examine as many of the parole violations were low frequency events, preventing group differences from being statistically tested using chi-square tests. Table 6 shows the prevalence of different technical violations by mental disorder diagnosis group for those who violated the conditions of their release. The most common parole violations included the use/possession of alcohol or drugs/paraphernalia (43.7% of offenders without a mental disorder and 40.3% of offenders with a mental disorder), failure to maintain contact (22.3% of offenders without a mental disorder and 27.4% of offenders with a mental disorder), and new arrest (23.3% of offenders without a mental disorder and 26.6% of offenders with a mental disorder).

While there were differences in the prevalence of some technical violations (e.g., 13.7% of offenders with a mental disorder diagnosis who experienced a technical violation, violated the condition related to restrictions of locations of where they were authorized to be while only 9.7% of offenders without a mental disorder did), of those violations with cell sizes sufficient for inferential testing, none reached statistical significance. Caution should be applied when looking for group differences for the remaining technical violations; however, it is interesting to note that being fired from employment seemed to be a more frequent occurrence for offenders with a mental disorder (8.1%) compared to those without a mental disorder (1.9%).

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 6

Prevalence of Individual Technical Violations by Mental Disorder Group (N = 227)

	Offenders without mental disorder (<i>n</i> = 103)	Offenders with mental disorder (<i>n</i> = 124)	Wald χ^2
	% (<i>n</i>)	% (<i>n</i>)	
Emotional/Verbal abuse	1.0 (1)	1.6 (2)	-
Failure to maintain contact	22.3 (23)	27.4 (34)	0.78 ^{ns}
Failure to pay court-ordered fines/restitution	1.9 (2)	0.8 (1)	-
Failure to report/return/absconsion	8.7 (9)	4.8 (6)	-
Failure to submit to security standard	6.8 (7)	1.6 (2)	-
Fired from employment	1.9 (2)	8.1 (10)	-
Illegal activity without arrest	4.9 (5)	1.6 (2)	-
New arrest	23.3 (24)	26.6 (33)	0.33 ^{ns}
Other prohibited contact	4.9 (5)	4.0 (5)	-
Out of place of assignment/unauthorized location	9.7 (10)	13.7 (17)	0.86 ^{ns}
Physical abuse	2.9 (3)	1.6 (2)	-
Possession of weapon	1.0 (1)	0.0 (0)	-

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 6 *Continued.*

	Offenders without mental disorder (<i>n</i> = 103)	Offenders with mental disorder (<i>n</i> = 124)	
	% (<i>n</i>)	% (<i>n</i>)	Wald χ^2
Quit without authorization	5.8 (6)	1.6 (2)	-
Terminated/Failure to participate in treatment	12.6 (13)	18.6 (23)	1.48 ^{ns}
Unauthorized distribution of alcohol or drugs	1.9 (2)	0.8 (1)	-
Use/Possession of alcohol or drugs/paraphernalia	43.7 (45)	40.3 (50)	0.26 ^{ns}
Violation of no contact order	1.0 (1)	0.0 (0)	-
Violation of special conditions - other	0.0 (0)	4.0 (5)	-
GPS violation	1.0 (1)	0.8 (1)	-
No reason provided	5.8 (6)	1.6 (2)	-

Note. Percentages do not sum to 100% as offenders could have violated more than one condition of their release during a single incident (the range of conditions violated during a single incident ranged between one and two). – cell frequencies did not support inferential testing of group differences. ^{ns} not significant, * $p < .05$, ** $p < .01$, *** $p < .001$.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Similarly, non-significant results were found when examining whether the types of new charges experienced by offenders differed by mental disorder group membership (see Table 7). The majority of offenders returned for a property (23.1% of offenders without a mental disorder and 32.5% of offenders with a mental disorder) or public order offence (37.2% of offenders without a mental disorder and 28.6% of offenders with a mental disorder), but this did not differ significantly depending on the presence of a mental disorder diagnosis.

Table 7

Prevalence of Type of Charges Occurring While on Community Supervision by Mental Disorder Group (N = 155)

	Offenders without mental disorder (n = 78)	Offenders with mental disorder (n = 169)	
	% (n)	% (n)	Wald χ^2
Drug	21.8 (17)	22.1 (17)	0.00 ^{ns}
Property	23.1 (18)	32.5 (25)	1.70 ^{ns}
Public Order	37.2 (29)	28.6 (22)	1.30 ^{ns}
Violent	15.4 (12)	15.6 (12)	0.00 ^{ns}
Other	2.6 (2)	1.3 (1)	-

Note. – cell frequencies did not support inferential testing of group differences. ^{ns} not significant, * p < .05, ** p < .01, *** p < .001.

Study 1 Summary

While previous research in other jurisdictions has found that offenders with mental disorders are more likely to return to custody for violating the conditions of their release (Skeem et al., 2014), the current research found that the presence of a mental

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

disorder diagnosis was not associated with an increased likelihood or the type of recidivism experienced by offenders.

Chapter 7

Study 2: Utility of Baseline DRAOR Assessments

The goals of Study 2 are two-fold: (1) to investigate the utility of using the DRAOR as a structured case management assessment tool for offenders with a mental disorder diagnosis and (2) to explore the potential of incorporating clinical considerations into baseline dynamic risk assessments.

Methods

Sample

The same participants from Study 1 were used in Study 2 ($N = 961$).

Materials

Dynamic Risk Assessment for Offender Re-entry. The DRAOR is a structured case management assessment tool that considers stable risk, acute risk, and protective factors. Through a structured interview conducted by a community supervision officer, the information collected in these three domains contributes to the community supervision officers' knowledge and understanding of the offender's current experiences in the community. All the items included in this assessment are rated on a three-point scale. The Stable subscale pertains to slow-changing criminogenic risk factors (e.g., antisocial attitudes), while the Acute subscale considers risk factors that can change more rapidly (e.g., substance abuse). Each item on these risk-based subscales are rated as "no problem", a "slight problem" or a "definite problem". The Protective Factors subscale

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

considers factors that are related to positive influences (e.g., prosocial supports) or personal characteristics (e.g., prosocial identity) and are rated as “not protective”, a “slight/possible asset”, or a “definite asset”. A total score can be created by summing the scores of each domain. Total scores have the possible range of -12 to 26, with higher scores indicating greater risk and lower protective characteristics. It is recommended that offenders on community supervision be assessed at every meaningful contact with their probation/parole officer. For Study 2, attention will be focused on the first DRAOR assessment that occurred while on community supervision as it is hypothesized that the first assessment will still be largely relevant in the prediction of recidivism outcomes when using a one-year fixed follow-up period.

Iowa Violence and Victimization Instrument. The Iowa Parole Risk assessment instrument is a static assessment tool that considers historical variables, including but not limited to the offender’s age of first arrest, number of previous convictions, and history of previous alcohol or drug problems. These items are considered together to determine the risk of future violence. The thirteen included items are summed to determine the total score that ranges from -5 to 25. There are two scores that are then calculated which represent the risk of committing a violent offence (Violence score) and the victimization risk of new property or violent crimes (Victimization score) within the next 30 months. An offender’s level of risk then informs the recommended level of supervision (e.g., administrative, minimum, low normal, high normal, and intensive). Research completed to validate this assessment tool, using a sample of 1,961 parolees or probationers, has found acceptable predictive power (Prell, Vitacco, & Zavodny, 2016). The Victimization score was able to predict property offences (AUC = .71), victimization offences (AUC =

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

.70), violence offences (AUC = .70), and any offence (AUC = .65); however, was unable to predict drug offences (AUC = .54). Further, the Violence score was found to significantly predict drug offences (AUC = .56), property offences (AUC = .64), victimization offences (AUC = .69), violence offences (AUC = .71), and any offence (AUC = .63).

Ongoing mental health problems indicator. As part of the Iowa Department of Corrections practice, at each opportunity that the DRAOR is administered, additional supplemental indicators are assessed. One of these indicators assesses whether offenders' mental health is a current issue. Community supervision officers can specify the following responses: N/A, not a problem (i.e., no known history of mental health problems or no current issues are noted), slight/possible problem (i.e., has some mental health issues, but meets the demands of daily living; offender stabilized on prescribed medication; involved in beneficial therapy), and definite problem (i.e., offender's mental health issues interfere with daily living; may be taking medication or attending therapy, but is not stabilized or it is not effective; may be refusing to take medication as prescribed). For the purposes of the current research, this indicator was used to assess the incremental predictive ability of assessing current mental health status in the prediction of recidivism outcomes, over that of the dynamic risk assessment.

Analytic Plan

Several statistical software packages were used to complete the comprehensive screening (e.g., data cleaning, assumption checks, etc.) and proposed analyses, including SAS (Version 9.4), R (Version 3.3.1), and SPSS (Version 20).

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Research question 2: Does the DRAOR have acceptable psychometric properties for offenders with mental disorder diagnoses? Does the DRAOR have comparable psychometric properties for offenders with a mental disorder diagnosis compared to offenders with no mental disorder diagnosis?

Some scholars (e.g., Helmus & Babchishin, 2017) have questioned the value of using classical test theory methods to assess the utility of risk assessment instruments. As risk assessment instruments are inherently criterion-referenced (e.g., intended to predict specific outcomes) as opposed to norm-referenced (e.g., intended to assess the degree to which individuals demonstrate or embody certain latent constructs) tools, it may not be meaningful to assess factor structure or internal consistency (Douglas, Skeem, & Nicholson, 2011; Helmus & Babschishin, 2017).

Certainly, the items within each subscale of the DRAOR are expected to provide distinctive information to the community supervision officer to aid in case management: with the Stable domain providing information regarding the likelihood of risk and treatment targets; the Acute domain informing on offender vulnerabilities and imminent risk warnings; and the Protective Factors domain providing information about offender strengths. This information, however, can still be organized into an overall risk score that is relevant in an operational working model (e.g., informing frequency of contact). As such, there are those who would suggest classical test theory examinations are necessary when using a total score (Douglas et al., 2011; Nunnally, 1967).

Several methods were used to assess the psychometric properties of the DRAOR for offenders with and without mental disorder. First, the underlying factor structure of

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

the DRAOR for offenders with mental disorder was contrasted to that of the non-disordered group using multi-group measurement invariance analysis,¹⁰ also known as multiple-samples confirmatory factor analysis or multiple-samples structural equation modelling. This analysis was used to determine whether DRAOR items measure the same latent constructs with equivalent accuracy over different samples (Kline, 2016).¹¹ It was expected that mental disorder group membership would not moderate the relations specified in the model.

There are four types of measurement invariance that could be assessed: (1) configural invariance (e.g., testing whether the number of latent variables and the pattern of the factor loadings are equal across groups); (2) weak invariance (e.g., testing whether the magnitude of the factor loadings are equal across groups); (3) strong invariance (e.g., testing whether item intercepts are equal across groups); and (4) strict invariance (e.g., testing whether the residual variances are equal across groups) (Hirshfeld & von Brachel, 2014). These types of measurement invariance are sequential and build on each other, constraining additional components at each step; therefore, measurement invariance in one must be satisfied before moving on to test others. It is important to note, however, that some scholars have argued that it is overly restrictive to require strict invariance and is of little interest in practice (Kline, 2015; Little, 2013; Wang & Wang, 2012). This is because strict invariance is a test of whether the sum of indicator-specific error and random error is equivalent between groups. Little (2013) postulates that while it may be

¹⁰ Measurement invariance analysis was examined in R statistical software using the “Lavaan”, “semPlot”, and “semTools” packages.

¹¹ Measurement invariance analysis can also be used to assess differences in conditions over time or test administration methods (Kline, 2016).

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

reasonable to assume that indicator-specific information would be invariant across groups, it may not be reasonable to assume that random error present in each item would be consistent between groups. Little further suggests that testing for strict invariance is not recommended, but if tested, it should not be a prerequisite to group comparisons. As the primary purpose of the measurement invariance analyses was to assess the appropriateness of the data for group comparisons, strict invariance was not tested.

There have been several factor structure examinations of the DRAOR in a variety of samples and jurisdictions (Chadwick, 2014; Hanby, 2013; Yesberg & Polaschek, 2014). Given the work by Chadwick (2014) used a sample of probationers/parolees being supervised under the Iowa Department of Corrections, it is expected that the current sample would align with a two-factor solution – a risk factor (containing all Stable and Acute items) and a protective factor. As DRAOR items are ordinal in nature, certain considerations are necessary to conduct measurement invariance analysis. It is suggested that the weighted least squares means and variance adjusted (WLSMV) estimator be used (Hirshfeld & von Brachel, 2014). Depending on the results of the measurement invariance analysis, subsequent analyses will be completed on the original DRAOR subscale and total scores, as these are used in practice, as well as on the results found at this step.

Model fit was assessed by examining a variety of fit indices including absolute fit indices and incremental fit indices. Absolute fit indices assess how well the observed covariance matrix aligns with the model-implied covariance matrix, measuring “badness of fit”. An example of an absolute fit index is the Root Mean Square Error of Approximation (RMSEA). A value of 0 indicates perfect fit, while increasing values

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

indicate an increasing deviation of the observed covariance matrix from the model-implied covariance matrix. As outlined by Van de Schoot, Lugtig, and Hox (2012), RMSEA values of about 0.05 suggest a close model fit and values of about 0.08 suggest acceptable model fit. The Standardized Root Mean Square Residual (SRMR), another absolute fit index, considers values of greater than .10 to be a model of poor fit. Another commonly referenced absolute model fit index is a chi-square test, that compares model fit to a perfectly fitting model. A significant chi-square test would suggest poor model fit. It is important to note, however, that the chi-square test is sensitive to sample sizes, with the researcher being more likely to experience a type I error with large samples (Cheung & Rensvold, 1999). Incremental fit indices assess whether the tested model is better than an alternative model by reproducing the observed covariance matrix, measuring “goodness of fit”. Larger numbers signify improvement in model fit over an alternative model that often assumes the observed variables are independent of one another. Incremental fit indices include the Comparative Fit Index (CFI) and the Tucker Lewis Index (TLI). CFI and TLI values of greater than 0.90 are considered acceptable, while values of greater than 0.95 are considered optimal (Van de Schoot et al., 2012).

Comparing the change in model fit (e.g., comparing the weak invariance model to the configural invariance model, etc.) primarily involves assessing the differences in the absolute fit and incremental fit indices, with negligible to no differences indicating that the fixed model characteristics (e.g., factor loadings) do not meaningfully differ between groups. The degree of acceptable change in fit indices has not been conclusively established in the literature; however, Chen (2007) explored the sensitivity of goodness of fit indices to measurement invariance using a series of Monte Carlo simulations. He

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

recommended that when there is sufficient sample size (a total of more than 300 assessments) and sample sizes were equal across groups, factor loading non-equivalence would be indicated when there is a change of 0.010 or more in CFI, accompanied by a change of 0.015 or more in RMSEA or a change of 0.030 or more in SRMR. Similarly, intercept or residual non-equivalence would be indicated when there is a change of 0.010 or more in CFI, accompanied by a change of 0.015 or more in RMSEA or a change of 0.010 or more in SRMR. Nested models can also be compared for similarity using the scaled Satorra-Bentler chi-square test; where significant results indicate a statistically significant change in the fit of the model (Kline, 2013). As such, a variety of fit indices were assessed to determine measurement invariance.

Further assessments of the psychometric properties of the DRAOR included item-total and inter-item correlations. Given the ordinal nature of DRAOR items, item-total correlations were assessed using polyserial correlations. Concurrent analyses were completed for offenders with and without mental disorder.

The internal consistency of the DRAOR subscales was assessed using an ordinal alpha coefficient as this statistic has been found to estimate reliability in ordinal variables with more precision than Cronbach's alpha coefficient (Zumbo, Gadermann, & Zeisser, 2007). While very similar to Cronbach's alpha, ordinal alpha differs in that it is based on the polychoric correlation matrix as opposed to the Pearson correlation matrix. Ordinal alpha coefficients will be calculated using R statistical software using the "userfriendlyscience" package (Peters, 2018). As described in work by Gadermann and colleagues (2012), the internal consistency cut-off values described by Nunnally (1978) apply to the ordinal version of this statistic; therefore, coefficient values of .80 or higher

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

were considered acceptable. Concurrent analyses will be completed for offenders with and without mental disorder. Further, ordinal alpha estimates were calculated to observe whether improvements could be found when removing individual DRAOR items.

Finally, the association between DRAOR total scores and static risk scores, assessing the convergent validity of the DRAOR, was assessed using Pearson correlation coefficients for offenders with and without mental disorder. Group differences were assessed using the Fisher's *r*-to-*z* transformation (Field, 2009).

Research question 3: Do DRAOR scores differ by mental disorder group membership?

Group differences in DRAOR scores (subscale and total scores) were assessed using a series of independent samples *t*-tests and associated Cohen's *d* effect sizes. A Bonferroni correction was applied to each *t*-test to ensure the family-wise error rate remains at $\alpha = .05$ (Field, 2013). As previous research has found that supervision officers view offenders with mental disorder as being more risky to community safety (Eno Louden & Skeem, 2013), it was expected that parolees with a mental disorder would be assessed as having higher Stable, Acute, and total DRAOR scores, and lower Protective Factor scores than individuals with no mental disorder diagnosis.

Research question 4: Are DRAOR scores able to reliably discriminate between recidivists and non-recidivists for those offenders with a mental disorder diagnosis? Are discrimination indices comparable to those offenders with no mental disorder diagnosis?

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Discrimination statistics (otherwise known as relative predictive accuracy statistics) are concerned with assessing whether offenders rated as higher risk are more likely to experience recidivism in comparison to lower risk offenders (Hanson, 2017; Helmus & Babchishin, 2017). One of the most common discrimination statistics, the area under the curve (AUC) from receiver operating characteristic (ROC) curve analyses, was used in the current research study. AUC values range from 0 to 1, with a value of .50 signifying chance levels of prediction. Values greater than .50 specify positive predictive accuracy, while values lower than .50 specify negative predictive accuracy. The AUC statistic describes the probability that a randomly selected recidivist would have a higher risk score than a randomly selected non-recidivist (Helmus & Babchishin, 2017). Regarding acceptable values, within the social sciences, values of .56, .64, and .71 represent small, moderate, and large effects, respectively (Rice & Harris, 2005). AUC statistics have the added benefit that they are not overly influenced by the base rate of the outcome of interest (Hanson, 2008). Cohen's *d* effect sizes were also computed to facilitate comparisons with previous research. These analyses were modelled for each recidivism outcome of interest (technical violations, new charges, any recidivism).

Group comparisons between offenders with and without a mental disorder diagnosis in AUC values can be calculated using a method described by Gonen (2015; see equation 1). This statistical test assesses whether the two AUCs are equal and when using a large sample, *T* will have a chi-square distribution with one degree of freedom. A significant value signifies that the AUC values are statistically different from one another, while a non-significant value signifies that the AUC values are not different from one another.

$$T = \frac{(AUC_1 - AUC_2)^2}{s_1^2 + s_2^2} \quad (1)$$

Research question 5: Do DRAOR scores demonstrate comparable absolute predictive accuracy for recidivism for offenders with a mental disorder diagnosis compared to those with no mental disorder diagnosis?

The absolute predictive accuracy of a risk assessment tool, also referred to as calibration, assesses the degree to which similarly rated offenders are expected to reoffend and can be particularly useful to assess potential bias in risk assessment instruments. As forensic scholars have only recently begun to consider the calibration of risk assessment instruments in recent years (e.g., Singh, 2013; Wilson & Gutierrez, 2014), there is no consensus on the preferred approach (Hanson, 2017; Helmus & Babchishin, 2017).

One approach to assessing potential bias in risk assessment instruments was described in a study authored by Wilson and Gutierrez (2014), exploring the predictive accuracy of the Level of Service Inventory-Ontario Revised assessment tool (LSI-OR) for Indigenous offenders compared to non-Indigenous offenders. They used a series of logistic regressions to assess the prospect of an interaction between Indigenous status (Indigenous versus non-Indigenous) and LSI-OR score in predicting recidivism. This approach was adapted in the current research to assess whether the distributions of recidivism outcomes by DRAOR total score differed by mental disorder group membership. This approach to assessing calibration had the added benefit of allowing for the plotting of the mean predicted probabilities of recidivism at each DRAOR total score. Perfect calibration would imply that disordered and non-disordered offenders have the

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

same predicted probability of experiencing a negative community outcome (i.e., a non-significant interaction term and logistic model lines of best fit that are perfectly superimposed). If there is a significant interaction term, it will be possible to review the plots of mean predicted probabilities of recidivism to assess where and how potential mis-calibration may exist.

Another approach to assessing calibration, the Expected/Observed (E/O) index, can be calculated if normative data are available. Within risk assessment research, the E/O statistic provides the ratio of the expected number of offenders with a recidivistic event (e.g., a new offence) to the number of offenders within the sample with that same outcome. Should the E/O statistic be equal to 1, the number of observed recidivists would be equal to the number of expected recidivists. Values of above 1 indicate that the number of expected recidivists was greater than the number of recidivists observed in the sample and values of less than 1 indicate fewer expected recidivists than were expected (Hanson, 2017). Hanson (2017) provides the formulas necessary to calculate 95% confidence intervals surrounding the E/O index and explains that confidence intervals containing 1 indicate that the observed and expected recidivism rates are not significantly different.

While the DRAOR does not have normative base rates for a one-year fixed follow-up, as this doctoral research is focused on, the E/O index has utility when comparing absolute predictive accuracy between two groups. The E/O index can provide a ratio illustrating the number of individuals with a mental disorder diagnosis expected to recidivate (the expected recidivism data produced by offenders without a mental disorder diagnosis) compared with the number of individuals with mental disorder diagnoses who

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

actually recidivated (the observed data). These analyses were modeled for all recidivism outcomes: any recidivism, new charges, and technical violations.

Research question 6: Do DRAOR scores predict recidivism outcomes over and above static risk scores for offenders with a mental disorder? Are results comparable to those offenders with no mental disorder diagnosis?

A series of moderated hierarchical logistic regression models were used to examine the predictive validity of DRAOR scores by mental disorder group membership, statistically controlling for static risk scores. To test for the independent effects of the DRAOR, static risk scores were entered into block 1 of the model, DRAOR score was entered into block 2, and, finally, the interaction between DRAOR score and mental disorder status was entered into block 3. It is anticipated that the interaction will be non-significant – signifying that the predictive validity of the DRAOR does not depend on the mental disorder status of the offender. This analysis will be modelled for each outcome of interest (technical violations, new charges, any recidivism).

Research question 7: For offenders with a mental disorder diagnosis, does the presence of ongoing mental health-related problems incrementally improve the prediction of recidivism outcomes over and above DRAOR total scores?

Finally, hierarchical logistic regression was used to examine the utility of additional clinical considerations when making risk assessments with offenders with mental disorder diagnoses. The ongoing mental health problems indicator, that was assessed at the same time as the DRAOR assessment, was examined to see whether it incrementally contributed to the prediction of recidivism outcomes, over DRAOR total

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

scores. To test for the independent effects of the ongoing mental health problems indicator, DRAOR total score were entered into block 1 of the model and the ongoing mental health indicator was entered into block 2. It was expected that this indicator would be non-significant. This analysis was modelled for each recidivism outcome of interest (technical violations, new charges, any recidivism).

Results

Data Management

All variables were assessed for data entry accuracy and presence of missing values. There were no apparent data entry errors or missing data for the DRAOR assessments; however, 71 offenders did not have a static risk assessment on file, representing 6.9% of cases. Given that the number of missing assessments was small and those with missing assessments did not differ from those with assessments on demographic or dynamic risk assessment characteristics, those with missing static risk assessments were removed from the dataset. Apart from the 71 offenders released on parole with no static risk assessment information, there was no other missing data in variables of interest.

Variables were examined for linearity, homoscedasticity, normality, univariate and multivariate outliers, and multicollinearity. These assumptions were tested at the level of DRAOR subscale and total scores, as opposed to individual items, as these were the focus of analyses. These assumptions were also tested separately for offenders with a mental disorder diagnosis and for offenders without a mental disorder diagnosis.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Scatter plots for each of the variables suggested linear relationships between each combination of variables. For variables included in logistic regression analyses, the linearity of the logit was assessed by examining the statistical significance of the interaction between the variable and its natural logarithm (Tabachnick & Fidell, 2013). This assumption was not violated as the interaction terms were not statistically significant. The assumption of homoscedasticity was also satisfied between offenders with a mental disorder diagnosis and offenders without a mental disorder diagnosis for the DRAOR total and subscale scores.

Kolmogorov-Sminov's test of normality was assessed for each DRAOR subscale and total score variables to test the hypothesis that the distribution of each variable were not significantly different from a normal distribution. Perhaps not surprising due to the large sample size, the test was significant ($p < .001$) for all variables, suggesting that the variables' distributions were not normal. As the Kolmogorov-Sminov test is sensitive to large sample sizes, it was important to also visually inspect the distributions instead of relying on formal inferential tests. An examination of the data (i.e., histograms, probability plots, box plots, kurtosis and skewness values) suggested that the departures from normality were not serious. Using a conservative alpha value of .001, none of the standardized scores for skewness and kurtosis exceeded the critical values of 3.29 (two-tailed test). Mahalanobis' distance was used to identify any multivariate outliers. There was only one individual who exceeded the critical value of 20.515 ($df=5, \alpha = .001$). Relevant analyses were run both with and without this individual included and results did not differ in any meaningful way; therefore, results are presented with this individual included.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Lastly, all variables were examined for multicollinearity using bivariate correlations (correlations of 0.80 or greater were considered problematic). Inter-correlations between the static risk measures and the DRAOR subscales can be found in Table 8. There were no multicollinearity concerns specific to the DRAOR subscales as the strongest correlation was between the Stable Risk and Acute Risk subscales and was not problematic ($r = 0.65, p < .001$). There were, however, multicollinearity concerns between the two static risk subscales that had a correlation of 0.92, $p < .001$. As such, the decision was made to, when necessary, focus on the victimization score rather than both the violence and victimization scores as this was the more general assessment of offender risk.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 8

Inter-Correlations Among Risk Measures

	Victimization risk	Stable risk	Acute risk	Protective factor
All offenders (<i>N</i> = 961)				
Violence risk	0.92***	0.20***	0.18***	-0.13***
Victimization risk		0.20***	0.18***	-0.12***
Stable risk			0.65***	-0.52***
Acute risk				-0.44***
Offenders without a mental disorder diagnosis (<i>N</i> = 483)				
Violence risk	0.92***	0.19***	0.20***	-0.18***
Victimization risk		0.19***	0.19***	-0.16***
Stable risk			0.64***	-0.51***
Acute risk				-0.48***
Offenders with a mental disorder diagnosis (<i>N</i> = 483)				
Violence risk	0.91***	0.20***	0.13**	-0.06 ^{ns}
Victimization risk		0.20***	0.13**	-0.05 ^{ns}
Stable risk			0.64***	-0.51***
Acute risk				-0.37***

^{ns} not significant, * *p* < .05, ** *p* < .01, *** *p* < .001.

Summary. There were no statistical or methodological issues in the data that would adversely affect the research conclusions.

Psychometric Properties of the Baseline DRAOR

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Hypothesis 2a: Based on previous research (Chadwick, 2014; Hanby, 2013; Tamatea & Wilson, 2009; Yesberge & Poleschek, 2015), it is expected that the DRAOR's psychometric properties (factor structure, internal consistency, item-total correlations, convergent validity) will be acceptable for individuals with a mental disorder diagnosis.

Hypothesis 2b: It is expected that the DRAOR will have comparable psychometric properties for individuals with a mental disorder diagnosis compared to those with no mental disorder diagnosis.

Measurement invariance. To begin, the factor structure of the DRAOR was examined separately for offenders with a mental disorder diagnosis and for offenders without a mental disorder diagnosis using Confirmatory Factor Analysis (CFA), assessing a two-factor solution: a risk factor (amalgamating the Stable and Acute subscales) and a protective factor.

The polychoric correlation matrices for offenders without a mental disorder diagnosis and with a mental disorder diagnosis were examined to assess for potential issues with factorability and multicollinearity (see Appendix A). These matrices consisted of 19 items, producing 171 bivariate correlations for each group. Polychoric correlations for offenders without a mental disorder diagnosis ranged from 0.09 to 0.74. Of these, 87 were 0.30 or larger. Polychoric correlations for offenders with a mental disorder diagnosis ranged from 0.04 to 0.66. Of these, 75 were 0.30 or larger. There were no perceived concerns about the appropriateness of this data for factor analysis.

As shown in Table 9, model fit indices generally showed acceptable fit. Although, perhaps unsurprisingly, the chi-square test was significant. As this inferential statistic is

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

sensitive to large sample sizes and the current samples are quite large, it is important to examine a wide range of fit indices to assess model fit. The remaining fit indices indicate acceptable to good fit.

Table 9

CFA Model Fit Indices by Mental Disorder Diagnosis Group

Fit Index	Offenders without a mental disorder (<i>N</i> = 483)	Offenders with a mental disorder (<i>N</i> = 478)
χ^2 (df)	416.866 (151)***	492.244 (151)***
CFI	0.971	0.959
TLI	0.967	0.954
RMSEA (90% CI)	0.060 (0.054 – 0.067)	0.069 (0.062 – 0.076)
SRMR	0.072	0.081

^{ns} not significant, * $p < .05$, ** $p < .01$, *** $p < .001$.

As shown in Table 10, the majority of DRAOR items strongly loaded onto their respective factor (e.g., the Protective Factor item, “Prosocial identity” has a factor loading of 0.76 for offenders with no mental disorder diagnosis and 0.83 for offenders with a mental disorder). There were, however, several DRAOR items with weaker factor loadings (e.g., “Access to victims,” “Negative mood”). The risk factor and protective factor were significantly negatively correlated with each other for both offenders without a mental disorder diagnosis ($r = -0.66, p < .001$) and offenders with a mental disorder diagnosis ($r = -0.63, p < .001$).

Model modification indices were assessed to determine how model fit could possibly be improved, particularly for offenders with a mental disorder diagnosis. The modification that was determined to have the greatest improvement on the model (MI =

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

45.046) was to have the item “Responsiveness to advice” load onto the risk factor. Given the importance of making model modifications in a theory-driven manner, not just to improve model fit, and given that the model fit was acceptable, the decision was made to not make any modifications to the model and to proceed with measurement invariance analyses.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 10

Standardized Factor Loadings for Separate CFA by Mental Disorder Diagnosis Group

Pattern coefficients	Offenders with no mental disorder			Offenders with a mental disorder		
	Unst.	SE	St.	Unst.	SE	St.
Risk → s1: Peer associations	1.00	0.00	0.61	1.00	0.00	0.66
Risk → s2: Attitudes towards authority	1.38	0.20	0.73	1.02	0.13	0.67
Risk → s3: Impulse control	1.16	0.14	0.67	1.39	0.17	0.77
Risk → s4: Problem-solving	1.26	0.17	0.69	1.47	0.18	0.79
Risk → s5: Sense of entitlement	1.36	0.19	0.72	0.75	0.10	0.55
Risk → s6: Attachment with others	1.02	0.15	0.62	0.76	0.10	0.56
Risk → a1: Substance abuse	0.65	0.10	0.45	0.78	0.10	0.57
Risk → a2: Anger	1.03	0.16	0.62	0.74	0.10	0.55
Risk → a3: Access to victims	0.59	0.10	0.41	0.24	0.07	0.21
Risk → a4: Negative mood	0.56	0.10	0.39	0.51	0.08	0.41
Risk → a5: Employment	0.64	0.10	0.44	0.49	0.08	0.40
Risk → a6: Interpersonal relationships	0.82	0.12	0.53	0.61	0.08	0.47
Risk → a7: Living situation	0.68	0.11	0.46	0.45	0.09	0.37
Protective → p1: Responsiveness to advice	1.00	0.00	0.75	1.00	0.00	0.69
Protective → p2: Prosocial identity	1.03	0.14	0.76	1.54	0.19	0.83
Protective → p3: High expectations	0.97	0.12	0.74	1.17	0.15	0.74
Protective → p4: Costs/Benefits	0.96	0.12	0.73	1.05	0.14	0.71
Protective → p5: Social support	0.91	0.12	0.72	0.90	0.12	0.65
Protective → p6: Social control	1.47	0.20	0.86	1.51	0.21	0.82

Note. Unst., unstandardized; SE, standard error; St., standardized. All results were computed by R for theta parameterization.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Given this, the configural model was assessed as being an acceptable baseline model based on the CFI, TLI, RMSEA, and SRMR fit indices (see Table 11 for detailed results). With each incremental constraint applied to the model, unsurprisingly, the chi-square difference test produced by the R statistical software was significant, indicating measurement non-equivalence. However, as with the chi-square fit index used to assess the baseline CFA models, this inferential statistic is affected by large sample sizes. A review of the remaining fit indices indicates an acceptably small degree of change in model fit. These findings indicate that both factor loadings and item thresholds can be considered invariant across offenders with and without mental disorder diagnoses. This result supports the examination of group differences.

Table 11

Values of Selected Fit Statistics for Measurement Invariance Hypotheses for a Two-Factor Model of offender Risk Analyzed Across Offenders with and without a Mental Disorder Diagnosis

Fit index	Configural model	Weak/Metric model	Strong/Scalar model
χ^2 (df)	909.110 (302)***	1,039 (319)***	1,093 (336)***
χ^2_{SB} (df)	-	48.649 (17)***	58.374 (17)***
CFI	0.966	0.959	0.957
Δ CFI	-	-0.007	-0.002
TLI	0.961	0.956	0.956
Δ TLI	-	-0.005	0.000
RMSEA	0.065	0.069	0.069
(90% CI)	(0.060 – 0.070)	(0.064 – 0.073)	(0.064 – 0.073)
Δ RMSEA	-	0.004	0.000
SRMR	0.077	0.082	0.078
Δ SRMR	-	0.005	-0.004

Note. χ^2_{SB} represents the Satorra-Bentler scaled chi-square; CI = confidence intervals; Δ = difference. ^{ns} not significant, * $p < .05$, ** $p < .01$, *** $p < .001$.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Internal consistency. The internal consistency of both the original DRAOR model (3 subscales) and the amalgamated two-factor model were investigated separately for offenders with and without a mental disorder diagnosis (see Table 12). Results indicated that, for the most part, the factors demonstrate good levels of internal consistency. The only exception to this was the original DRAOR Acute subscale only approached acceptable internal consistency levels. Amalgamating the original DRAOR Stable and Acute subscales provided a more concise model with good internal consistency. The DRAOR appeared to have similar internal consistency for offenders with a mental disorder diagnosis compared to offenders without a mental disorder diagnosis.

Table 12

Internal Consistency of the DRAOR by Mental Disorder Diagnosis Group

	Offenders without a mental disorder	Offenders with a mental disorder
	Alpha (95% CI)	Alpha (95% CI)
Original DRAOR		
Stable risk	0.82 (0.79 – 0.84)	0.80 (0.77 – 0.83)
Acute risk	0.67 (0.62 – 0.71)	0.62 (0.56 – 0.67)
Protective factors	0.88 (0.87 – 0.90)	0.87 (0.85 – 0.89)
Two-factor model		
Risk factor	0.85 (0.83 – 0.87)	0.83 (0.81 – 0.85)
Protective factor	0.88 (0.87 – 0.90)	0.87 (0.85 – 0.89)

Item-total correlations and ordinal alpha correlations if the item is deleted are displayed in Appendix A for the original DRAOR model and for the two-factor model.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Very few notable differences were observed between offenders who did and did not have a mental disorder diagnosis. Within the original model, results indicated that there would be no internal consistency improvements for either offenders with a mental disorder diagnosis or offenders without a mental disorder diagnosis if any of the items were removed. Item-total polyserial correlations suggested that all items were moderately to strongly related to their respective subscale total. When the Stable and Acute subscales were amalgamated to form the Risk Factor, it was determined that, for offenders with a mental disorder diagnosis, the Acute subscale item, “Access to victims” would improve the internal consistency if removed ($\alpha = 0.83$ versus $\alpha = 0.84$). Given this marginal increase in internal consistency, no items were removed from the scale.

Convergent validity. Convergent validity was assessed using correlational data between the DRAOR and the IVVI Victimization score. As shown in Table 13, Pearson correlation coefficients demonstrated that the total DRAOR score was weakly associated with the IVVI Victimization score for both offenders without a mental disorder and offenders with a mental disorder. Put plainly, the higher an offender scores on the static risk measure, the more likely they will have higher dynamic risk scores. The Fisher’s r to z transformation analysis method, allows for the comparison of z -scores so that statistically significant differences between groups can be assessed. Results indicated that the correlations between the IVVI Victimization score and the total DRAOR score were not significantly different by mental disorder group membership ($Z = 1.01, p = .313$).

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 13

Association Between Static Risk Scores and Total DRAOR Scores by Mental Disorder Diagnosis Group

	Victimization Score	
	Offenders without a mental disorder	Offenders with a mental disorder
Total DRAOR Score	0.22***	0.15***

^{ns} not significant, * $p < .05$, ** $p < .01$, *** $p < .001$.

Summary. The DRAOR has acceptable psychometric properties and this does not differ meaningfully by mental disorder group membership.

Level of Dynamic Risk by Mental Disorder Status

Hypothesis 3: Based on previous research (Skeem et al., 2014), it is expected that offenders with a mental disorder diagnosis will have significantly higher stable and acute risk scores and significantly lower protective factor scores in comparison to offenders with no mental disorder diagnosis.

A series of independent samples t-tests assessed whether DRAOR scores differed by mental disorder group membership. As shown in Table 14, offenders with a mental disorder diagnosis were consistently assessed as having significantly higher risk scores and significantly lower protective factor scores than offenders without a mental disorder diagnosis. The Cohen's d effect size estimates suggested that these differences fall in the small to medium strength range. The strongest difference can be seen for the Acute subscale where offenders without a mental disorder are assessed, on average, as 5.3 while offenders with a mental disorder are assessed as 6.4 (Cohen's $d = 0.41$).

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 14

Comparisons Between Offenders without a Mental Disorder and Offenders with a Mental Disorder on DRAOR Scores

	Offenders without a mental disorder	Offenders with a mental disorder	t (df)	Cohen's d
	M (SD)	M (SD)		
Stable	5.2 (2.6)	5.9 (2.6)	-4.3 (959)***	0.27
Acute	5.3 (2.7)	6.4 (2.7)	-6.02 (959)***	0.41
Protective	6.8 (2.7)	6.1 (2.6)	4.3 (959)***	0.26
Total DRAOR	3.7 (6.6)	6.2 (6.5)	-5.92 (959)***	0.38

Note. A Bonferroni correction was applied to account for four independent-samples t-tests (e.g., $p = .05/4 = .0125$). ^{ns} not significant, * $p < .0125$, ** $p < .0025$, *** $p < .00025$.

Summary. Offenders with a mental disorder diagnosis are assessed has having higher risk and lower protective factors than their non-disordered counterparts.

DRAOR Discrimination

Hypothesis 4a: It is expected that DRAOR scores will be able to reliably discriminate between offenders with a mental disorder diagnosis who do and do not recidivate.

Hypothesis 4b: It is expected that the ability of the DRAOR to discriminate between offenders who do and do not recidivate will be comparable regardless of mental disorder group membership.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

A series of separate AUC analyses were performed to assess the predictive accuracy of the original DRAOR total score and subscales as well as the amalgamated Risk Factor for offenders with a mental disorder diagnosis and those without a mental disorder diagnosis. The ability of the DRAOR to reliably discriminate between recidivists and non-recidivists was statistically compared between mental disorder group membership. Further, Cohen's d was computed for each AUC value to allow for additional comparisons to previous research.

Any recidivism. Results showed that the DRAOR subscales, total score, and amalgamated Risk Factor scores were able to discriminate between recidivists and non-recidivists with moderate predictive accuracy for offenders with no mental disorder diagnosis (see Table 15). For offenders with a mental disorder diagnosis, with the exception of the Protective Factor subscale, the DRAOR was able to discriminate between recidivists and non-recidivists; however, the strength of this discrimination was small. The ability of the DRAOR total score in discriminating between recidivists and non-recidivists can be visualized through a ROC curve graph, as shown in Figure 2. It is evident that the area under the curve is greater for offenders without a mental disorder (black line; AUC = 0.64) compared to offenders with a mental disorder (grey line; AUC = 0.54), where the DRAOR has about chance-levels of discrimination accuracy. ROC curve graphs for each DRAOR subscale and the amalgamated Risk Factor for each recidivism outcome can be found in Appendix B.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Figure 2. ROC Curve for the DRAOR Total Score Predicting Any Recidivism.

New charges. Results were less positive when focusing on the ability of the DRAOR to discriminate between those who did or did not experience a new charge while on community supervision (Table 16). The DRAOR subscales, total score, and amalgamated Risk Factor score were able to discriminate between recidivists and non-recidivists for offenders without a mental disorder diagnosis with small-to-moderate levels of accuracy, but not for those with a mental disorder diagnosis.

Technical violations. When focusing on technical violations (Table 17), all DRAOR scores, excluding the Protective Factors subscale, were able to discriminate between violators and non-violators with a small degree of accuracy for offenders with a mental disorder diagnosis. That said, with the exception of the Acute subscale, the DRAOR had significantly better discrimination with offenders who did not have a mental disorder compared to those that did have a mental disorder.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 15

Discrimination Indices of the DRAOR Predicting Any Recidivism

DRAOR Measure	Offenders without a mental disorder				Offenders with a mental disorder				χ^2
	AUC	SE	95% CI	<i>d</i>	AUC	SE	95% CI	<i>d</i>	
Original DRAOR									
Stable	0.69	0.03	0.64 – 0.74	0.65	0.55	0.03	0.50 – 0.60	0.20	12.90***
Acute	0.63	0.03	0.58 – 0.68	0.46	0.55	0.03	0.50 – 0.61	0.16	4.18*
Protective	0.65	0.03	0.60 – 0.70	0.52	0.53	0.03	0.47 – 0.58	0.08	10.47**
Total DRAOR	0.69	0.03	0.64 – 0.74	0.66	0.54	0.03	0.50 – 0.60	0.18	14.88***
Amalgamated Stable + Acute									
Risk Factor	0.68	0.03	0.63 – 0.73	0.61	0.55	0.03	0.50 – 0.61	0.20	11.41***

Note. AUC values of .56, .64, and .71 represent small, moderate, and large effect sizes. ^{ns} not significant, * $p < .05$, ** $p < .01$, *** $p < .001$.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 16

Discrimination Indices of the DRAOR Predicting New Charges

DRAOR Measure	Offenders without a mental disorder				Offenders with a mental disorder				χ^2
	AUC	SE	95% CI	<i>d</i>	AUC	SE	95% CI	<i>d</i>	
Original DRAOR									
Stable	0.67	0.03	0.61 – 0.73	0.64	0.51	0.03	0.45 – 0.57	0.04	13.30***
Acute	0.62	0.04	0.55 – 0.68	0.40	0.53	0.03	0.46 – 0.59	0.09	3.59 ^{ns}
Protective	0.63	0.03	0.56 – 0.79	0.43	0.49	0.04	0.42 – 0.56	0.03	7.37**
Total DRAOR	0.67	0.03	0.61 – 0.72	0.59	0.50	0.03	0.44 – 0.57	0.03	12.35***
Amalgamated Stable + Acute									
Risk Factor	0.66	0.03	0.60 – 0.73	0.57	0.51	0.03	0.45 – 0.58	0.03	10.51**

Note. AUC values of .56, .64, and .71 represent small, moderate, and large effect sizes. ^{ns} not significant, * $p < .05$, ** $p < .01$, *** $p < .001$.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 17

Discrimination Indices of the DRAOR Predicting Technical Violations

DRAOR Measure	Offenders without a mental disorder				Offenders with a mental disorder				χ^2
	AUC	SE	95% CI	<i>d</i>	AUC	SE	95% CI	<i>d</i>	
Original DRAOR									
Stable	0.64	0.03	0.59 – 0.70	0.49	0.56	0.03	0.50 – 0.61	0.21	4.54*
Acute	0.62	0.03	0.56 – 0.68	0.43	0.57	0.03	0.52 – 0.63	0.23	1.37 ^{ns}
Protective	0.63	0.03	0.57 – 0.69	0.49	0.53	0.03	0.47 – 0.56	0.09	6.36*
Total DRAOR	0.67	0.03	0.61 – 0.72	0.58	0.56	0.03	0.50 – 0.61	0.21	7.73**
Amalgamated Stable + Acute									
Risk Factor	0.65	0.03	0.59 – 0.71	0.52	0.56	0.03	0.51 – 0.62	0.24	4.50*

Note. AUC values of .56, .64, and .71 represent small, moderate, and large effect sizes. ^{ns} not significant, * $p < .05$, ** $p < .01$, *** $p < .001$.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Summary. The DRAOR is unable to routinely discriminate between recidivists and non-recidivists for offenders with a mental disorder diagnosis; however, it has small-to-moderate predictive accuracy for those without a mental disorder diagnosis.

DRAOR Calibration

Hypothesis 5: It is expected that the DRAOR will be similarly calibrated between offenders with a mental disorder diagnosis and offenders without a mental disorder diagnosis.

To assess calibration, it was necessary to first examine whether the DRAOR total score and the presence of a mental disorder diagnosis significantly predicted recidivism. In the first model, displayed in Table 18, a test of the relationship between DRAOR total score and any recidivism revealed a statistically significant association (Wald $\chi^2 = 33.77$, $p < .001$). While model 2 indicates that mental disorder group membership was not associated with any recidivism (Wald $\chi^2 = 0.001$, $p = .972$), there was a significant interaction between DRAOR total score and mental disorder group membership (Model 3; Wald $\chi^2 = 10.71$, $p = .001$). Evidently, the ability of the DRAOR to predict any recidivism is dependent on whether an offender has a mental disorder.

Figure 3 shows the lines-of-best-fit generated from the third logistic regression model for the mean predicted probability of experiencing any recidivism by DRAOR total score for offenders with a mental disorder diagnosis (solid black line) and offenders without a mental disorder diagnosis (dashed black line). To illustrate the ability of the predicted model to fit observed data, absolute base rates of any recidivism for offenders with and without a mental disorder diagnosis are provided in grey. With a well-calibrated

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

measure, the regression lines would be identical (i.e., an offender assessed as being of a particular risk level would have the same predicted probability of recidivism regardless of whether they have a mental disorder diagnosis). Figure 3 illustrates that, for both groups, the mean predicted probability of any recidivism increases as DRAOR total scores increase; however, the regression line for offenders without a mental disorder increases much more steeply. This figure further shows that offenders with a mental disorder who score lower on the DRAOR are more likely to experience recidivism compared to their non-disordered counterparts. This provides indications that the DRAOR may be under-classifying lower-scoring offenders with a mental disorder diagnosis (i.e., assessing them at lower risk than their outcomes suggest are accurate). As DRAOR total scores increase to a medium level of risk (approximately a value of 6), the DRAOR appears to classify disordered recidivists with a similar accuracy to non-disordered recidivists; however, differences again emerge as DRAOR total score increases further. Higher scoring offenders with a mental disorder diagnosis tended to have lower mean predicted probabilities of recidivism than expected (i.e., compared to their non-disordered counterparts), resulting in an over-classification of higher-scoring offenders with mental disorders (i.e., assessing them at higher risk than their outcomes suggest are accurate). It is important to note, however, that few offenders were assessed as having very low or very high DRAOR total scores (e.g., only five offenders without a mental disorder and eight offenders with a mental disorder scored 20+ on the DRAOR) so these results should be accepted with caution.

Similar trends were found when disaggregating any recidivism by any new charges (Table 19 and Figure 4) and any technical violations (Table 20 and Figure 5).

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

The DRAOR appears to under-classify lower-scoring offenders and over-classify higher-scoring offenders with a mental disorder diagnosis which is not the case for offenders without a mental disorder diagnosis.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 18

Logistic Regression of DRAOR Total Score and Mental Disorder Diagnosis Group Predicting Any Recidivism

				95% Confidence	
				Interval for	
			Odds	Odds Ratio	
	β (SE)	Wald χ^2 (df)	Ratio	Lower	Upper
Model 1					
Constant	-0.73 (0.07)	106.82 (1)***	-	-	-
DRAOR total score	0.06 (0.01)	33.77 (1)***	1.07	1.04	1.09
<i>Model Summary</i>					
	Wald χ^2 (df)	33.77 (1)***			
Model 2					
Constant	-0.73 (0.07)	106.82 (1)***	-	-	-
DRAOR total score	0.06 (0.01)	32.61 (1)***	1.07	1.04	1.09
Mental disorder status	0.00 (0.07)	0.00 ^{ns}	1.00	0.75	1.31
<i>Model fit</i>					
	Wald χ^2 (df)	33.77 (2)***			
Model 3					
Constant	-0.70 (0.07)	94.96 (1)***	-	-	-
DRAOR total score	0.07 (0.01)	33.26 (1)***	-	-	-
Mental disorder status	-0.03 (0.07)	0.21 (1) ^{ns}	-	-	-
DRAOR*Mental disorder status	0.03 (0.1)	10.71 (1)**	-	-	-
<i>Model fit</i>					
	Wald χ^2 (df)	40.72 (3)***			

Note. SAS does not compute odds ratios and associated 95% confidence intervals for variables included in an interaction term as the odds ratio for the variable depends on the level of the interaction variable. The absence of a mental disorder diagnosis was the reference category. ^{ns} not significant, * $p < .05$, ** $p < .01$, *** $p < .001$.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Figure 3. Logistic regression model lines of best fit (in black) and absolute base rates for any recidivism (in grey) by DRAOR total score and by mental disorder membership group

Note. There are some breaks in data as not all possible DRAOR scores were present in the data (e.g., no offenders were assessed as scoring a value of 24).

Caution should be applied when accepting the mean predicted probability of recidivism at extreme scores due to low number of offenders being assessed as such.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 19

Logistic Regression of DRAOR Total Score and Mental Disorder Diagnosis Group Predicting New Charges

				95% Confidence Interval for Odds Ratio	
	β (SE)	Wald χ^2 (df)	Odds Ratio	Ratio	
				Lower	Upper
Model 1					
Constant	-1.67 (0.09)	348.8 (1)***	-	-	-
DRAOR total score	0.04 (0.01)	9.26 (1)**	1.04	1.02	1.07
<i>Model fit</i>					
Wald χ^2 (df)		9.26 (1)**			
Model 2					
Constant	-1.67 (0.09)	348.67 (1)***	-	-	-
DRAOR total score	0.04 (0.01)	9.61 (1)**	1.04	1.02	1.07
Mental disorder status	0.05 (0.09)	0.36 (1) ^{ns}	1.11	0.78	1.58
<i>Model fit</i>					
Wald χ^2 (df)		9.61 (2)**			
Model 3					
Constant	-1.65 (0.09)	333.39 (1)***	-	-	-
DRAOR total score	0.04 (0.01)	9.22 (1)**	-	-	-
Mental disorder status	-0.00 (0.09)	0.00 (1) ^{ns}	-	-	-
DRAOR *Mental disorder status	0.05 (0.01)	11.59 (1)***	-	-	-
<i>Model fit</i>					
Wald χ^2 (df)		20.48 (3)***			

Note. SAS does not compute odds ratios and associated 95% confidence intervals for variables included in an interaction term as the odds ratio for the variable depends on the level of the interaction variable. The absence of a mental disorder was the reference category.

^{ns} not significant, * $p < .05$, ** $p < .01$, *** $p < .001$.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Figure 4. Logistic regression model lines of best fit (in black) and absolute base rates for new charges (in grey) by DRAOR total score and by mental disorder membership group

Note. There are some breaks in data as not all possible DRAOR scores were present in the data (e.g., no offenders were assessed as scoring a value of 24). Caution should be applied when accepting the mean predicted probability of recidivism at extreme scores due to low number of offenders being assessed as such.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 20

Logistic Regression of DRAOR Total Score and Mental Disorder Diagnosis Group Predicting Technical Violations

				95% Confidence Interval for Odds Ratio	
	β (SE)	Wald χ^2 (df)	Odds Ratio	Ratio	
				Lower	Upper
Model 1					
Constant	-1.21 (0.08)	238.56 (1)***	-	-	-
DRAOR total score	0.06 (0.01)	24.62 (1)***	1.06	1.04	1.09
<i>Model fit</i>					
		Wald χ^2 (df)			
		24.62 (1)***			
Model 2					
Constant	-1.21 (0.08)	238.49 (1)***	-	-	-
DRAOR total score	0.06 (0.01)	22.56 (1)***	1.06	1.03	1.09
Mental disorder status	-0.06 (0.08)	0.60 (1) ^{ns}	0.89	0.65	1.20
<i>Model fit</i>					
		Wald χ^2 (df)			
		25.17 (2)***			
Model 3					
Constant	-1.19 (0.08)	226.83 (1)***	-	-	-
DRAOR total score	0.06 (0.01)	23.38 (1)***	-	-	-
Mental disorder status	-0.09 (0.08)	1.36 (1) ^{ns}	-	-	-
DRAOR *Mental disorder status	0.03 (0.01)	4.61 (1)*	-	-	-
<i>Model fit</i>					
		Wald χ^2 (df)			
		27.76 (3)***			

Note. SAS does not compute odds ratios and associated 95% confidence intervals for variables included in an interaction term as the odds ratio for the variable depends on the level of the interaction variable. The absence of a mental disorder diagnosis was the reference category.

^{ns} not significant, * $p < .05$, ** $p < .01$, *** $p < .001$.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Figure 5. Logistic regression model lines of best fit (in black) and absolute base rates for technical violations (in grey) by DRAOR total score and by mental disorder membership group

Note. There are some breaks in data as not all possible DRAOR scores were present in the data (e.g., no offenders were assessed as scoring a value of 24). Caution should be applied when accepting the mean predicted probability of recidivism at extreme scores due to low number of offenders being assessed as such.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

The E/O index was then used to assess how similar the recidivism rates for offenders with a mental disorder are compared with offenders without a mental disorder for each recidivism outcome of interest. Ideally these comparisons would be assessed for each DRAOR score; however, not all possible DRAOR scores had at least one offender assessed at each possible score for one or more groups and the E/O index was unable to be calculated for the lowest and highest DRAOR scores (these results can be found in Appendix C).

To make more meaningful conclusions, the DRAOR total scores were categorized into five approximately equal-sized groups, based on the number of possible scores, and the E/O index was calculated for each group.¹² Results showed that lower-scoring offenders with mental disorder diagnoses are indeed under-estimated in their risk in comparison to offenders without a mental disorder. For example, Table 21 pertains to the E/O index when predicting any recidivism. There were 8 out of 31 offenders with a mental disorder categorized as very low risk, but the DRAOR, using expected recidivism rates from the non-disordered group, only forecasted approximately 4 recidivists ($E/O = 0.460$). Comparatively, offenders with a mental disorder diagnosis who were assessed as being medium risk experienced levels of any recidivism much closer to the expected rates (84 versus 83.640; $E/O \text{ index} = 0.996$). The results of the earlier logistic regression calibration analyses that indicated that higher scoring offenders were over-classified were also supported. There were 36 out of 102 offenders with a mental disorder categorized as

¹² DRAOR scores between -12 and -5 were categorized as “Very low”; DRAOR scores of -4 to +3 were categorized as “Low”; DRAOR scores of +4 to +10 were categorized as “Medium”; DRAOR scores of +11 to +18 were categorized as “High”; and DRAOR scores of +19 to +26 were categorized as “Very high”.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

high risk, but the DRAOR, using expected recidivism rates from the non-disordered group, expected approximately 59 recidivisms (E/O index = 1.636).

Again, findings were generally similar when disaggregating any recidivism by new charges (Table 22) and technical violations (Table 23). For both community outcomes the baseline DRAOR underpredicted the level of recidivism experienced by offenders with a mental disorder diagnosis who were assessed as lower risk. While not seen with technical violations, the baseline DRAOR overpredicted new charges experienced by offenders with a mental disorder diagnosis who were assessed as high risk.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 21

E/O Index Assessing the Calibration Between Observed and Expected Recidivism Numbers for Any Recidivism for Each DRAOR Risk Category

DRAOR Category	N	Observed	Expected	E/O Index	95% CI	Sig.
Very Low	31	8	3.677	0.460	[0.230 – 0.919]	n.s.
Low	128	35	23.066	0.659	[0.473 – 0.918]	n.s.
Medium	205	84	83.640	0.996	[0.804 – 1.233]	sig.
High	102	36	58.905	1.636	[1.180 – 2.268]	n.s.
Very High	12	4	3.428	0.857	0.322 – 2.284]	sig.

Note. Confidence Intervals (Cis) that contain 1 indicate that the observed and expected number of recidivists do not significantly differ.

Table 22

E/O Index Assessing the Calibration Between Observed and Expected Recidivism Numbers for New Charges for Each DRAOR Risk Category

DRAOR Category	N	Observed	Expected	E/O Index	95% CI	Sig.
Very Low	31	6	2.635	0.439	[0.197 – 0.978]	n.s.
Low	128	15	10.368	0.691	[0.417 – 1.147]	sig.
Medium	205	41	39.975	0.975	[0.718 – 1.324]	sig.
High	102	14	33.048	2.361	[1.398 – 3.986]	n.s.
Very High	12	1	3.432	3.432	[0.483 – 24.365]	sig.

Note. Confidence Intervals (Cis) that contain 1 indicate that the observed and expected number of recidivists do not significantly differ.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 23

E/O Index Assessing the Calibration Between Observed and Expected Recidivism Numbers for Technical Violations for Each DRAOR Risk Category

DRAOR Category	N	Observed	Expected	E/O Index	95% CI	Sig.
Very Low	31	5	1.581	0.316	[0.321 – 0.760]	n.s.
Low	128	25	16.384	0.655	[0.443 – 0.970]	n.s.
Medium	205	65	61.295	0.943	[0.730 – 1.948]	sig.
High	102	26	34.476	1.326	[0.903 – 1.948]	sig.
Very High	12	3	3.432	1.144	[0.369 – 3.547]	sig.

Note. Confidence Intervals (Cis) that contain 1 indicate that the observed and expected number of recidivists do not significantly differ.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Summary. The DRAOR is not similarly calibrated between offenders with a mental disorder diagnosis and offenders without a mental disorder diagnosis.

Correctional staff utilizing the DRAOR with clients who have a mental disorder diagnosis should be especially cautious if the client is rated towards the low or high end of the DRAOR.

Incremental Prediction of DRAOR Scores over Static Risk Scores

Hypothesis 6a: It is expected that DRAOR scores will incrementally predict unsatisfactory community outcomes over static risk scores for offenders with a mental disorder diagnosis.

Hypothesis 6b: It is expected that DRAOR scores will incrementally predict unsatisfactory community outcomes over static scores regardless of mental disorder group membership.

A series of hierarchical logistic regression analyses were conducted to assess the ability of the DRAOR to incrementally predict negative community outcomes over the IVVI victimization static risk scale and to explore whether results differed by mental disorder group membership. Analyses were completed separately for any recidivism (Table 24), new charges (Table 25), and technical violations (Table 26).

Any recidivism. When static risk was entered into block 1 of this model it was significantly associated with any recidivism (Wald $\chi^2 (1) = 30.86, p < .001$). A one-point increase in static risk was associated with an 11% increase in the odds of an offender experiencing any recidivism (odds ratio = 1.11). Adding DRAOR total score into block 2 also produced a significant model (Wald $\chi^2 (2) = 52.73, p < .001$), showing that increases

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

in static risk and DRAOR total scores were associated with increased odds of an offender recidivating (a 9% increase and a 6% increase for every one-point increase in static and dynamic risk, respectively). The change in the Wald χ^2 value (Δ Wald $\chi^2(1) = 21.87, p < .001$) indicated that DRAOR total score incrementally predicted the likelihood of any recidivism over static risk scores.

Adding an interaction between mental disorder group membership and DRAOR total score, as seen in block 3, resulted in a statistically significant model (Wald $\chi^2(4) = 59.06, p < .001$) that incrementally predicted any recidivism over the model that contained only contained static risk and DRAOR total score (Δ Wald $\chi^2(1) = 6.33, p < .05$). These results indicated that mental disorder group membership (i.e., either having or not having a mental disorder diagnosis) affected whether DRAOR total scores incrementally any recidivism over static risk. Follow-up analysis showed that the odds of experiencing any recidivism increased by 10% for every one-point increase in DRAOR total for offenders without a mental disorder diagnosis (odds ratio = 1.10; 95%CI = 1.06 – 1.14), but did not change for offenders with a mental disorder (odds ratio = 1.02; 95%CI = 0.99 – 1.05).

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 24

Incremental Association of DRAOR Total Score in Predicting Any Recidivism Over Static Risk by Mental Disorder Group

	B (SE)	Wald χ^2 (df)	Odds Ratio	95% CI
Block 1: Static risk scores				
Constant	-0.72 (0.07)	106.31 (1)***	-	-
Victimization risk	0.10 (0.02)	30.86 (1)***	1.11	[1.07 – 1.15]
<i>Overall model fit</i>				
Wald χ^2 (df)		30.86(1)***		
Block 2: Adding DRAOR total score				
Constant	-0.75 (0.07)	108.36(1)***	-	-
Violence risk	0.09 (0.02)	20.96 (1)***	1.09	[1.05 – 1.13]
DRAOR	0.05 (0.01)	24.21(1)***	1.06	[1.03 – 1.08]
<i>Overall model fit</i>				
Wald χ^2 (df)		52.73(2)***		
Δ Wald χ^2 (Δ df)		21.87 (1)***		
Block 3: Adding interaction				
Constant	-0.71 (0.07)	96.85 (1)***	-	-
Violence risk	0.08 (0.02)	20.32 (1)***	1.09	[1.05 – 1.13]
DRAOR	0.06 (0.01)	24.82 (1)***	-	-
Mental disorder group	0.004 (0.07)	0.004 (1) ^{ns}	-	-
DRAOR*mental disorder group	-0.04 (0.01)	10.04 (1)**	-	-
<i>Overall model fit</i>				
Wald χ^2 (df)		59.06 (4)***		
Δ Wald χ^2 (Δ df)		6.33(1)*		

Note. SAS does not compute odds ratios and associated 95% confidence intervals for variables included in an interaction term as the odds ratio for the variable depends on the level of the interaction variable. Offenders without a mental disorder diagnosis were the reference group.
 ns not significant, * $p < .05$, ** $p < .01$, *** $p < .001$

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

New charges. When static risk was entered into block 1 of this model it was significantly associated with new charges (Wald $\chi^2(1) = 25.48, p < .001$). A one-point increase in static risk was associated with 12% increase in the odds of an offender experiencing a new charge while on community supervision (odds ratio = 1.12). Adding DRAOR total score into block 2 still produced a significant omnibus test (Wald $\chi^2(2) = 29.44, p < .001$) and increases in static risk and DRAOR total scores were both associated with increased odds of an offender experiencing a new charge (an 11% and 3% increase for every one-point increase in static and dynamic risk, respectively). The change in the Wald χ^2 value (Δ Wald $\chi^2(1) = 5.96, p < .05$) indicated that DRAOR total score incrementally predicted the likelihood of new charges over static risk scores.

Adding an interaction between mental disorder group membership and DRAOR total score, as seen in block 3, resulted in a statistically significant model (Wald $\chi^2(4) = 39.89, p < .001$) that incrementally predicted new charges over the model that contained only static risk and DRAOR total score (Δ Wald $\chi^2(1) = 10.45, p < .01$). These results indicated that mental disorder group membership affected whether DRAOR total scores incrementally predicted new charges over static risk assessments. Follow-up analysis showed that the odds of experiencing a new charge increased by 8% for every one-point increase in DRAOR total for offenders without a mental disorder diagnosis (odds ratio = 1.08; 95%CI = 1.04 – 1.13), but did not change for offenders with a mental disorder (odds ratio = 0.98; 95%CI = 0.95 – 1.02).

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 25

Incremental Association of DRAOR Total Score in Predicting New Charges Over Static Risk by Mental Disorder Group

	B (SE)	Wald χ^2 (df)	Odds Ratio	95% CI
Block 1: Static risk scores				
Constant	-1.71 (0.09)	342.96 (1)***	-	-
Victimization risk	0.11 (0.02)	25.48 (1)***	1.12	[1.07 – 1.17]
<i>Overall model fit</i>				
Wald χ^2 (df)		23.48 (1)***		
Block 2: Adding DRAOR total score				
Constant	-1.73 (0.09)	340.41 (1)***	-	-
Victimization risk	0.11 (0.02)	20.86 (1)***	1.11	[1.06 – 1.16]
DRAOR	0.03 (0.01)	4.58 (1)*	1.03	[1.00 – 1.06]
<i>Overall model fit</i>				
Wald χ^2 (df)		29.44 (2)***		
Δ Wald χ^2 (Δ df)		5.96 (1)*		
Block 3: Adding interaction				
Constant	-1.70 (0.09)	325.93 (1)***	-	-
Victimization risk	0.11 (0.02)	20.90 (1)***	1.11	[1.06 – 1.16]
DRAOR	0.03 (0.01)	4.90 (1)*	-	-
Mental disorder group	-0.03 (0.09)	0.13 (1) ^{ns}	-	-
DRAOR*mental disorder group	-0.05 (0.01)	11.04 (1)***	-	-
<i>Overall model fit</i>				
Wald χ^2 (df)		39.89(4)***		
Δ Wald χ^2 (Δ df)		10.45(1)**		

Note. SAS does not compute odds ratios and associated 95% confidence intervals for variables included in an interaction term as the odds ratio for the variable depends on the level of the interaction variable. Offenders without a mental disorder diagnosis were the reference group.

^{ns} not significant, * $p < .05$, ** $p < .01$, *** $p < .001$.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Technical violations. When static risk was entered into block 1 of this model, it was significantly associated with technical violations (Wald $\chi^2(1) = 12.84, p < .001$). A one-point increase in static risk was associated with an 7% increase in the odds of an offender experiencing a technical violation while on community supervision (odds ratio = 1.07). Adding DRAOR total score into block 2 also produced a significant omnibus test (Wald $\chi^2(2) = 31.22, p < .001$) illustrating that increases in static risk and DRAOR total scores were associated with increased odds of an offender experiencing a technical violation (a 6% increase for every one-point increase in each assessment of risk). The change in the Wald χ^2 value (Δ Wald $\chi^2(1) = 18.38, p < .001$) indicated that DRAOR total scores incrementally predict the likelihood of technical violations over static risk scores.

Adding an interaction between mental disorder group membership and DRAOR total score, as seen in block 3, resulted in a statistically significant model (Wald $\chi^2(4) = 33.85, p < .001$); however this model did not incrementally predict technical violations over the block 2 model (Δ Wald $\chi^2(1) = 2.63, p > .05$). That said, the interaction between DRAOR total score and mental disorder group membership, in alignment with the discrimination analyses, was statistically significant. Follow-up analysis showed that the odds of violating release conditions increased by 8% for every one-point increase in the DRAOR for offenders without a mental disorder diagnosis (odds ratio = 1.08; 95%CI = 1.05 – 1.12), but did not change for offenders with a mental disorder diagnosis (odds ratio = 1.03; 95%CI = 0.97 – 1.06). However, this model did not provide significantly better fit of the data compared to the model without the interaction term.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 26

Incremental Association of DRAOR Total Score in Predicting Technical Violations Over Static Risk by Mental Disorder Group

	B (SE)	Wald χ^2 (df)	Odds Ratio	95% CI
Block 1: Static risk scores				
Constant	-1.19 (0.08)	238.71 (1)***	-	-
Victimization risk	0.07 (0.02)	12.84(1)***	1.07	[1.03 – 1.12]
<i>Overall model fit</i>				
Wald χ^2 (df)		12.84(1)***		
Block 2: Adding DRAOR total score				
Constant	-1.23 (0.08)	238.42 (1)***	-	-
Victimization risk	0.05 (0.02)	7.25 (1)**	1.06	[1.02 – 1.10]
DRAOR	0.05 (0.01)	19.43 (1)***	1.06	[1.03 – 1.08]
<i>Overall model fit</i>				
Wald χ^2 (df)		31.22 (2)***		
Δ Wald χ^2 (Δ df)		18.38(1)***		
Block 3: Adding interaction				
Constant	-1.20 (0.08)	227.02(1)***	-	-
Victimization risk	0.05 (0.02)	6.62(1)**	1.05	[1.01 – 1.10]
DRAOR	0.05 (0.01)	18.99 (1)***	-	-
Mental disorder group	0.08 (0.08)	0.88 (1) ^{ns}	-	-
DRAOR*mental disorder group	-0.03 (0.01)	4.28 (1)*		
<i>Overall model fit</i>				
Wald χ^2 (df)		33.85 (4)***		
Δ Wald χ^2 (Δ df)		2.63 (1) ^{ns}		

Note. SAS does not compute odds ratios and associated 95% confidence intervals for variables included in an interaction term as the odds ratio for the variable depends on the level of the interaction variable. Offenders without a mental disorder diagnosis were the reference group.

^{ns} not significant, * $p < .05$, ** $p < .01$, *** $p < .001$

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Summary. DRAOR total scores incrementally predicted over static risk scores for all community outcomes for offenders without a mental disorder diagnosis; however, it did not incrementally predict recidivism outcomes for those with a mental disorder diagnosis.

Incremental Prediction of Clinical Considerations over DRAOR Scores

Hypothesis 7: Previous research has found the presence of a mental disorder may be related to supervision failure but not for new crimes (Skeem et al., 2014). Therefore, it is expected that the presence of ongoing mental health-related problems will incrementally improve the prediction of technical violations, but not new charges, over DRAOR total score.

Finally, it was of interest to assess whether the parole officer assessment of clinical considerations would incrementally predict recidivism outcomes over baseline DRAOR assessments for offenders with a mental disorder diagnosis. As shown in Table 27, at the time of the first DRAOR assessment, 33.05% of offenders had no ongoing mental health problems, 30.13% of offenders had slight/possible ongoing mental health problems, and 36.82% of offenders had definite ongoing mental health problems.

Those assessed as having definite ongoing mental health problems experienced the highest rates of any recidivism (44.3%), followed by those with no ongoing mental health problems (32.3%) and those with a slight/possible ongoing mental health problem (26.4%). Similar trends can be found for technical violations with offenders with definite problems being the most likely to experience a technical violation (33.5%) and those with slight/possible problems being the least likely to experience a technical violation

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

(16.7%). Results between groups were more analogous when focusing on new charges, with prevalence rates ranging from 15.2% to 17.6%.

Table 27

Prevalence of Community Outcomes by Ratings of Ongoing Mental Health Problems for Offenders Diagnosed with a Mental Disorder

	Ongoing mental health problems		
	Not a problem (<i>N</i> = 158)	Slight/Possible problem (<i>N</i> = 144)	Definite problem (<i>N</i> = 176)
	% (<i>n</i>)	% (<i>n</i>)	% (<i>n</i>)
Any recidivism	32.3 (51)	26.4 (38)	44.3 (78)
New charge	15.2 (24)	15.3 (22)	17.6 (31)
Technical violation	26.0 (41)	16.7 (24)	33.5 (59)

Note. Any recidivism is the combination of any technical violations or new charges

A series of hierarchical logistic regression analyses were conducted to assess whether the inclusion of additional clinical considerations, through parole officer ratings of the presence of ongoing mental health-related problems at the time of the DRAOR assessment, incrementally improves upon the DRAOR total score's ability to predict negative community outcomes. Analyses were completed separately for any recidivism (Table 28), new charges (Table 29), and technical violations (Table 30).

Any recidivism. Consistent with discrimination and calibration analyses, there is no statistically significant association between DRAOR total score and any recidivism (-2LL = 615.04, Wald χ^2 (1) = 3.50, p = .961). However, when the presence of ongoing mental health problems was included in the model, model fit improved (-2LL = 605.91, Wald χ^2 (2) = 12.45, p = .011). While the DRAOR still did not significant predict any

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

recidivism, the odds of experiencing any recidivism were 54.5% higher for offenders with definite ongoing mental health-related problems and 26.5% lower for offenders with slight/possible ongoing mental health-related problems compared to those offenders with no ongoing problems. The change in the Wald χ^2 value (Δ Wald $\chi^2(2) = 8.95, p < .05$) indicates that clinical considerations incrementally predict the likelihood of any recidivism over DRAOR total scores.

New charges. Similarly, consistent with discrimination and calibration analyses, there was not statistically significant association between DRAOR total scores and any recidivism ($-2LL = 421.98$, Wald $\chi^2(1) = 0.07, p = .792$). Further, when the presence of ongoing mental health related problems was included in the model, it was still non-significant ($-2LL = 421.28$, Wald $\chi^2(3) = 0.77, p = .856$). These findings indicate that neither the DRAOR total score nor clinical considerations are relevant in the prediction of new charges.

Technical violations. A model containing just DRAOR total scores significantly predicted technical violations for offenders with a mental disorder diagnosis ($-2LL = 543.21$, Wald $\chi^2(1) = 3.99, p = .046$). A one-point increase in DRAOR score was associated with a 3% increase in the odds of an offender violating the conditions of their release (odds ratio = 1.03). Adding clinical considerations into block 2 improved the fit of the model ($-2LL = 533.65$, Wald $\chi^2(3) = 12.83, p = .005$). While DRAOR scores were no longer predictive of technical violations, the presence of ongoing mental health related problems was. The odds of violating release conditions were 27.5% higher for offenders with definite ongoing mental health-related problems and 44.9% lower for offenders with slight/possible ongoing mental health-related problems compared to those offenders with

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

no ongoing problems. The change in the Wald χ^2 value (Δ Wald $\chi^2(2) = 8.84, p < .05$) indicates that clinical considerations incrementally predict the likelihood of technical violations over DRAOR total scores.

In examining the types of technical violations that occurred for offenders with mental disorder, there appeared to be some differences in the nature of violations (see Table 31). It appears individuals with the most severe mental health symptoms were the most likely to violate conditions related to their mental disorder. Individuals with definite ongoing mental health-related problems were the most likely to be terminated or fail to participate in treatment and use/possess alcohol or drugs/paraphernalia than other groups. Comparatively, offenders with no ongoing mental-health related problems were the most likely to be in an unauthorized location and offenders with slight/possible ongoing mental health-related problems were the most likely to have a new arrest.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 28

Hierarchical Logistic Regression Analysis of the Incremental Contribution of Ongoing Mental Health-Related Problems Over DRAOR Total Score in Predicting Any Recidivism (N = 478)

				95% Confidence Interval for Odds Ratio	
				Lower	Upper
Block 1					
Constant	0.66 (0.10)	44.48(1)***	-	-	-
DRAOR total score	-0.03 (0.02)	3.50(1) ^{ns}	1.03	1.00	1.06
<i>Model fit</i>					
Wald χ^2 (df)		3.50 (1) ^{ns}			
Block 2					
Constant	-0.68 (0.10)	45.63(1)***	-	-	-
DRAOR total score	0.01 (0.02)	0.75(1) ^{ns}	1.01	0.98	1.05
Ongoing mental health-related problems					
Slight/possible problem vs not a problem	-0.35 (0.15)	5.60(1)*	0.74	0.45	1.21
Definite problem vs not a problem	0.39 (0.14)	7.69(1)**	1.54	0.96	2.50
<i>Model fit</i>					
Wald χ^2 (df)		12.45(3)**			
Δ Wald χ^2 (Δ df)		8.95(2)*			

Note. No ongoing mental health-related problems was the reference group. ^{ns} not significant, * $p < .05$, ** $p < .01$, *** $p < .001$.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 29

Hierarchical Logistic Regression Analysis of the Incremental Contribution of Ongoing Mental Health-Related Problems Over DRAOR Total Score in Predicting New Charges (N = 478)

				95% Confidence Interval for Odds Ratio	
	β (SE)	Wald χ^2	Odds Ratio	Lower	Upper
Block 1					
Constant	-1.64 (0.13)	169.58(1)***	-	-	-
DRAOR total score	-0.01 (0.02)	0.07(1) ^{ns}	1.00	0.96	1.03
<i>Model fit</i>					
Wald χ^2 (df)		0.07(1) ^{ns}			
Block 2					
Constant	-1.65 (0.13)	168.77(1)***	-	-	-
DRAOR total score	-0.01 (0.02)	0.31(1) ^{ns}	0.99	0.95	1.03
Ongoing mental health-related problems					
Slight/possible problem vs not a problem	-0.06 (0.18)	0.12(1) ^{ns}	0.99	0.95	1.03
Definite problem vs not a problem	0.15 (0.18)	0.70(1) ^{ns}	1.27	0.68	2.38
<i>Model fit</i>					
Wald χ^2 (df)		0.77(3) ^{ns}			

Note. No ongoing mental health-related problems was the reference group. ^{ns} not significant, * $p < .05$, ** $p < .01$, *** $p < .001$.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 30

Hierarchical Logistic Regression Analysis of the Incremental Contribution of Ongoing Mental Health-Related Problems Over DRAOR Total Score in Predicting Technical Violations (N = 478)

				95% Confidence Interval for Odds Ratio	
	β (SE)	Wald χ^2	Odds Ratio	Lower	Upper
Block 1					
Constant	-1.10 (0.11)	101.33(1)***	-	-	-
DRAOR total score	0.03 (0.02)	3.99(1)*	1.03	1.00	1.07
<i>Model fit</i>					
	Wald χ^2 (df)	3.99(1)*			
Block 2					
Constant	-1.14 (0.11)	102.22(1)***	-	-	-
DRAOR total score	0.02 (0.02)	1.53(1) ^{ns}	1.02	0.99	1.06
Ongoing mental health-related problems					
Slight/possible problem vs not a problem	-0.48 (0.17)	7.91(1)**	0.55	0.31	0.97
Definite problem vs not a problem	0.36 (0.15)	5.51(1)*	1.28	0.77	2.13
<i>Model fit</i>					
	Wald χ^2 (df)	12.83(3)**			
	Δ Wald χ^2 (Δ df)	8.84(2)*			

Note. No ongoing mental health-related problems was the reference group. ^{ns} not significant, * $p < .05$, ** $p < .01$, *** $p < .001$.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 31

Prevalence of Individual Technical Violations by Current Mental Health-Related Problem Status (N = 124)

	Not a problem (n = 41)	Slight/possible problem (n = 24)	Definite problem (n = 59)
	% (n)	% (n)	% (n)
Emotional/Verbal abuse	2.44 (1)	4.17 (1)	0.0 (0)
Failure to maintain contact	29.27 (12)	20.8 (5)	28.8 (17)
Failure to pay court-ordered fines/restitution	0.0 (0)	0.0 (0)	1.69 (1)
Failure to report/return/absconsion	4.88 (2)	4.17 (1)	5.08 (3)
Failure to submit to security standard	2.44 (1)	0.0 (0)	1.69 (1)
Fired from employment	7.32 (3)	12.5 (3)	6.78 (4)
Illegal activity without arrest	2.44 (1)	0.0 (0)	1.69 (1)
New arrest	24.39 (10)	37.5 (9)	23.73 (14)
Other prohibited contact	7.32 (3)	0.0 (0)	3.39 (2)
Out of place of assignment/unauthorized location	21.95 (9)	8.33 (2)	10.17 (6)
Physical abuse	2.44 (1)	0.0 (0)	1.69 (1)
Possession of weapon	0.0 (0)	0.0 (0)	0.0 (0)

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 31 *Continued.*

	Not a problem (<i>n</i> = 41)	Slight/possible problem (<i>n</i> = 24)	Definite problem (<i>n</i> = 59)
	% (<i>n</i>)	% (<i>n</i>)	% (<i>n</i>)
Quit without authorization	2.44 (1)	4.17 (1)	0.0 (0)
Terminated/Failure to participate in treatment	14.63 (6)	16.67 (4)	22.03 (13)
Unauthorized distribution of alcohol or drugs	2.44 (1)	0.0 (0)	0.0 (0)
Use/Possession of alcohol or drugs/paraphernalia	26.83 (11)	37.50 (9)	50.85 (30)
Violation of no contact order	0.0 (0)	0.0 (0)	0.0 (0)
Violation of special conditions - other	2.44 (1)	4.17 (1)	5.08 (3)
GPS violation	2.44 (1)	0.0 (0)	0.0 (0)
No reason provided	4.88 (2)	0.0 (0)	0.0 (0)

Note. Percentages do not sum to 100% as offenders could have violated more than one condition of their release during a single incident (the range of conditions violated during a single incident ranged between one and two).

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Summary. The presence of definite ongoing mental health-related problems incrementally improved the prediction of technical violations, but not new charges, over DRAOR total scores.

Study 2 Summary

Study 2 set out to assess the utility of using baseline DRAOR assessments as a meaningful case management tool for parole officers for assessing offender risk and protective factors. While the DRAOR appears to have utility with offenders who do not have a mental disorder diagnosis provided during incarceration, results were mixed for offenders with a mental disorder diagnosis. The DRAOR generally has acceptable psychometric properties, regardless of the presence of a mental disorder diagnosis. While Study 1 found that offenders have similar rates of recidivism outcomes regardless of their mental disorder status, Study 2 found that offenders with mental disorder diagnoses were assessed as having higher risk and lower protective factor levels.

Acceptable predictive validity in all recidivism outcomes examined was found for offenders without a mental disorder diagnosis; however, the DRAOR was only able to weakly discriminate between offenders with mental disorder diagnoses who did or did not violate the conditions of their release. When the calibration of the DRAOR was compared between offenders with a mental disorder diagnosis and offenders without a mental disorder diagnosis, results showed that the DRAOR may be under-classifying lower-scoring offenders with a mental disorder diagnosis (i.e., assessing them at lower risk than their outcomes suggest are accurate) and over-classifying higher-scoring offenders with mental disorders (i.e., assessing them at higher risk than their outcomes

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

suggest are accurate). Caution should be applied when accepting the calibration results, however, as these results may be affected by the few offenders being assessed at the very low and very high extremes of potential DRAOR scores. When the DRAOR was predictive of recidivism outcomes (e.g., for offenders without a mental disorder diagnosis this was for all recidivism outcomes and for offenders with a mental disorder diagnosis this was for any recidivism and technical violations), findings showed that the DRAOR provided unique information to this prediction over static risk assessments.

Finally, by the time offenders with a mental disorder diagnosis were released, nearly one-third were assessed as no longer having ongoing mental health-related problems by parole officers. While having possible/some mental health problems was associated with a decrease in risk for technical violations, having definite mental health-related problems increased offenders' risk for technical violations. Offenders with definite mental health-related problems were the most likely to violate conditions related to mental illness (e.g., treatment and substance use conditions). Ongoing mental health problems did not incrementally predict new charge outcomes over dynamic risk assessments.

Chapter 8

Study 3a: Psychometric Properties of the DRAOR over Time

The purpose of Study 3a was to better understand the psychometric properties of the DRAOR over time by examining the factor structure and measurement invariance of the DRAOR, as well as examining the internal consistency and convergent validity at various time-points. If results show that the factor structure of the DRAOR changes over time, it would not be possible to determine whether changes in DRAOR scores are the

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

result of real offender change or rather measurement error. As such, it was necessary to confirm the measurement equivalence of the DRAOR over time before changes in reassessments were examined.

Methods

Sample

The sample of offenders used in Study 3a was drawn from the sample used in Studies 1 and 2. Study 3 differs from Study 2 in that it is focused on repeat DRAOR assessments compared to the baseline assessment. The total sample ($N = 961$) had, on average, 4 DRAOR assessments ($SD = 2.88$) within the first year of community supervision, ranging from 1 to 20 assessments.

Extant literature recommends a minimum of three assessments to effectively assess offender change on risk and protective factors (Brown, St. Amand, & Zamble, 2009; Singer & Willett, 2003), thereby informing the minimum required number of assessments for the current research study. Further, the proposed analyses (e.g., measurement invariance analysis) requires assessments to occur at set time periods (e.g., weekly, monthly, etc.) with no missing data. Due to the variability in the timing of DRAOR assessments (due to differences in reporting frequency requirements) which would have resulted in large amounts of missing data having to be imputed, the optimal approach to selecting DRAOR assessments was to group time-points into regular intervals that spanned a sufficient period of time as to result in a sufficient sample size.

Three time-period groupings were examined (see Table 32) and it was clear the following three-time points was most optimal: 1-2 months (Time 1), 3-4 months (Time

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

2), and 5-6 months (Time 3). This categorization of assessments provided a sufficient sample size for factor analysis (Moshagen & Much, 2014) and had been considered optimal in previous research examining longitudinal measurement invariance of offender risk assessment tools (Babchishin, 2013). In cases where an offender had multiple DRAOR assessments within the time-period, a random assessment was selected.

Table 32

Sample Sizes for Potential Time-Period Groupings

Time-Points	Total <i>N</i>	Offenders without a mental disorder	Offenders with a mental disorder
		<i>n</i>	<i>n</i>
1, 2, and 3 months after release	93	43	50
1-2, 3-4, and 5-6 months after release	219	111	108
1-3, 4-6, and 7-9 months after release	246	121	125

The subsample of offenders included in the longitudinal analyses were compared to those excluded to assess whether they differed on any demographic characteristics or static risk scores (see Table 33). Results indicated no statistically significant differences. The majority of offenders were male, white, had no significant other, had a high school diploma, and were convicted of a drug or property offence. As Study 2 found DRAOR measurement equivalence between offenders with and without mental disorder diagnoses, these samples were combined for the purposes of Study 3a.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 33

Study 3a Sample Characteristics

	Ineligible for longitudinal analysis (<i>N</i> = 742)	Longitudinal sample (<i>N</i> = 219)		
	% (n)	% (n)	χ^2 (df)	Cramer's V/Phi
Gender			1.03 (1) ^{ns}	0.03
Male	81.0 (601)	84.0 (184)		
Female	19.0 (141)	16.0 (35)		
Race			2.96 (2) ^{ns}	0.06
White	77.1 (572)	73.1 (160)		
Black	20.6 (153)	25.6 (56)		
Other	2.3 (17)	1.4 (3)		
Marital Status ^a			0.09 (2) ^{ns}	0.01
Does not have significant other	82.5 (607)	81.6 (177)		
Does have significant other	17.5 (129)	18.4 (40)		
Education ^b			0.44 (1) ^{ns}	0.01
Has high school diploma	86.2 (637)	84.4 (184)		
Does not have high school diploma	13.8 (102)	15.6 (34)		
Convicting offence			5.80 (4) ^{ns}	0.08
Violent	12.3 (91)	15.1 (33)		
Drug	37.7 (280)	40.6 (89)		
Property	31.0 (230)	22.8 (50)		
Public Order	11.9 (88)	13.2 (29)		
Other	7.1 (53)	8.2 (18)		

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 33 *Continued.*

	Ineligible for longitudinal analysis (<i>N</i> = 742)	Longitudinal sample (<i>N</i> = 219)		
	M (SD)	M (SD)	t(df)	d
Iowa Static Risk				
Violence Risk	9.46 (3.46)	9.27 (3.61)	0.69 (959) ^{ns}	0.05
Victimization risk	10.07 (3.83)	9.73 (4.05)	1.15 (959) ^{ns}	0.09

^a Eight individuals were missing marital status information. ^b Four individuals were missing education information. ^{ns} not significant, * *p* < .05, ** *p* < .01, *** *p* < .001.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Materials

The same measures used for studies 1 and 2 were used for Study 3a.

Dynamic Risk Assessment for Offender Re-entry. The DRAOR is a structured case management assessment tool that considers stable risk, acute risk, and protective factors. Through a structured interview conducted by a community supervision officer, the information collected in these three domains contributes to the community supervision officers' knowledge and understanding of the offender's current experiences in the community. All the items included in this assessment are rated on a three-point scale. A total score can be created by summing the scores of each domain. Total scores have the possible range of -12 to 26, with higher scores indicating greater risk and lower protective characteristics. It is recommended that offenders on community supervision be assessed at every meaningful contact with their probation/parole officer. For Study 3a, DRAOR assessments that occurred within the first year of parole supervision will be considered.

Iowa Violence and Victimization Instrument. The IVVI is an institutional static assessment tool that considers historical variables, including but not limited to the offender's age of first arrest, number of previous convictions, and history of previous alcohol or drug problems. These items are considered together to determine the risk of future violence. The thirteen included items are summed to determine the total score that ranges from -5 to 25. There are two scores that are then calculated which represent the risk of committing a violent offence (violence score) and the victimization risk of new property or violent crimes (victimization score) within the next 30 months. Each offender

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

has a baseline IVVI assessed while incarcerated. Given the previously discovered multicollinearity concerns between the two IVVI risk estimates in Study 2, the IVVI victimization score was the focus of Study 3a convergent validity analysis.

Analytic Plan

Several statistical software packages were used to complete the comprehensive screening (e.g., data cleaning, assumption checks, etc.) and analyses, including SAS (Version 9.4), R (Version 3.3.1), and SPSS (Version 20).

Research question 8: Does the DRAOR demonstrate sufficient psychometric properties and stability in factor structure over time?

A number of analytic techniques were employed to assess the stability of the psychometric properties over time of the DRAOR for offenders with and without a mental disorder diagnosis. First, longitudinal measurement invariance analysis assessed the DRAOR items measure the same latent constructs with equivalent accuracy over multiple time-points. It was expected that the timing of the DRAOR assessment would not moderate the relations specified in the model. Longitudinal measurement invariance analysis is conducted in a very similar manner as that described as multi-group measurement invariance analysis in Study 2. A series of increasingly constrained sequential models (e.g., the configural model tests whether the number of latent variables and the pattern of the factor loadings are equal across assessments, weak invariance tests whether the magnitude of the factor loadings are equal across assessments, etc.) are analyzed to assess the equivalence of the factor structure.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

The hypothesized two-factor solution (i.e., a risk factor that contains all the Stable and Acute subscale items and a protective factor) was tested over the three DRAOR assessments occurring within the first six months of parole supervision. As DRAOR items are ordinal in nature, a WLSMV estimator was used. A variety of fit indices (e.g., RMSEA, SRMR, CFI, etc.) were examined to assess measurement equivalence at each step.

Further assessments of the psychometric properties of the DRAOR included the examination of inter-item correlations and item-total correlations. Given the ordinal nature of the DRAOR, item-total correlations were assessed using polyserial correlations. The internal consistency of the DRAOR subscales was examined using the ordinal alpha coefficient. While very similar to Cronbach's alpha, ordinal alpha is based on the polychoric correlation matrix as opposed to the Pearson correlation matrix. As described in work by Gadermann and colleagues (2012), the internal consistency cut-off values described by Nunnally (1978) apply to the ordinal version of this statistic; therefore, coefficient values of .80 or higher were considered acceptable. Further, ordinal alpha estimates were calculated to observe whether improvements can be found when deleting individual DRAOR items.

Finally, the convergent validity of the DRAOR was assessed by examining the Pearson correlation coefficient of the DRAOR total score and the IVVI victimization score.

Results

Psychometric Properties of the DRAOR over Time

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Hypothesis 8: Based on previous research (e.g., Hanby 2013; Lloyd, 2015) It is expected that the DRAOR's psychometric properties (factor structure, internal consistency, item-total correlations, convergent validity) will be acceptable over time.

Longitudinal measurement invariance. To examine the stability of the factor structure of the DRAOR over time, the polychoric correlation matrices at each of the three time points were examined to assess any potential issues with factorability and multicollinearity (see Appendix D). These matrices consisted of 19 items, producing 171 bivariate correlations for each time point. At time 1, polychoric correlations ranged from 0.01 to 0.69. Of these, 50 correlations were 0.30 or larger. At time 2, polychoric correlations ranged from 0.01 to 0.68. Of these, 51 correlations were 0.30 or larger. At time 3, polychoric correlations ranged from 0.01 to 0.68. Of these, 55 correlations were 0.30 or greater. While multicollinearity did not appear to be a concern, the moderate amount of polychoric correlations that were below 0.30 indicated there may be concerns related to the factorability of these data.

A closer look showed no concerns for Protective Factor items across any of the time points (polychoric correlations ranged from 0.15 to 0.67, with nearly all being 0.30 or greater); however, a small number of the acute items were uncorrelated with other Risk Factor items. That said, the majority of items were at least weakly inter-correlated, so the decision was made to proceed with measurement invariance analysis.

To begin, the factor structure of the DRAOR as examined separately for each time point using CFA, assessing a two-factor solution: a risk factor (amalgamating the Stable and Acute subscales) and a protective factor. As shown in Table 34, model fit indices

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

generally showed acceptable fit. While the chi-square test was significant and the SRMR values hovered around the acceptable cut-off (0.100), the remaining fit indices suggested acceptable to good model fit.

Table 34

CFA Model Fit Indices by Time Point

Fit Index	Time 1 (1-2 months)	Time 2 (3-4 months)	Time 3 (5-6 months)
χ^2 (df)	337.563 (151)***	358.852 (151)***	305.171 (151)***
CFI	0.929	0.920	0.944
TLI	0.920	0.909	0.937
RMSEA	0.075	0.079	0.068
(90% CI)	(0.065 - 0.086)	(0.069 – 0.090)	(0.057 – 0.079)
SRMR	0.102	0.104	0.095

^{ns} not significant, * $p < .05$, ** $p < .01$, *** $p < .001$.

As shown in Table 35, the majority of DRAOR items loaded onto their respective factors (e.g., the Stable subscale item, “Impulse control” has a factor loading of 0.71 at time 1, 0.71 at time 2, and 0.75 at time 3). There were, however, several DRAOR items with weaker factor loadings (e.g., Access to victims). The risk and protective factors were significantly negatively correlated with each other at time 1 ($r = -0.594$, $p < .001$), time 2 ($r = -0.632$, $p < .001$), and time 3 ($r = -0.616$, $p < .001$).

Given the acceptable fit of the individual CFAs, measurement invariance was assessed using a number of fit indices (see Table 36). With each incremental constraint applied to the model, the change in fit indices and the Satorra-Bentler scaled chi-square test indicated that the change in fit was negligible. These findings indicate that both factor loadings and item thresholds can be considered invariant across time.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 35

Standardized Factor Loadings for Separate CFAs by Time Point

Pattern coefficients	Time 1 (1-2 months)			Time 2 (3-4 months)			Time 3 (5-6 months)		
	Unst.	SE	St.	Unst.	SE	St.	Unst.	SE	St.
Risk → s1: Peer associations	1.00	-	0.53	1.00	-	0.59	1.00	-	0.67
Risk → s2: Attitudes towards authority	1.35	0.28	0.64	1.11	0.23	0.63	0.75	0.15	0.56
Risk → s3: Impulse control	1.63	0.32	0.71	1.38	0.25	0.71	1.27	0.20	0.75
Risk → s4: Problem-solving	1.59	0.31	0.70	1.43	0.26	0.72	1.20	0.21	0.73
Risk → s5: Sense of entitlement	1.08	0.23	0.56	0.96	0.20	0.57	0.68	0.13	0.52
Risk → s6: Attachment with others	0.85	0.20	0.47	0.60	0.15	0.40	0.43	0.11	0.36
Risk → a1: Substance abuse	0.69	0.18	0.40	0.72	0.15	0.46	0.68	0.13	0.52
Risk → a2: Anger	0.87	0.22	0.48	0.64	0.17	0.42	0.42	0.12	0.35
Risk → a3: Access to victims	0.39	0.14	0.24	0.47	0.14	0.32	0.41	0.10	0.35
Risk → a4: Negative mood	0.74	0.19	0.42	0.53	0.14	0.36	0.53	0.12	0.43
Risk → a5: Employment	0.54	0.16	0.32	0.60	0.14	0.40	0.69	0.14	0.52
Risk → a6: Interpersonal relationships	0.80	0/16	0.45	0.54	0.13	0.37	0.52	0.10	0.42
Risk → a7: Living situation	0.64	0.17	0.37	0.61	0.15	0.40	0.50	0.12	0.41

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 35 *Continued.*

Pattern coefficients	Time 1 (1-2 months)			Time 2 (3-4 months)			Time 3 (5-6 months)		
	Unst.	SE	St.	Unst.	SE	St.	Unst.	SE	St.
Protective → p1: Responsiveness to advice	1.00	-	0.70	1.00	-	0.69	1.00	-	0.73
Protective → p2: Prosocial identity	1.12	0.20	0.74	1.01	0.18	0.70	0.92	0.19	0.71
Protective → p3: High expectations	1.19	0.21	0.76	1.14	0.21	0.74	0.90	0.18	0.70
Protective → p4: Costs/Benefits	0.98	0.17	0.69	0.93	0.16	0.66	0.89	0.16	0.69
Protective → p5: Social support	0.94	0.18	0.67	0.85	0.17	0.63	0.75	0.15	0.63
Protective → p6: Social control	1.35	0.28	0.80	1.36	0.29	0.79	1.18	0.23	0.79

Note. Unst., unstandardized; SE, standard error; St., standardized. All results were computed by R for theta parameterization.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 36

Values of Selected Fit Statistics for Measurement Invariance Hypotheses for a Two-Factor Model of offender Risk Analyzed Across Offenders with and without a Mental Disorder Diagnosis

Fit index	Configural model	Weak/Metric model	Strong/Scalar model
χ^2 (df)	1,001.587 (453)***	1,045.754 (487)***	1,043.146 (521)***
χ^2_{SB} (df)	-	25.863 (34) ^{ns}	10.269 (34) ^{ns}
CFI	0.931	0.930	0.935
Δ CFI	-	0.001	0.005
TLI	0.922	0.926	0.936
Δ TLI	-	0.004	0.010
RMSEA (90% CI)	0.075 (0.068 – 0.081)	0.073 (0.066 – 0.079)	0.068 (0.062 – 0.074)
Δ RMSEA	-	-0.002	-0.005
SRMR	0.100	0.102	0.101
Δ SRMR	-	0.002	-0.001

Note. χ^2_{SB} represents the Satorra-Bentler scaled chi-square; CI = confidence intervals; Δ = difference. ^{ns} not significant, * $p < .05$, ** $p < .01$, *** $p < .001$.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Internal consistency. The internal consistency of both the original DRAOR model (3 subscales) and the amalgamated two-factor model were investigated separately at each time point (Table 37). Results indicated that, for the most part, the factors demonstrate good levels of internal consistency. The only exception to this was the original DRAOR Acute subscale which had consistently lower levels of internal consistency (ranging from 0.50 to 0.57). Given previous research showing that the Acute subscale tends to have lower internal consistency (e.g., Chadwick, 2015) and the very nature of acute risk (i.e., fast changing indicators of imminent risk of recidivism), it is not necessarily surprising that the Acute subscale showed lower internal consistency across time. Amalgamating the original DRAOR Stable and Acute subscales provided a more concise model with good internal consistency. The DRAOR appeared to have similar internal consistency across all time points.

Table 37

Internal Consistency of the DRAOR by Time Point

	Time 1 (1-2 months)	Time 2 (3-4 months)	Time 3 (5-6 months)
	Alpha (95% CI)	Alpha (95% CI)	Alpha (95% CI)
Original DRAOR			
Stable risk	0.71 (0.65 – 0.77)	0.72 (0.66 – 0.78)	0.74 (0.68 – 0.79)
Acute risk	0.55 (0.46 – 0.64)	0.50 (0.40 – 0.60)	0.57 (0.49 – 0.66)
Protective factor	0.85 (0.82 – 0.88)	0.83 (0.80 – 0.87)	0.83 (0.80 – 0.87)
Two-factor model			
Risk factor	0.78 (0.74 – 0.82)	0.79 (0.74 – 0.83)	0.81 (0.77 – 0.84)
Protective factor	0.85 (0.82 – 0.88)	0.83 (0.80 – 0.87)	0.83 (0.80 – 0.87)

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Item-total correlations and ordinal alpha correlations if the item was deleted are displayed in Appendix D for the original DRAOR model and for the two-factor model. Very few notable differences were observed between the different time periods examined. Results showed that there would be no meaningful internal consistency improvements if any of the items were removed. Item-total polyserial correlations indicated that all items were moderately to strongly related to their respective subscale total.

Convergent validity. Convergent validity was assessed using correlational data between the DRAOR and the IVVI Victimization score at each time point. As shown in Table 38, Pearson correlation coefficients demonstrate that the total DRAOR score was moderately (Time 1) to strongly (Time 2 and Time 3) associated with the IVVI Victimization score. Put plainly, the higher an offender scored on the static risk measure, the more likely they had higher dynamic risk scores, particularly later in their supervision period.

Table 38

Association Between Static Risk Scores and Total DRAOR Scores Across Time

	Victimization Score		
	Time 1 (1-2 months)	Time 2 (3-4 months)	Time 3 (5-6 months)
Total DRAOR Score	0.36***	0.79***	0.84***

^{ns} not significant, * $p < .05$, ** $p < .01$, *** $p < .001$.

Study 3a Summary

Results found invariance of the factor structure of the DRAOR across three time-points, indicating that both factor loadings and item thresholds could be considered

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

invariant across time. While the Acute subscale had low internal consistency, there were no other concerns related to the psychometric properties of the DRAOR over time. It is reasonable to assume that any changes in DRAOR scores can be attributed to intra-individual change and not measurement error.

Chapter 9

Study 3b: Changes in Risk and Protective Factors over Time

The main rationale for repeatedly assessing offenders' levels of dynamic risk is that these assessments purportedly provide useful ongoing information that is relevant to the effective supervision of the offender. Newer risk information should improve the ability of criminal justice organizations to predict recidivism outcomes (Serin, Chadwick, & Lloyd, 2016). The purpose of Study 3b is to (1) explore whether offender risk and protective factors change over time and (2) examine whether this rate of change differs depending on the presence of a mental disorder diagnosis. If the results show that there are changes in risk and protective factors over time, Study 3b will also examine the utility of incorporating change scores in the prediction of recidivism outcomes (e.g., any recidivism, new charges, and technical violations).

Methods

Sample

Figure 6 illustrates the reduction in sample used for Study 3b. As participants were required to have at least three DRAOR assessments to assess reliable changes over time, this reduced the sample size from 961 parolees to 542 parolees.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Figure 6. Participant flow chart for Study 3b

Offenders had between 3 and 20 DRAOR assessments completed within the first year of community supervision ($M = 6.06$, $SD = 2.90$). The average amount of time between the first DRAOR assessment and the last DRAOR assessment ranged from less than one month to nearly 12 months, with an average of 5.37 months (standard deviation = 2.75, median = 5.00). Figure 7 illustrates the full range of time between the first and last DRAOR assessments for all offenders who had at least three DRAOR assessments on file within the first year of community supervision.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Figure 7. Length of time between first and last DRAOR assessment in months for those with three or more assessments ($N = 542$).

The subsample of offenders that were included in Study 3b (those with at least three DRAOR assessments) were compared to those excluded to assess whether they differed on any demographic characteristics or static risk scores (see Table 39). Results indicated no statistically significant differences. The majority of offenders were male, white, had no significant other, had a high school diploma, and were convicted of a drug or property offence.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 39

Study 3b Sample Characteristics

	Ineligible for Study 3b (N = 419)	Eligible for Study 3b (N = 542)		
	% (n)	% (n)	χ^2 (df)	Cramer's V/Phi
Gender			3.59 (1) ^{ns}	0.06
Male	79.0 (331)	83.8 (454)		
Female	21.0 (88)	16.2 (88)		
Race			3.29 (2) ^{ns}	0.06
White	79.0 (331)	74.0 (401)		
Black	19.1 (80)	23.8 (129)		
Other	1.9 (8)	2.2 (12)		
Marital Status ^a			0.07 (1) ^{ns}	-0.01
Does not have significant other	81.9 (339)	82.6 (445)		
Does have significant other	18.1 (75)	17.4 (94)		
Education ^b			0.01 (1) ^{ns}	0.003
Has high school diploma	85.9 (360)	85.7 (461)		
Does not have high school diploma	14.1 (59)	14.3 (77)		
Convicting offence			2.23 (4) ^{ns}	0.05
Violent	12.4 (52)	13.3 (72)		
Drug	38.4 (161)	38.4 (208)		
Property	30.8 (129)	27.9 (151)		
Public Order	12.2 (51)	12.2 (66)		
Other	6.2 (26)	8.3 (45)		

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 39 *Continued.*

	Ineligible for Study 3b (<i>N</i> = 419)	Eligible for Study 3b (<i>N</i> = 542)		
	M (SD)	M (SD)	t(df)	Cohen's <i>d</i>
Iowa Static Risk				
Violence Risk	9.21 (3.50)	9.57 (3.49)	-1.58 (959) ^{ns}	0.10
Victimization risk	9.80 (3.78)	10.15 (3.95)	-1.37 (959) ^{ns}	0.09

^a Eight individuals were missing marital status information. ^b Four individuals were missing education information. ^{ns} not significant, * *p* < .05, ** *p* < .01, *** *p* < .001.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Materials

The same measures used for the previous studies were used for Study 3b. The only notable difference was Study 3b allowed all DRAOR assessments in the first year of supervision to be considered (as opposed to focusing on the first assessment (Study 2) or a random sample of three assessments per offender in the first six months of supervision (Study 3a)).

Analytic Plan

The question of whether DRAOR scores change over time and if these change scores were related to recidivism outcomes can be examined through a variety of advanced statistical models (see Yang, Guo, Olver, Polaschek, & Wong, 2016 for a detailed summary). The current data were analyzed using the Two-Stage Model (TSM) technique described by Yang and associates (2016) where, in stage one, growth models are used to identify changes in risk scores over time and, in stage two, regression models assess how change patterns are related to recidivism outcomes.

Research question 9: Do offenders demonstrate change in risk and protective factors? Does this change in risk and protective factors differ depending on whether offenders have a mental disorder diagnosis?

The examination as to whether offenders experience changes in the risk and protective factors assessed by the DRAOR over time was assessed using a series of Multilevel Models (MLM, also commonly referred to as hierarchical models, growth models, etc.; Tabachnick & Fidell, 2013). MLM is an advanced form of regression analysis that can be used to analyze the variance in a dependent variable when the

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

predictor variables vary hierarchically (e.g., students nested within a variety of schools, multiple observations nested within a variety of individuals).

MLM is an advantageous analytic technique in several ways. Given its hierarchical or clustered nature, the data negates the independence assumption that is required by more simplistic analytic techniques (i.e., regression and ANOVA), as one would expect that the results of a risk assessment repeatedly applied on an offender would be related to one another. Using an analytic technique that assumes independence of observations, therefore, could produce biased parameter estimates that are vulnerable to Type I errors (Peugh, 2010). MLM, however, does not have this assumption and expects that observations within the same individual or group are related. Further, MLM does not require longitudinal data to be structured (i.e., having the same number of assessments for everyone) or balanced (i.e., having the assessments be equally spaced across time) (Tabachnick & Fidell, 2013). These characteristics are particularly advantageous for the present doctoral research as offenders have varying number and timing of DRAOR assessments that coincide with diverse parole officer reporting frequency requirements.

The current research examined changes in offender risk that were repeatedly assessed over time.¹³ Further, other variables can be added to the model to explore why some offenders change more or less than others (e.g., mental disorder group membership). Separate analyses were conducted for the Stable subscale, Acute subscale,

¹³ The current doctoral research used the Restricted Maximum Likelihood (RML) method to fit the model of change as recommended by Singer and Willett (2003) to more accurately allot degrees of freedom to the estimates of the intercept and slope.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Protective Factors subscale, total DRAOR score, and the amalgamated Risk Factor (combining Stable and Acute subscales).

MLM analysis occurs in a multi-step process (for a detailed explanation please see Singer, & Willett, 2003; Tabachnick & Fidell, 2013). First, the unconditional model (also referred to as the intercepts-only or null model), absent of any predictors, assesses mean differences between offenders on risk (or protective factors). From this model, the intraclass correlation (ICC; equation 2) can be calculated to assess how much variation in risk (or protective factors) is present across offenders (value ranging from 0 to 1, representing the proportion of variation in the dependent variable that occurs between offenders), where τ_{00} represents the intercept variance and σ^2 represents the residual variance. Larger ICC values indicate the need for multilevel modelling techniques.

$$ICC = \frac{\tau_{00}}{(\tau_{00} + \sigma^2)} \quad (2)$$

Second, including the level-1 predictor (in this case, the timing of the DRAOR assessment) is added to the model.¹⁴ The results of this model provides a variety of information, notably the average risk score (or protective factor score) at the beginning of the community supervision period, as well as the average rate of change in risk score (or protective factor score) for every one-month change in time. Finally, the third model will examine potential mental disorder group differences in the average risk score (or

¹⁴ There are several potential methods to consider when centering the time variable in MLM analyses, including grand mean centering and person-centering (Tabachnick & Fidell, 2013). The decision, however, was made to center time based on a common start time of the at-risk (community supervision) period as this was considered more meaningful. The time variable was centered by subtracting the DRAOR assessment date from the parole start date. As such, the intercept of the model represents the estimated DRAOR score at the start of the at-risk period (i.e., on the day the offender begins parole supervision).

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

protective factor score) at the beginning of the community supervision period and its rate of change.¹⁵ Please see Figure 8 for a layout of the data used in the MLM analysis.

Figure 8. Layout of data for the Multilevel Model

¹⁵ As mental disorder group membership is a dichotomous variable (0 = no mental disorder diagnosis; 1 = mental disorder diagnosis), it does not require centering. As such, the intercept of the model 3 will represent the estimated DRAOR score at the start of the at-risk period for the group coded as 0 – offenders with no mental disorder diagnosis.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Several effect sizes specific to multilevel modelling were presented. First, pseudo R^2 , a global effect size, demonstrates the variability in observed risk (or protective) scores that can be explained by the variables included in the model (e.g., time and mental disorder group membership). It is calculated by squaring the correlation between the observed and predicted risk (or protective) scores. A local effect size, specifically the proportional reduction in variance (PVR) statistic, was calculated to determine the proportional of variance reduced by adding level-1 and level-2 model components. PVR statistics can be calculated with the following equation:

$$PVR = (variance_{no\ predictor} - variance_{predictor}) / variance_{no\ predictor} \quad (3)$$

The specific variance examined could be level-1 residual variance or level-2 intercept or slope variance. In the current research study, the level-1 residual variance PVR statistic specifies the degree to which residual variance is decreased by adding a linear growth term (e.g., the timing of the DRAOR assessments). The level-2 intercept variance PVR statistic assesses the degree to which the variability in offenders' DRAOR scores at commencement of supervision can be explained by mental disorder group membership and the interaction between time and mental disorder group membership. The level-2 slope variance PVR statistic assesses the degree to which variability in offenders' monthly risk change scores can be explained by mental disorder group membership and the interaction between time and mental disorder group membership.

Research question 10: Does the inclusion of changes in risk and protective factors enhance the prediction of recidivism over baseline models? Do these results differ depending on whether offenders have a mental disorder diagnosis?

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

To explore whether changes in risk and protective factors were predictive of recidivism outcomes, offenders' individual intercepts (e.g., their estimated DRAOR score at the beginning of their supervision period) and slopes (e.g., their intra-individual rate of change on a monthly basis) were requested from the MLM analyses. These estimates were then entered into a series of logistic regression models to assess their association with recidivism outcomes (e.g., any recidivism, new charges, and technical violations). Interaction terms between offenders' rates of change and their mental disorder group membership (0 = those without a mental disorder diagnosis; 1 = those with a mental disorder diagnosis) assessed whether the predictive accuracy of change scores differed for those with a mental disorder diagnosis compared to those without a mental disorder diagnosis.

Results

Data Management

Level-one residuals for each model were assessed for violations of normality by examining skewness and kurtosis values, histograms, and QQ-plots. Level-one residuals were generally normal, with no skewness concerns, albeit the histograms showed somewhat leptokurtic distributions. An examination of the QQ-plots indicated most of the level-one residual values fell on or very near to the normal line, with some minor fanning, indicating that there may be some outliers. When examining the within-offender effect of time on level-one residuals using scatterplots, there appeared to be homogeneity of level-one residuals. There was no apparent fanning or trends in the data; however, there was several potential outliers identified in the data. Sensitivity analyses, removing the most extreme level-one residuals (e.g., values in the zero and ninety-ninth percentiles)

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

indicated no substantial differences to the model results. Therefore, results with outliers included were presented in the current research study.

Histograms and QQ-plots suggested that the distribution of the random effects for the intercept were relatively normal, while the distribution of the random effect for time was somewhat leptokurtic with some possible outliers. A series of scatterplots plotting the random effects of the intercept and time for offenders with a mental disorder and offenders without a mental disorder indicated that these groups had similar variability in random effects; however, a small number of outliers were identified. Finally, a scatterplot assessing the linearity between random effects indicated the relationships were generally linear in nature. Further sensitivity analysis explored removing identified outliers and found no substantial differences in model results; therefore, these cases were retained.

Offender Change on Risk and Protective Factors

Hypothesis 9a: Based on previous research (Hanby, 2013; Lloyd, 2015), it is expected that offenders will demonstrate a decrease in risk and an increase in protective factors over time.

Hypothesis 9b: It is expected that change in risk and protective factors will not differ depending on mental disorder group membership.

Total DRAOR score. A three-level hierarchical model assessed the rate of change in offenders' total DRAOR risk scores over time and examined the effect of having a mental disorder diagnosis on this rate of change. Table 40 displays the model results specific to the DRAOR total score.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Unconditional model. To assess the necessity of using multilevel models, the unconditional model (or intercept-only model) provided information to calculate the intraclass correlation. The ICC represents the proportion of variance in DRAOR total scores that is between individuals.¹⁶ In the current data the ICC was equal to 0.81, indicating that 81% of the variability in DRAOR total score occurred across offenders.

Modeling change over time. Model 2 presents the MLM regression model used to examine the degree to which offenders ($N = 542$) differed on their individual intercept (i.e., their estimated DRAOR total score when beginning supervision; γ_{00}) and slope (i.e., estimated changes in the DRAOR total score throughout their first year of supervision; γ_{10}). Results showed that, on average, offenders were assessed as having an estimated DRAOR total score of 6.04 at release and the average estimated rate of change was a decrease of 0.16 points per month of supervision.

The intercept (τ_{00}) and slope (τ_{11}) variance estimates were 42.86 and 0.62, respectively. The slope variance was significantly different from zero ($p < .001$), indicating that there was significant variation in the rate of change on DRAOR total scores between offenders on community supervision. For added interpretability variance components can be converted to standard deviations. The standard deviation of the rate of change (i.e., the slope; $\sqrt{0.62}$) was 0.79. As such, assuming normally distributed slope residuals, 95% of offenders would be expected to have DRAOR total scores that changed between -3.71 and 1.39 DRAOR total score points per month.¹⁷ Similarly, if the intercept

¹⁶ $ICC = \tau_{00} / (\tau_{00} + \sigma^2) = 27.94 / (6.57 + 27.94) = 0.81$.

¹⁷ ± 1.96 standard deviations from the mean slope estimate; $-0.16 \pm 1.96(0.79) = -3.71$ and 1.39 .

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

variance estimate is converted to standard deviation (i.e., $\sqrt{42.86} = 6.55$) and assuming normally distributed intercept residuals, 95% offenders would have a DRAOR total score between -6.80 and 18.88 at the start of supervision.¹⁸

Results showed that level-1 residual variance decreased by 57.83% after adding the linear growth term.¹⁹ The significant and negative intercept-slope covariance indicated that offenders with higher DRAOR total scores at release showed a greater decrease in DRAOR total score over time.

Effect of mental disorder status. Model 3 included mental disorder status group as a dummy-coded variable (0 = no mental disorder diagnosis; 1 = mental disorder diagnosis) and included an interaction between mental disorder status and time. This changes how the fixed effect parameters are interpreted. The intercept is now interpreted as the average estimated DRAOR total score at release for offenders without a mental disorder diagnosis ($\gamma_{00} = 5.17, p < .001$). The slope is now the average estimated change in non-disordered offenders' DRAOR total scores per month ($\gamma_{10} = -0.14, p < .001$), indicating a decrease in 0.14 points per month. The main effect of mental disorder status ($\gamma_{01} = 1.71, p < .01$) represents the mean difference in DRAOR total score at release for offenders with a mental disorder diagnosis compared to those without a mental disorder diagnosis (e.g., offenders without a mental disorder diagnosis score, on average, 5.17 at release and offenders with a mental disorder diagnosis score, on average 6.88 at release). Finally, the cross-level interaction coefficient ($\gamma_{11} = -0.04, p = .598$) represents the mean

¹⁸ ± 1.96 standard deviations from the mean intercept estimate; $6.04 \pm 1.96(6.55) = -6.80$ and 18.88 .

¹⁹ $PVR = (6.57 - 2.77) / 6.57 = 0.5783$

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

slope difference between offenders without a mental disorder diagnosis and offenders with a mental disorder diagnosis (e.g., offenders without a mental disorder experience an average decrease on the DRAOR of 0.14 points and offenders with a mental disorder diagnosis experience an average decrease on the DRAOR of 0.18 points). This non-significant interaction term indicates that, while offenders with a mental disorder diagnosis score higher on the DRAOR at release, their rate of change over the first year of supervision is essentially the same as offenders without a mental disorder diagnosis.

The correlation between the observed and predicted total DRAOR scores was 0.1296. Squaring this value indicates that 1.68% of the variation in total DRAOR scores can be explained by linear change, mental disorder status, and the interaction between the two variables. PVR statistics show that level-2 intercept variance decreased by 1.65% after adding mental disorder group membership and the interaction between time and mental disorder group membership into the level-2 model.²⁰ Level-2 slope variance did not decrease.²¹

Figure 9 illustrates the rate of change in DRAOR total scores for the first year of supervision for offenders with and without a mental disorder diagnosis.

²⁰ $PVR = (42.86 - 42.15) / 42.86 = 0.0165$

²¹ $PVR = (0.62 - 0.62) / 0.62 = 0$

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 40

Multilevel Model Summaries: Total DRAOR Score

Parameters	Model 1: Unconditional	Model 2: Adding Time	Model 3: Adding Mental Disorder Status
Regression coefficients (fixed effects)			
Intercept (γ_{00})	5.39 (0.23)***	6.04 (0.30)***	5.17 (0.42)***
Time (γ_{10})	-	-0.16 (0.04)***	-0.14 (0.05)***
Mental disorder status (γ_{01})	-	-	1.71 (0.59)**
Time*Mental disorder status (γ_{11})	-	-	-0.04 (0.08) ^{ns}
Variance components (random effects)			
Residual (σ^2)	6.57 (0.18)***	2.77 (0.08)***	2.77 (0.08)***
Intercept (τ_{00})	27.93 (1.78)***	42.86 (2.93)***	42.15 (2.89)***
Slope (τ_{11})	-	0.62 (0.05)***	0.62 (0.05)***
Covariance (τ_{01})	-	-2.75 (0.31)***	-2.73 (0.30)***
Model Summary			
-2 Log Likelihood	17,236.1	15,895.3	15,887.9
Number of estimated parameters	3	6	8

Note. Parameter estimate standard errors are listed in parentheses. ^{ns} non-significant, * $p < .05$, ** $p < .01$, *** $p < .001$.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Figure 9. Mental disorder status as a predictor of rate of change in DRAOR total scores.

Linear trend. Multilevel models were also examined using a variable with the squared value of time to examine whether a quadratic function would fit the data better than the linear function presented directly above. Similar trends in the quadratic models were found; however, fit indices indicated that the linear function was a better fit than the quadratic function. Quadratic results can be found in Table E1 in Appendix E.

Stable subscale. A three-level hierarchical model assessed the rate of change in offenders' stable risk over time and examined the effect of having a mental disorder diagnosis on this rate of change. Table 41 displays the model results specific to the Stable subscale.

Unconditional model. To assess the necessity of using multilevel models, the unconditional model provides information to calculate the intraclass correlation. In the

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

current data the ICC was equal to 0.83, indicating that 83% of the variability in Stable subscale scores occurred across offenders.²²

Modeling change over time. Model 2 presents the MLM regression model used to examine the degree to which offenders differed on their individual intercept (i.e., their estimated Stable subscale score when beginning supervision; γ_{00}) and slope (i.e., estimated changes in the Stable subscale score throughout their first year of supervision; γ_{10}). Results showed that, on average, offenders were assessed as having a Stable subscale score of 5.95 at release and the average rate of change was a decrease of 0.05 points per month of supervision.

The intercept (τ_{00}) and slope (τ_{11}) variance estimates were 6.67 and 0.08, respectively. The slope variance was significantly different from zero ($p < .001$), indicating that there was significant variation in the rate of change on Stable subscale scores between offenders on supervision. The standard deviation of the rate of change (i.e., the slope; $\sqrt{0.08}$) was 0.28). As such, assuming normally distributed slope residuals, 95% of offenders would be expected to have Stable subscale scores that changed between -0.63 and 0.47 points per month.²³ Similarly, if the intercept variance estimate is converted to standard deviation (i.e., $\sqrt{6.67} = 2.58$) and assuming normally distributed intercept residuals, 95% offenders would have a Stable subscale score between -0.71 and

²² ICC = $\tau_{00}/(\tau_{00} + \sigma^2) = 4.56/(0.91+4.56) = 0.83$.

²³ ± 1.96 standard deviations from the mean slope estimate; $-0.05 \pm 1.96(0.28) = -0.63$ and 0.47 .

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

12.61 at the start of supervision (although, in reality, a score of 12 is the upper limit of the Stable subscale).²⁴

Results showed that the level-1 residual variance decreased by 57.14% after adding the linear growth term.²⁵ The significant and negative intercept-slope covariance indicated that offenders with higher Stable subscale scores at release showed a greater decrease in stable risk over time.

Effect of mental disorder status. Model 3 includes an interaction between mental disorder status and time. This changes how the fixed effect parameters are interpreted. The intercept is now interpreted as the average Stable subscale score at release for offenders without a mental disorder diagnosis ($\gamma_{00} = 5.71, p < .001$). The slope is now the average change in non-disordered offenders' Stable subscale scores per month ($\gamma_{10} = -0.04, p < .05$), indicating a decrease in 0.04 points per month. The main effect of mental disorder status ($\gamma_{01} = 0.48, p < .05$) represents the mean difference in Stable subscale score at release for offenders with a mental disorder diagnosis compared to those without a mental disorder diagnosis (e.g., offenders without a mental disorder diagnosis score, on average, 5.71 at release and offenders with a mental disorder diagnosis score, on average 6.19 at release). Finally, the cross-level interaction coefficient ($\gamma_{11} = -0.01, p = .683$) represents the mean slope difference between offenders without a mental disorder diagnosis and offenders with a mental disorder diagnosis (e.g., offenders without a mental disorder experience an average decrease on the Stable subscale of 0.04 points and

²⁴ ± 1.96 standard deviations from the mean intercept estimate; $5.95 \pm 1.96(2.58) = -0.71$ and 12.61 .

²⁵ $PVR = (0.91 - 0.39) / 0.91 = 0.5714$

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

offenders with a mental disorder diagnosis experience an average decrease on the Stable subscale of 0.05 points). This non-significant interaction term indicates that, while offenders with a mental disorder diagnosis scored higher on the Stable subscale at release, their rate of change over the first year of supervision was essentially the same as offenders without a mental disorder diagnosis.

The correlation between the observed and predicted Stable subscale scores was 0.08781. Squaring this value indicates that 0.77% of the variation in Stable subscale scores can be explained by linear change, mental disorder status, and the interaction between the two variables. PVR statistics show that level-2 intercept variance decreased by 0.75% after adding mental disorder group membership and the interaction between time and mental disorder group membership into the level-2 model.²⁶ Level-2 slope variance did not decrease.²⁷

²⁶ $PVR = (6.67 - 6.62) / 6.67 = 0.0075$

²⁷ $PVR = (0.08 - 0.08) / 0.08 = 0$

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 41

Multilevel Model Summaries: Stable Subscale

Parameters	Model 1: Unconditional	Model 2: Adding Time	Model 3: Adding Mental Disorder Status
Regression coefficients (fixed effects)			
Intercept (γ_{00})	5.76 (0.09)***	5.95 (0.12)***	5.71 (0.17)***
Time (γ_{10})	-	-0.05 (0.02)***	-0.04 (0.02)*
Mental disorder status (γ_{01})	-	-	0.48 (0.23)*
Time*Mental disorder status (γ_{11})	-	-	-0.01 (0.03) ^{ns}
Variance components (random effects)			
Residual (σ^2)	0.91 (0.02)***	0.39 (0.01)***	0.39 (0.01)***
Intercept (τ_{00})	4.56 (0.29)***	6.67 (0.45)***	6.62 (0.45)***
Slope (τ_{11})	-	0.08 (0.01)***	0.08 (0.01)***
Covariance (τ_{01})	-	-0.39 (0.04)***	-0.39 (0.04)***
Model Summary			
-2 Log Likelihood	10,830.4	9,487.3	9,489.1
Number of estimated parameters	3	6	8

Note. Parameter estimate standard errors are listed in parentheses. ^{ns} non-significant, * $p < .05$, ** $p < .01$, *** $p < .001$.

Figure 10 illustrates the rate of change in Stable subscale scores for the first year of supervision for offenders with and without a mental disorder diagnosis.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Figure 10. Mental disorder status as a predictor of rate of change in Stable subscale scores.

Linear trend. Multilevel models were also examined using a variable with the squared value of time to examine whether a quadratic function would fit the data better than the linear function presented directly above. Similar trends in the quadratic models were found; however, fit indices indicated that the linear function was a better fit than the quadratic function. Quadratic results can be found in Table E2 in Appendix E.

Acute subscale. A three-level hierarchical model assessed the rate of change in offenders' acute risk over time and examined the effect of having a mental disorder diagnosis on this rate of change. Table 42 displays the model results specific to the Acute subscale.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Unconditional model. To assess the necessity of using multilevel models, the unconditional model provides information to calculate the intraclass correlation. In the current data the ICC was equal to 0.76, indicating that 76% of the variability in Acute subscale scores occurred across offenders.²⁸

Modeling change over time. Model 2 presents the MLM regression model used to examine the degree to which offenders differed on their individual intercept (i.e., their estimated Acute subscale score when beginning supervision; γ_{00}) and slope (i.e., changes in the estimated Acute subscale score throughout their first year of supervision; γ_{10}). Results showed that, on average, offenders were assessed as having an Acute subscale score of 6.32 at release and the average rate of change was a decrease in 0.07 points per month of supervision.

The intercept (τ_{00}) and slope (τ_{11}) variance estimates were 7.43 and 0.11, respectively. The slope variance was significantly different from zero ($p < .001$), indicating that there was significant variation in the rate of change on Acute subscale scores between offenders on supervision. The standard deviation of the rate of change (i.e., the slope; $\sqrt{0.11}$) was 0.33. As such, assuming normally distributed slope residuals, 95% of offenders would be expected to have Stable subscale scores that changed between -0.72 and 0.58 points per month.²⁹ Similarly, if the intercept variance estimate is converted to standard deviation (i.e., $\sqrt{7.43} = 2.73$) and assuming normally distributed intercept residuals, 95% offenders would be estimated to have an Acute subscale score

²⁸ ICC = $\tau_{00}/(\tau_{00} + \sigma^2) = 4.77/(1.47+4.7) = 0.76$.

²⁹ ± 1.96 standard deviations from the mean slope estimate; $-0.07 \pm 1.96(0.33) = -0.72$ and 0.58 .

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

between -1.12 and 13.76 at the start of supervision (although, in reality, a score of 0 is the lowest possible score on the Acute subscale).³⁰

Results show that level-1 residuals decreased by 48.30% after adding the linear growth term. The significant and negative intercept-slope covariance indicated that offenders with higher Acute subscale scores at release showed a greater decrease in acute risk over time.

Effect of mental disorder status. Model 3 includes an interaction between mental disorder status and time. This changes how the fixed effect parameters are interpreted. The intercept is now interpreted as the average Acute subscale score at release for offenders without a mental disorder diagnosis ($\gamma_{00} = 5.93, p < .001$). The slope is now the average change in non-disordered offenders' Acute subscale scores per month ($\gamma_{10} = -0.08, p < .01$), indicating a decrease in 0.08 points per month. The main effect of mental disorder status ($\gamma_{01} = 0.76, p < .01$) represents the mean difference in Acute subscale score at release for offenders with a mental disorder diagnosis compared to those without a mental disorder diagnosis (e.g., offenders without a mental disorder diagnosis score, on average, 5.93 at release and offenders with a mental disorder diagnosis score, on average 6.69 at release). Finally, the cross-level interaction coefficient ($\gamma_{11} = -0.01, p = .764$) represents the mean slope difference between offenders without a mental disorder diagnosis and offenders with a mental disorder diagnosis (e.g., offenders without a mental disorder experience an average decrease on the Acute subscale of 0.08 points and

³⁰ ± 1.96 standard deviations from the mean intercept estimate; $6.32 \pm 1.96(2.73) = -1.12$ and 13.76 .

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

offenders with a mental disorder diagnosis experience an average decrease on the Acute subscale of 0.07 points). This non-significant interaction term indicates that, while offenders with a mental disorder diagnosis scored higher on the Acute subscale at release, their rate of change over the first year of supervision was essentially the same as offenders without a mental disorder diagnosis.

The correlation between the observed and predicted Acute risk scores was 0.1755. Squaring this value indicates that 3.08% of the variation in Acute risk scores can be explained by linear change, mental disorder status, and the interaction between the two variables. PVR statistics show that level-2 intercept variance decreased by 1.88% after adding mental disorder group membership and the interaction between time and mental disorder group membership into the level-2 model.³¹ Level-2 slope variance did not decrease.³²

³¹ $PVR = (7.43 - 7.29) / 7.43 = 0.0188$

³² $PVR = (0.11 - 0.11) / 0.11 = 0$

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 42

Multilevel Model Summaries: Acute Subscale

Parameters	Model 1: Unconditional	Model 2: Adding Time	Model 3: Adding Mental Disorder Status
Regression coefficients (fixed effects)			
Intercept (γ_{00})	5.99 (0.10)***	6.32 (0.13)***	5.93 (0.18)***
Time (γ_{10})	-	-0.07 (0.02)***	-0.08 (0.02)**
Mental disorder status (γ_{01})	-	-	0.76 (0.25)**
Time*Mental disorder status (γ_{11})	-	-	0.01 (0.03) ^{ns}
Variance components (random effects)			
Residual (σ^2)	1.47 (0.04)***	0.76 (0.02)***	0.76 (0.02)***
Intercept (τ_{00})	4.77 (0.31)***	7.43 (0.53)***	7.29 (0.06)***
Slope (τ_{11})	-	0.11 (0.01)***	0.11 (0.01)***
Covariance (τ_{01})	-	-0.51 (0.06)***	-0.51 (0.06)***
Model Summary			
-2 Log Likelihood	12,189.6	11,231.4	11,221.5
Number of estimated parameters	3	6	8

Note. Parameter estimate standard errors are listed in parentheses. ^{ns} non-significant, * $p < .05$, ** $p < .01$, *** $p < .001$.

Figure 11 illustrates the rate of change in Acute subscale scores for the first year of supervision for offenders with and without a mental disorder diagnosis.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Figure 11. Mental disorder status as a predictor of rate of change in Acute subscale scores.

Linear trend. Multilevel models were also examined using a variable with the squared value of time to examine whether a quadratic function would fit the data better than the linear function presented directly above. Similar trends in the quadratic models were found; however, fit indices indicated that the linear function was a better fit than the quadratic function. Quadratic results can be found in Table E3 in Appendix E.

Protective Factors subscale. A three-level hierarchical model assessed the rate of change in offenders' protective factors over time and examined the effect of having a mental disorder diagnosis on this rate of change. Table 43 displays the model results specific to the Protective Factor subscale.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Unconditional model. To assess the necessity of using multilevel models, the unconditional model provides information to calculate the intraclass correlation. In the current data the ICC was equal to 0.85, indicating that 85% of the variability in Protective Factor subscale scores occurred across offenders.³³

Modeling change over time. Model 2 presents the MLM regression model used to examine the degree to which offenders differed on their individual intercept (i.e., their estimated Protective Factor subscale score when beginning supervision; γ_{00}) and slope (i.e., changes in the estimated Protective Factor subscale score throughout their first year of supervision; γ_{10}). Results showed that, on average, offenders were assessed as having a Protective Factor subscale score of 6.24 at release and the average rate of change was an increase in 0.03 points per month of supervision.

The intercept (τ_{00}) and slope (τ_{11}) variance estimates were 7.89 and 0.08, respectively. The slope variance was significantly different from zero ($p < .001$), indicating that there was significant variation in the rate of change on Protective Factor subscale scores between offenders on supervision. The standard deviation of the rate of change (i.e., the slope; $\sqrt{0.08}$) was 0.28. As such, assuming normally distributed slope residuals, 95% of offenders would be expected to have Protective Factor subscale scores that changed between -0.52 and 0.58 points per month.³⁴ Similarly, if the intercept variance estimate is converted to standard deviation (i.e., $\sqrt{7.89} = 2.81$) and assuming

³³ $ICC = \tau_{00}/(\tau_{00} + \sigma^2) = 5.15/(5.15+0.93) = 0.85$.

³⁴ ± 1.96 standard deviations from the mean slope estimate; $0.03 \pm 1.96(0.28) = -0.52$ and 0.58 .

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

normally distributed intercept residuals, 95% offenders would have a Protective Factor subscale score between 0.73 and 11.75 at the start of supervision.³⁵

Results show that level-1 residual variance decreased by 56.99% after adding the linear growth term. The significant and negative intercept-slope covariance indicated that offenders with lower Protective Factor subscale scores at release showed a greater increase in protective factors over time.

Effect of mental disorder status. Model 3 includes an interaction between mental disorder status and time. This changes how the fixed effect parameters are interpreted. The intercept is now interpreted as the average Protective Factor subscale score at release for offenders without a mental disorder diagnosis ($\gamma_{00} = 6.50, p < .001$). The slope is now the average change in non-disordered offenders' Protective Factor subscale scores per month ($\gamma_{10} = 0.01, p = .659$), indicating that Protective Factor subscale scores did not change over time. The main effect of mental disorder status ($\gamma_{01} = -0.52, p < .05$) represents the mean difference in Protective Factor subscale score at release for offenders with a mental disorder diagnosis compared to those without a mental disorder diagnosis (e.g., offenders without a mental disorder diagnosis score, on average, 6.50 at release and offenders with a mental disorder diagnosis score, on average 5.98 at release; indicating fewer protective factors). Finally, the cross-level interaction coefficient ($\gamma_{11} = 0.04, p = .137$) represents the mean slope difference between offenders without a mental disorder diagnosis and offenders with a mental disorder diagnosis (e.g., offenders without a

³⁵ ± 1.96 standard deviations from the mean intercept estimate; $6.24 \pm 1.96(2.81) = 0.73$ and 11.75 .

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

mental disorder experience an average increase on the Protective Factor subscale of 0.01 points and offenders with a mental disorder diagnosis experience an average decrease on the Protective Factor subscale of 0.05 points). This non-significant interaction term indicates that, while offenders with a mental disorder diagnosis scored lower on the Protective Factor subscale at release, their rate of change over the first year of supervision was, in essence, the same as offenders without a mental disorder diagnosis, not meaningfully changing.

The correlation between the observed and predicted Protective Factor scores was 0.0590. Squaring this value indicates that 0.35% of the variation in Protective Factor scores can be explained by linear change, mental disorder status, and the interaction between the two variables. PVR statistics show that level-2 intercept variance decreased by 0.63% after adding mental disorder group membership and the interaction between time and mental disorder group membership into the level-2 model.³⁶ Level-2 slope variance did not decrease.³⁷

³⁶ $PVR = (7.89 - 7.84) / 7.89 = 0.0063$

³⁷ $PVR = (0.08 - 0.08) / 0.08 = 0$

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 43

Multilevel Model Summaries: Protective Factors Subscale

Parameters	Model 1: Unconditional	Model 2: Adding Time	Model 3: Adding Mental Disorder Status
Regression coefficients (fixed effects)			
Intercept (γ_{00})	6.36 (0.10)***	6.24 (0.13)***	6.50 (0.18)***
Time (γ_{10})	-	0.03 (0.01)*	0.01 (0.02) ^{ns}
Mental disorder status (γ_{01})	-	-	-0.52 (0.25)*
Time*Mental disorder status (γ_{11})	-	-	0.04 (0.03) ^{ns}
Variance components (random effects)			
Residual (σ^2)	0.93 (0.03)***	0.40 (0.01)***	0.40 (0.01)***
Intercept (τ_{00})	5.15 (0.33)***	7.89 (0.53)***	7.84 (0.53)***
Slope (τ_{11})	-	0.08 (0.01)***	0.08 (0.01)***
Covariance (τ_{01})	-	-0.46 (0.05)***	-0.45 (0.05)***
Model Summary			
-2 Log Likelihood	10,943.7	9,634.3	9,636.6
Number of estimated parameters	3	6	8

Note. Parameter estimate standard errors are listed in parentheses. ^{ns} non-significant, * $p < .05$, ** $p < .01$, *** $p < .001$.

Figure 12 illustrates the rate of change in Protective Factor subscale scores for the first year of supervision for offenders with and without a mental disorder diagnosis.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Figure 12. Mental disorder status as a predictor of rate of change in Protective Factor subscale scores.

Linear trend. Multilevel models were also examined using a variable with the squared value of time to examine whether a quadratic function would fit the data better than the linear function presented directly above. Similar trends in the quadratic models were found; however, fit indices indicated that the linear function was a better fit than the quadratic function. Quadratic results can be found in Table E4 in Appendix E.

Risk Factor. A three-level hierarchical model assessed the rate of change in offenders' scores for the amalgamated risk factor (combining scores on the Acute and Stable subscales) over time and examined the effect of having a mental disorder diagnosis on this rate of change. Table 44 displays the model results specific to the Risk Factor score.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Unconditional model. To assess the necessity of using multilevel models, the unconditional model provides information to calculate the intraclass correlation. In the current data the ICC was equal to 0.80, indicating that 80% of the variability in Risk Factors scores occurred across offenders.³⁸

Modeling change over time. Model 2 presents the MLM regression model used to examine the degree to which offenders differed on their individual intercept (i.e., their estimated Risk Factor score when beginning supervision; γ_{00}) and slope (i.e., changes in the estimated Risk Factor score throughout their first year of supervision; γ_{10}). Results showed that, on average, offenders were assessed as having a Risk Factor score of 12.28 at release and the average rate of change was a decrease of 0.13 points per month of supervision.

The intercept (τ_{00}) and slope (τ_{11}) variance estimates were 22.87 and 0.33, respectively. The slope variance was significantly different from zero ($p < .001$), indicating that there was significant variation in the rate of change on Protective Factor subscale scores between offenders on supervision. The standard deviation of the rate of change (i.e., the slope; $\sqrt{0.33}$) was 0.57. As such, assuming normally distributed slope residuals, 95% of offenders would be expected to have Risk Factor scores that changed between -1.25 and 0.99 points per month.³⁹ Similarly, if the intercept variance estimate is converted to standard deviation (i.e., $\sqrt{22.87} = 4.78$) and assuming normally distributed

³⁸ ICC = $\tau_{00}/(\tau_{00} + \sigma^2) = 15.00/(15.00+3.72) = 0.80$.

³⁹ ± 1.96 standard deviations from the mean slope estimate; $-0.13 \pm 1.96(0.57) = -1.25$ and 0.99 .

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

intercept residuals, 95% offenders would have a Risk Factor score between 2.91 and 21.64 at the start of supervision.⁴⁰

Results showed that level-1 residual variance decreased by 55.38% after adding the linear growth term. The significant and negative intercept-slope covariance indicated that offenders with higher Risk Factor scores at release showed a greater decrease in risk over time.

Effect of mental disorder status. Model 3 includes an interaction between mental disorder status and time. This changes how the fixed effect parameters are interpreted. The intercept is now interpreted as the average Risk Factor score at release for offenders without a mental disorder diagnosis ($\gamma_{00} = 11.66, p < .001$). The slope is now the average change in non-disordered offenders' Risk Factor scores per month ($\gamma_{10} = -0.13, p < .01$). The main effect of mental disorder status ($\gamma_{01} = 1.20, p < .05$) represents the mean difference in Risk Factor score at release for offenders with a mental disorder diagnosis compared to those without a mental disorder diagnosis (e.g., offenders without a mental disorder diagnosis score, on average, 11.66 at release and offenders with a mental disorder diagnosis score, on average 12.86 at release; indicating greater risk). Finally, the cross-level interaction coefficient ($\gamma_{11} = 0.002, p = .968$) represents the mean slope difference between offenders without a mental disorder diagnosis and offenders with a mental disorder diagnosis (e.g., offenders without a mental disorder experience an average decrease on the Risk Factor of 0.13 points and offenders with a mental disorder

⁴⁰ ± 1.96 standard deviations from the mean intercept estimate; $12.28 \pm 1.96(4.78) = 2.91$ and 21.64 .

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

diagnosis experience an average decrease on the Risk Factor of 0.132 points). This non-significant interaction term indicated that, while offenders with a mental disorder diagnosis scored higher on the Risk Factor at release, their rate of change over the first year of supervision was essentially the same as offenders without a mental disorder diagnosis.

The correlation between the observed and predicted Risk Factor scores was 0.1459. Squaring this value indicates that 2.13% of the variation in Risk Factor scores can be explained by linear change, mental disorder status, and the interaction between the two variables. PVR statistics show that level-2 intercept variance decreased by 1.54% after adding mental disorder group membership and the interaction between time and mental disorder group membership into the level-2 model.⁴¹ Level-2 slope variance did not decrease.⁴²

⁴¹ $PVR = (22.87 - 22.52) / 22.87 = 0.0154$

⁴² $PVR = (0.33 - 0.33) / 0.3 = 0$

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 44

Multilevel Model Summaries: Risk Factor (Stable + Acute subscales)

Parameters	Model 1: Unconditional	Model 2: Adding Time	Model 3: Adding Mental Disorder Status
Regression coefficients (fixed effects)			
Intercept (γ_{00})	11.75 (0.17)***	12.28 (0.22)***	11.66 (0.31)***
Time (γ_{10})	-	-0.13 (0.03)***	-0.13 (0.04)**
Mental disorder status (γ_{01})	-	-	1.20 (0.43)**
Time*Mental disorder status (γ_{11})	-	-	0.002 (0.06) ^{ns}
Variance components (random effects)			
Residual (σ^2)	3.72 (0.10)***	1.65 (0.05)***	1.66 (0.05)***
Intercept (τ_{00})	15.00 (0.96)***	22.87 (1.58)***	22.53 (1.56)***
Slope (τ_{11})	-	0.33 (0.03)***	0.33 (0.03)***
Covariance (τ_{01})	-	-1.47 (0.17)***	-1.47 (0.17)***
Model Summary			
-2 Log Likelihood	15,341.8	14,104.6	14,097.1
Number of estimated parameters	3	6	8

Note. Parameter estimate standard errors are listed in parentheses. ^{ns} non-significant, * $p < .05$, ** $p < .01$, *** $p < .001$.

Figure 13 illustrates the rate of change in Risk Factor scores for the first year of supervision for offenders with and without a mental disorder diagnosis.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Figure 13. Mental disorder status as a predictor of rate of change in Risk Factor scores.

Linear trend. Multilevel models were also examined using a variable with the squared value of time to examine whether a quadratic function would fit the data better than the linear function presented directly above. Similar trends in the quadratic models were found; however, fit indices indicated that the linear function was a better fit than the quadratic function. Quadratic results can be found in Table E5 in Appendix E.

Summary. The results of the multilevel modelling indicated that, while offenders with a mental disorder were assessed as being higher risk at release than offenders without a mental disorder diagnosis, both groups experienced a similar statistically significant decrease in risk over their first year of supervision. The same cannot be said for protective factors. Offenders with a mental disorder diagnosis were assessed as having fewer protective factors at release compared to offenders without a mental disorder diagnosis; however, offenders did not experience any changes in their protective

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

factors over time. Notably, the PVR effect sizes showing very small decreases in level 2 intercept and slope variances indicate that there are likely other variables, other than mental disorder group membership, that can explain the remaining variance (e.g., static risk).

Change in Risk and Protective Factors in the Prediction of Recidivism

Hypothesis 10a: It is expected that changes in risk and protective factors will be significantly associated with recidivism outcomes.

Hypothesis 10b: It is expected that these results will not differ depending on whether offenders have a mental disorder diagnosis.

The current doctoral research examined whether changes in offender risk was predictive of recidivism outcomes. As previous MLM results showed that assessed protective factor levels did not meaningfully change over time, this subscale was not included in subsequent analyses.

Table 45 displays the rates of recidivism outcomes within the first year of supervision for offenders with and without a mental disorder diagnosis. Like that of the full sample (Table 4 in Study 1), nearly one-quarter of offenders experienced a violation of release conditions within the first year of supervision, with offenders with mental disorder diagnoses experiencing slightly higher rates of technical violations than offenders without mental disorder diagnoses (24.8% versus 21.3%, respectively). Rates of new criminal behaviour were lower, with approximately 14% of offenders with and without a mental disorder diagnosis experiencing a new charge. Finally, a composite

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

variable of any technical violation or any new charge, titled any recidivism, showed that nearly one-third of offenders experienced a recidivism outcome in the community.

Table 45

Prevalence Rates of Recidivism Outcomes by Mental Disorder Group Membership

	Offenders without a mental disorder (<i>N</i> = 268)	Offenders with a mental disorder (<i>N</i> = 274)
	% (<i>n</i>)	% (<i>n</i>)
Any recidivism	30.2 (81)	32.1 (88)
New charges	13.8 (37)	13.5 (37)
Technical violations	21.3 (57)	24.8 (68)

Note. The percentage of offenders who experienced new charges and technical violations are not mutually exclusive and, thus, will not sum to that who experienced any recidivism.

Changes in total DRAOR score. Table 46 displays the logistic regression results examining whether the MLM estimate intercepts (e.g., the predicted DRAOR score at the beginning of the supervision period) and slopes (e.g., the average rate of change on the DRAOR for every one-month of supervision) significantly predicted recidivism outcomes, as well as whether the ability of changes in risk propensities to predict recidivism outcomes differed depending on whether offenders had a mental disorder diagnosis. Results showed that a higher baseline DRAOR score was significantly associated with a higher risk of experiencing any recidivism and technical violations in the first year of supervision ($p = .002$ and $p = .001$, respectively). Further, changes in DRAOR total score were significantly associated with the risk of any recidivism and technical violations ($p = .007$ and $p = .014$, respectively); but, this did not differ depending on whether the offender had a mental disorder diagnosis ($p = .203$ and $p =$

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

.474, respectively). Interestingly, neither the baseline DRAOR total score nor changes in the DRAOR total score were significantly associated with the likelihood of experiencing a new charge in the first year of supervision.

Table 46

Association Between DRAOR Total Score MLM Parameter Estimates and Recidivism Outcomes

Parameters	β (SE)	Wald χ^2	<i>p</i>
Any recidivism			
Intercept	-1.05 (0.13)	61.88	<.001
Estimated baseline score	0.06 (0.02)	9.76	.002
Estimated rate of change	0.45 (0.17)	7.37	.007
Estimated rate of change * mental disorder status	0.18 (0.14)	1.62	.203
New charges			
Intercept	-1.93 (0.17)	124.89	<.001
Estimated baseline score	0.02 (0.02)	0.48	.486
Estimated rate of change	0.08 (0.22)	0.12	.726
Estimated rate of change * mental disorder status	0.25 (0.18)	1.87	.172
Technical violations			
Intercept	-1.51 (0.15)	99.88	<.001
Estimated baseline score	0.06 (0.02)	10.36	.001
Estimated rate of change	0.44 (0.18)	6.02	.014
Estimated rate of change * mental disorder status	0.11 (0.15)	0.51	.474

To illustrate the association between changes in DRAOR total scores and recidivism outcomes, the average predicted probability of recidivism outcomes for

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

various DRAOR change scores are displayed in Figure 14. A value of zero on the horizontal axis represents no DRAOR change over time. This figure clearly shows that offenders with negative change values (e.g., indicating a decrease in risk over time) have a lower average probability of experiencing any recidivism or technical violations, but as change scores increase into positive change values (e.g., indicating an increase in risk over time), offenders have increasingly higher average probabilities of experiencing any recidivism or technical violations. Further, one can see that the predicted probability of experiencing a new charge remains relatively constant across all DRAOR change scores.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Figure 14. Mean predicted probability of recidivism outcomes across DRAOR change scores

Note. Combined predicted probabilities of recidivism outcomes for offenders with and without a mental disorder diagnosis are presented as the logistic regression interaction was non-significant. It is also important to note that change scores with no data presented (e.g., 1.9, 2.5, etc.) are not indicating that these change scores have a mean predicted probability of recidivism outcomes of zero but are blank as no offenders had these change scores.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Changes in Stable subscale score. Higher baseline Stable subscale scores ($p = .004$) and greater positive change scores (e.g., being assessed as higher risk over time; $p = .041$) were significantly associated with higher risks of experiencing any recidivism (see Table 47). Interestingly, the ability of changes in stable risk to predict any recidivism depended on offenders' mental disorder status ($p = .049$). To illustrate this interaction, the average predicted probability of experiencing any recidivism for various Stable subscale change scores are presented in Figure 15. The ability of stable risk change scores to predict any recidivism was only apparent for offenders with a mental disorder diagnosis, as evidenced by the gradual increase in the predicted recidivism rates for offenders who had greater, thus riskier, change scores.

Comparatively, while neither the baseline assessment nor changes in stable risk over time were significantly associated with new charges, they were significantly associated with technical violations. Higher baseline Stable subscale assessments were associated with a higher likelihood of violating the conditions of one's release ($p = .010$). Further, changes in stable risk were significantly associated with technical violations ($p = .049$) and this did not differ by mental disorder status ($p = .090$). Figure 16 displays the average predicted probabilities of experiencing new charges and technical violations for various Stable subscale scores, combining across mental disorder status. The predicted probability of experiencing new charges remains relatively constant across all Stable subscale change scores, while change scores that indicated an elevation in risk is associated with higher average predicted technical violation rates.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 47

Association Between Stable Subscale MLM Parameter Estimates and Recidivism Outcomes

Parameters	β (SE)	Wald χ^2	p
Any recidivism			
Intercept	-1.51 (0.27)	30.79	<.001
Estimated baseline score	0.13 (0.04)	8.30	.004
Estimated rate of change	0.90 (0.44)	4.16	.041
Estimated rate of change * mental disorder status	0.75 (0.38)	3.87	.049
New charges			
Intercept	-2.16 (0.36)	36.80	<.001
Estimated baseline score	0.05 (0.06)	0.81	.369
Estimated rate of change	0.003 (0.57)	0.00	.996
Estimated rate of change * mental disorder status	0.67 (0.49)	1.89	.169
Technical violations			
Intercept	-1.92 (0.30)	40.27	<.001
Estimated baseline score	0.13 (0.05)	6.73	.010
Estimated rate of change	0.95 (0.48)	3.86	.049
Estimated rate of change * mental disorder status	0.70 (0.42)	2.87	.090

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Figure 15. Mean predicted probability of any recidivism across Stable subscales change scores by mental disorder status

Note. Change scores with no data presented (e.g., -1.1) are not indicating that these change scores have a mean predicted probability of recidivism outcomes of zero but are blank as no offenders had these change scores. The change in the Stable subscale score value of -1.3 was based on one offender.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Figure 16. Mean predicted probability of new charges and technical violations across Stable subscale change scores

Note. Combined predicted probabilities of recidivism outcomes for offenders with and without a mental disorder diagnosis are presented as the logistic regression interaction was non-significant. It is also important to note that change scores with no data presented (e.g., -1.1) are not indicating that these change scores have a mean predicted probability of recidivism outcomes of zero but are blank as no offenders had these change scores. The change in the Stable subscale score value of -1.3 was based on one offender.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Changes in Acute subscale scores. As shown in Table 48, a higher baseline Acute subscale score was significantly associated with a higher risk of experiencing any recidivism and technical violations in the first year of supervision ($p = .001$ and $p < .001$, respectively). Further, changes in acute risk were significantly associated with the risk of any recidivism and technical violations ($p = .002$ for each) and this did not differ depending on whether the offender had a mental disorder diagnosis ($p = .793$ and $p = .822$, respectively). Neither the baseline Acute subscale score nor changes in acute risk were significantly associated with the likelihood of experiencing a new charge in the first year of supervision.

Figure 14 illustrates the association between changes in acute risk and recidivism outcomes. Results show that, while the average predicted probabilities of experiencing a new charge remain relatively constant across all Acute subscale change scores, individuals who are assessed as having lower acute risk over time (e.g., those with increasingly negative change scores) were less likely to be charged with a new crime compared to those who are assessed as having higher acute risk over time (e.g., those with increasingly positive change scores).

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 48

Association Between Acute Subscale MLM Parameter Estimates and Recidivism Outcomes

Parameters	β (SE)	Wald χ^2	p
Any recidivism			
Intercept	-1.55 (0.27)	32.53	<.001
Estimated baseline score	0.14 (0.04)	10.29	.001
Estimated rate of change	1.23 (0.39)	0.80	.002
Estimated rate of change * mental disorder status	0.09 (0.33)	0.07	.793
New charges			
Intercept	-1.89 (0.35)	29.46	<.001
Estimated baseline score	0.01 (0.06)	0.01	.905
Estimated rate of change	0.08 (0.52)	0.03	.873
Estimated rate of change * mental disorder status	0.54 (0.44)	1.55	.213
Technical violations			
Intercept	-2.30 (0.31)	54.37	<.001
Estimated baseline score	0.19 (0.05)	15.81	<.001
Estimated rate of change	1.37 (0.43)	9.86	.002
Estimated rate of change * mental disorder status	-0.08 (0.36)	0.05	.822

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Figure 17. Mean predicted probability of recidivism outcomes across Acute subscale change scores

Note. Combined predicted probabilities of recidivism outcomes for offenders with and without a mental disorder diagnosis are presented as the logistic regression interaction was non-significant.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Changes in Risk Factor scores. Finally, the association between the amalgamated Risk Factor (e.g., the risk score that combines Stable and Acute subscale scores) MLM estimates and recidivism outcomes are displayed in Table 49. Results showed that a higher baseline Risk Factor score was significantly associated with a higher risk of experiencing any recidivism and technical violations in the first year of supervision ($p = .001$ and $p < .001$, respectively). Further, changes in risk were significantly related with the risk of any recidivism and technical violations ($p = .004$ and $p = .005$, respectively) and this association did not differ depending on whether the offender had a mental disorder diagnosis ($p = .246$ and $p = .461$, respectively). Neither the baseline Risk Factor score ($p = .581$) nor changes in risk ($p = .936$) were significantly associated with the likelihood of experiencing a new charge in the first year of supervision.

To illustrate the association between changes in Risk Factor scores and recidivism outcomes, the average predicted probability of recidivism outcomes for various Risk Factor change scores are displayed in Figure 18. While the average predicted probabilities of experiencing a new charge remain relatively constant across all change scores, individuals who were assessed to decrease in risk (e.g., those with increasingly negative change scores) were less likely to violate the conditions of their release compared to those who were assessed to increase in risk (e.g., those with increasingly positive change scores).

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table 49

Association Between Amalgamated Risk Factor (Stable and Acute) MLM Parameter Estimates and Recidivism Outcomes

Parameters	β (SE)	Wald χ^2	p
Any recidivism			
Intercept	-1.70 (0.30)	32.02	<.001
MLM intercept	0.08 (0.02)	11.22	.001
MLM slope	0.64 (0.23)	8.16	.004
MLM slope * mental disorder status	0.22 (0.19)	1.35	.246
New charges			
Intercept	-2.06 (0.38)	28.66	<.001
MLM intercept	0.02 (0.03)	0.29	.589
MLM Change score	0.02 (0.29)	0.01	.936
MLM Change score * mental disorder status	0.35 (0.25)	1.96	.161
Technical violations			
Intercept	-2.32 (0.34)	46.64	<.001
MLM intercept	0.10 (0.03)	13.24	<.001
MLM Change score	0.70 (0.25)	7.83	.005
MLM Change score * mental disorder status	0.15 (0.21)	0.54	.461

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Figure 18. Mean predicted probability of recidivism outcomes across Risk Factor change scores

Note. Combined predicted probabilities of recidivism outcomes for offenders with and without a mental disorder diagnosis are presented as the logistic regression interaction was non-significant. It is also important to note that change scores with no data presented (e.g., -1.5, 1.3) are not indicating that these change scores have a mean predicted probability of recidivism outcomes of zero but are blank as no offenders had these change scores.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Summary. While DRAOR change scores were not significantly associated an increased likelihood of offenders receiving new charges, in general, they were significantly associated with an increased likelihood of offenders violating the conditions of their release. The ability of changes in risk to predict recidivism was generally the same regardless of whether an offender had a mental disorder diagnosis. The one exception, however, was changes in the Stable subscale score only predicted any recidivism for offenders with a mental disorder diagnosis.

Study 3b Summary

Together, Study 3b findings illustrate the partial utility of assessing dynamic risk factors over time. Results showed that offenders' levels of dynamic risk, although not their protective factors, were assessed to change over the course of their first year of supervision. This rate of range was comparable regardless of whether offenders were assessed as having a mental disorder diagnosis. Further, results showed that DRAOR change scores were significantly predictive of future violations of release conditions, but not of new criminal behaviour. Again, results were generally the same for offenders with a mental disorder diagnosis and those without a mental disorder diagnosis.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Chapter 10: General Discussion

Given the disproportionate number of offenders diagnosed with mental disorders and the extant literature revealing the widespread challenges they face, better understanding their experiences with the criminal justice system is essential to ensure they are managed, and treated, appropriately. This doctoral research marks the first examination of the utility of the DRAOR for use with persons with mental disorders and raises important implications for correctional jurisdictions and several areas for further study.

Summary of Results

Study 1 began with an examination of whether the presence of a mental disorder diagnosis on file was significantly associated with several recidivism outcomes. Results showed that the presence of a mental disorder diagnosis was not associated with an increased likelihood of offenders violating the conditions of their release nor new criminal behaviour, as assessed by receiving new criminal charges. Further analyses examined the type of technical violations and new charges experienced and found no differences between offenders with a mental disorder and offenders without a mental disorder.

Study 2 set out to assess the utility of using baseline DRAOR assessments as a meaningful case management tool for assessing offender risk and protective factors for those with a diagnosed mental disorder. An examination of the psychometric properties of the DRAOR noted no issues that would discourage its use with offenders with mental disorder diagnoses. Multi-group measurement invariance analysis found that both factor

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

loadings and item thresholds were invariant across mental disorder group membership, providing support for the assessment of group differences. Further, the DRAOR subscales generally had acceptable internal consistency and were significantly correlated with static risk scores. There were no substantial differences in the psychometric properties of the DRAOR between offenders who did or did not have a mental disorder diagnosis.

While Study 1 found that offenders had similar rates of recidivism outcomes regardless of their mental disorder status, Study 2 found that offenders with mental disorder diagnoses were assessed as having significantly higher levels of dynamic risk and significantly lower levels of protective factors. This was the first indication that the DRAOR may not function similarly for offenders with and without mental disorder diagnoses, as one would expect that groups who have similar recidivism rates would be assessed as having similar levels of risk. This notion was further exacerbated when analyses examined the predictive validity of the DRAOR for several recidivism outcomes (e.g., new charges, technical violations, and any recidivism). While the DRAOR was able to discriminate between non-disordered recidivists and non-recidivists with moderate predictive accuracy, the same was not found for offenders with mental disorder diagnoses. The DRAOR was only able to weakly discriminate between offenders with mental disorders who did and did not violate the conditions of their release. Although caution should be applied due to the small number of offenders who were assessed as having very low and very high DRAOR scores, calibration analyses found that the DRAOR may be under-classifying lower-scoring offenders with a mental disorder diagnosis (i.e., assessing them at lower risk than their outcomes suggest are accurate) and

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

over-classifying higher-scoring offenders with mental disorders (i.e., assessing them at higher risk than their outcomes suggest are accurate). It is clear from these results that probation/parole officers should be cautious when using the DRAOR with offenders who have a mental disorder diagnosis.

Study 2 also found that assessments of offenders' current mental health status, particularly for those experiencing more acute mental health-related problems, augmented the DRAOR's ability to predict technical violations, although not new charges. Specifically, the odds of violating release conditions for offenders with a mental disorder diagnosis on file were 27.5% higher for offenders with definite ongoing mental health-related problems and 44.9% lower for offenders with slight/possible ongoing mental health-related problems compared to those offenders with no ongoing problems at the time of the first DRAOR assessment. Those assessed as having definite ongoing mental health-related problems more frequently violated conditions relating to substance misuse and treatment adherence than other groups.

Finally, Study 3a and 3b focused on the utility of assessing changes in offenders' risk and protective factors over the first year of supervision. Study 3a focused on the psychometric properties of the DRAOR over three time points. Results showed that there was measurement invariance of the factor structure over time, a prerequisite for assessing offender change over time. Longitudinal measurement equivalence ensures any changes in observed risk scores are due to true intra-individual changes rather than measurement error. While the Acute subscale had low internal consistency, unsurprising given previous DRAOR research (e.g., Chadwick, 2015) and the nature of acute risk, there were no other concerns related to the psychometric properties of the DRAOR over time.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Study 3b went on to assess whether offenders experience changes in risk and protective factors and, if so, whether these changes differ depending on whether an offender has a diagnosed mental disorder. Results indicated that offenders' levels of dynamic risk, but not protective factors, changed over the course of the first year of supervision and this rate of change was comparable regardless of whether offenders were diagnosed with a mental disorder.

Subsequent analysis found partial predictive utility of reassessing dynamic risk factors over time. While DRAOR change scores significantly predicted future technical violations, they did not predict new charges. Results were generally comparable for offenders with a mental disorder diagnosis and those without a mental disorder diagnosis.

The current findings parallel and differ from previous DRAOR-specific research in some interesting ways. The confirmation of the two-factor model found by Chadwick (2015) using Iowa data reinforces the concept that the protective factor subscale represents a distinct latent construct from dynamic criminal risk. This supports both the theoretical underpinnings of the DRAOR (Serin, Lloyd & Hanby, 2010) and extant literature that posits that protective factors are not simply the inverse of risk, but rather unique information that may be important for risk prediction and case management purposes (Serin, Chadwick, & Lloyd, 2016).

Further, disaggregating the discrimination analyses by mental disorder group membership may provide an explanation for why the discrimination of the DRAOR in predicting reoffences has been historically poor in the state of Iowa following the initial pilot (Serin, Chadwick & Prell, in preparation). While the DRAOR was unable to

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

discriminate between those with a mental disorder diagnosis who did or did not garner a new charge while on release (AUCs ranging from 0.49 to 0.53), it had relatively good discrimination with those who did not have a mental disorder diagnosis (AUCs ranging from 0.62 to 0.67). Chadwick (2015) examined the discrimination of the DRAOR for general offenders, not making any distinctions regarding mental disorder group membership, and found it did not discriminate for reoffences (AUCs ranging from 0.51 to 0.56). These findings highlight the need to validate assessment tools on offender sub-populations of interest – improved predictive accuracy may have been found by Chadwick by disaggregating results by offender characteristics. Notably, discrimination results have historically been stronger with offender samples from New Zealand (e.g., Ferguson, 2015; Hanby, 2013). By specifically examining different jurisdictions and offender sub-populations, correctional agencies can have confidence that the assessment tools in use are relevant to all offenders under their jurisdiction, or, if predictive validity is not found for all/some offenders, can stimulate further research to determine the most appropriate way to assess criminal risk.

Implications of Research

It was anticipated that the findings of this research would contribute to our understanding of the relationship between mental disorder and crime by assessing the applicability of the psychopathological theories of criminal behaviour and the GPCSL theory of criminal behaviour. Support for psychopathological theories of criminal behaviour would be demonstrated through: (1) the presence of a mental disorder diagnosis increasing one's likelihood of recidivism; (2) DRAOR scores not predicting recidivism outcomes for those with a mental disorder diagnosis on file; and (3) clinically

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

relevant information augmenting the prediction of recidivism outcomes. Comparatively, support for the GPCSL approach would be substantiated by: (1) the presence of a mental disorder diagnosis not increasing one's likelihood of recidivism; (2) DRAOR scores would be predictive of recidivism for those with a mental disorder diagnosis; and (3) clinically-relevant information would not enhance the prediction of recidivism outcomes. While the GPCSL approach appeared to be largely relevant for offenders without mental disorder diagnoses, as evidenced by the predictive validity of the DRAOR in predicting technical violations and new charges, clearly, neither of these theoretical perspectives were wholly supported based on the current findings for those with a mental disorder diagnosis. That said, there are still important implications regarding our understanding of mental illness, crime, and community supervision strategies for offenders with mental disorder diagnoses.

Relationship between the presence of a mental disorder diagnosis and recidivism outcomes. The results of the current research studies indicate that the presence of a mental disorder diagnosis does not make someone more likely to fail while on supervision. Consequently, parole/probation officers should not necessarily view clients with a mental disorder diagnosis on file as being riskier than those who do not. That said, offenders with a mental disorder diagnosis who, at their first DRAOR assessment, were experiencing slight/possible ongoing mental health-related problems (i.e., those who had some mental health issues, but meet the demands of daily living; those stabilized on prescribed medication; those involved in beneficial therapy) were significantly *less* likely to violate the conditions of their release compared to those with no ongoing problems. Comparatively, offenders with a mental disorder diagnosis on file

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

who were experiencing definite ongoing mental health-related problems (i.e., those whose mental health issues interfere with daily living; those who may be taking medication or attending therapy but who are not stabilized or it is not effective; those who are refusing to take medication as prescribed) were significantly *more* likely to violate the conditions of their release compared to those with no ongoing problems.⁴³

While it is not possible to know the reasons for these results with certainty, criminal justice scholars (e.g., Porporino & Motiuk, 1995; Skeem & Enno Louden, 2005; Skeem et al., 2014) have hypothesized various explanations.

An offender's mental disorder may directly affect their likelihood to fail in the community. For example, offenders with a substance use disorder (either alone or concurrently with another diagnosis) would be at increased risk of violating any substance use condition imposed on their release.⁴⁴ Further, if mental disorder symptoms are severe enough to cause a significant functional impairment in an individual, they may be unable to manage the day-to-day commitments associated with their supervision requirements (e.g., their ability to attend supervision meetings or treatment/program appointments). While it would have been informative to examine the specific mental disorder diagnoses associated with community failures, it seems reasonable to

⁴³ These results are somewhat at odds with the meta-analytic research completed by Bonta and associates (1998; 2014) where the majority of clinical factors were not found to be associated with recidivism outcomes. The only clinical factors associated with an increased risk of recidivism was the presence of antisocial personality disorder and psychopathy. It is important to note, however, that the work by Bonta and associates was focused on general and violent recidivism, while the current research found an incremental association with technical violations only. This likely suggests that clinical factors may be particularly important in predicting community reintegration indicators other than criminal behaviour.

⁴⁴ Offenders with a substance use disorder would also be more likely to have a related release condition imposed on them.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

hypothesize that, for some individuals on supervision in the state of Iowa, the presence of ongoing mental disorder symptoms may be directly affecting offenders' behaviour in the community. While the current research studies were not set up to determine causality, results did show that offenders experiencing more severe mental health symptomology, operationalized by a noticeable inability to function in daily living, were more likely to violate a substance use condition and/or the condition related to being terminated or fail to participate in treatment. If true, addressing mental disorder-related problems so that offenders are better able to function in daily living as well as cope with substance use cravings, in addition to focusing on traditional areas of risk, should decrease the likelihood of offenders violating their supervision conditions.

The perceptions of and supervision strategies used by parole officers could also provide an explanation of the current findings. Extant literature has found that criminal justice professionals, including parole officers, may be more cautious or may allow negative bias to affect their perceptions of and supervision strategies used with clients experiencing ongoing mental disorder symptoms (Eno Louden et al., 2018; Porporino & Motiuk, 1995; Skeem et al., 2014). Research specific to parole officers has found that they perceive offenders with mental disorders as challenging to supervise (Van Deinse et al., 2018), riskier (Eno Louden & Skeem, 2013), and react more severely to parole condition violations (Eno Louden et al., 2018). Negative perceptions of persons with mental disorder, coupled with the fact that many agencies do not have formal guidelines for addressing technical violations (Eno Louden, Skeem, Camp, & Christensen, 2008), could indicate that parole officers in Iowa may find it particularly difficult to manage the risk of this sub-group, are reacting in a more punitive manner to clients' behaviour, and

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

are more likely to record technical violations for those offenders with more severe ongoing mental health problems. If true, additional parole officer training to clarify the role of mental illness in criminal behaviour would be beneficial.

High rate of technical violations. As somewhat of an aside, it is interesting to note that releasees experienced technical violations at a rate of 46.6% higher than new charges (23.6% violated the conditions of their release versus 16.1% received a new charge). Increasingly, criminal justice experts are expressing concerns about the high number of prison admissions that are occurring, not for criminal behaviour, but for supervision violations (Council of State Governments, 2018; Travis, 2001; Travis & Stacey, 2010). Recent examinations have shown that 45% of American state prison admissions were due to technical violations of probation or parole; in the state of Iowa, this is 22% (Council of State Governments, 2018). As probation and parole are seen as methods of reducing the over-population of prisons and assisting in (re)integration of offenders into the community, these high rates of technical violations raise broader questions about the role of release conditions, the overuse of release conditions, and the efficacy of community supervision strategies.

Utility of the DRAOR with persons with mental disorder. While the DRAOR had moderate predictive accuracy for offenders without a mental disorder diagnosis, it did not function as well for offenders with a mental disorder diagnosis. As meta-analytic research by Bonta and colleagues (1998; 2014) has reinforced the relevance of general risk factors for offenders diagnosed with mental disorder, this may point to the notion that the risk and protective factors measured by the DRAOR are still relevant for this sub-population, but parole officers may not be appropriately considering these factors and

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

producing quality assessments. Evidence shows that the negative perceptions of individuals with mental disorders found in the public (e.g., Angermeyer & Dietrich, 2006) also exist within criminal justice professionals (Batastini et al., 2017; Eno Louden & Skeem, 2013; Eno Louden et al., 2018; Van Deirse et al., 2018). As the current research found that parole officers assessed offenders with a mental disorder diagnosis as being higher risk compared to their non-disordered counterparts, even though they had similar recidivism rates, it is reasonable to hypothesize that parole officers may be allowing other considerations to affect their judgements of offender risk.⁴⁵ The Iowa Department of Corrections may want to organize additional risk assessment training to reinforce the importance of considering risk-relevant information in their interactions with clients.

In view of offenders' current mental health status being important to the prediction of technical violations, there may be other areas of offenders' lives that are relevant to assess for those with a mental disorder diagnosis. Assessment tools developed specifically for individuals with mental disorders (e.g., the START) often include detailed items specific to an individual's mental wellness (e.g., mental state, emotional state, medication adherence). It is possible that creating a more detailed supplementary assessment tool to accompany the DRAOR would augment parole officers'

⁴⁵ It is important to recognize, however, that not all supervision officers may have signed the confidentiality agreement that would allow them to access clients' medical records and were, therefore, not aware of the mental disorder diagnosis(es) on file. It is not known what proportion of staff did or did not know the medical records of the offenders under their supervision.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

understanding of offenders' likelihoods of success and failure in the community, without losing the benefits of using the DRAOR as a case management/planning tool.

Regardless of the reasons for the inability of the DRAOR to consistently and strongly predict recidivism outcomes for offenders with mental disorder diagnoses, these results indicate that parole officers should exercise caution in relying too heavily on the specific DRAOR scores. Given the disproportionate involvement of individuals with mental disorders within the criminal justice system, specialized models of interventions have been implemented at several key points to divert and/or support these individuals (Council of State Governments, 2002; Michalski, 2017; Skeem, Manchak, & Peterson, 2011). The state of Iowa and the Iowa Department of Corrections may want to consider the potential relevance of exploring these options to augment their current practices.

Mental health treatment programs. Once an offender with mental illness has been incarcerated, there are typically efforts made by the correctional agency to treat their mental health symptoms – with the hope of improving reintegration and public safety outcomes. While historical treatment models for individuals with mental illness have focused on providing appropriate psychiatric care, research has shown that, while this approach can reduce mental health symptoms, it often has little effect on criminal justice outcomes (Calsyn, Yonker, Lemming, Morse, & Klinkenberg, 2005; Morgan, Scanlan, & Van Horn, 2019; Morrissey, Meyer, & Cuddeback, 2007). Increasingly, there have been calls to not just treat mental illness, but to simultaneously target the criminogenic needs of justice-involved individuals with mental illness (Hodgins et al., 2008; Morgan, Flora, Kroner, Mills, Varghese, & Steffan, 2011; Morgan, Kroner, Mills, Bauer, & Serna, 2014).

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

One such program, *Changing Lives and Changing Outcomes: A Therapeutic Program for Justice Involved Persons with Mental Illness*, developed by Morgan and colleagues (2018) does just that. This holistic treatment program addresses issues with criminal orientation (e.g., criminal awareness, antisocial thoughts and attitudes) and mental illness (e.g., medication adherence, coping with mental illness) in an effort to improve psychiatric and criminal justice outcomes. Evaluations into the program's efficacy has shown that program completers were found to be more engaged in program sessions and retained more program content than non-completers (Morgan et al., 2014; Van Horn et al., 2019). Further, program completers showed improvements in both psychological distress indicators (e.g., symptoms distress, depression, anxiety, psychoticism, etc.) and reactive criminal thinking upon program completion (Gaspar et al., 2019; Morgan et al., 2014). While these preliminary results are quite promising, continued efforts should be made to replicate these findings with larger groups and examine program impacts on recidivism outcomes.

Specialized community supervision. Finally, once an offender has served their custodial sentence, or if they were sentenced to probation, there may be specialized community supervision practices that take into account their mental health concerns (Dirks-Linhorst & Linhorst, 2012; Skeem & Eno Loudon, 2006; Skeem, Manchak, & Montoya, 2017). Speciality community supervision is often distinguished from traditional supervision with small caseloads (often less than 50 individuals assigned to each supervision officer), in-depth mental health training provided to supervision officers, supervision officers being directly in contact and involved in the offenders' mental health treatment, and collective problem-solving (Skeem et al., 2017). Through these methods,

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

community supervision officers must serve dual roles: security enforcers and social workers (Skeem, et al., 2017).

There has been little research to examine the utility of specialized community supervision; however, Skeem and colleagues (2017) compared the efficacy of specialty mental health probation with traditional probation for 359 offenders with serious mental illness, matched on age, sex, race, offence type, and probation types. Results showed that, while speciality probationers were just as likely to be violent (Odds ratio (OR) = 0.97, 95% CI = 0.69 – 1.36), offenders in traditional probation were nearly three times more likely to experience arrest within two years compared to those in specialty probation (OR = 2.68, 85% CI = 1.86 – 3.84).

Other research has found that speciality community supervision officers spend more time with their clients, focusing on mental health-related concerns and are supportive in their interactions with clients, with these probationers more fully participating in their mental health treatment programs compared to traditional probation methods (Eno Loudon et al., 2008; Eno Loudon, Skeem, Camp, Vidal, & Peterson, 2012; Manchak, Skeem, Kennealy, & Loudon, 2014). Further, specially trained probation and parole officers have been found to more strongly believe that supervision strategies for offenders with mental illness are most effective when they combine components of reducing offender risk, developing offender strengths, and addressing mental disorder symptoms (Matejkowski, Severson, & Manthey, 2015).

Many of the characteristics of specialty community supervision have also been increasingly seen as important in the supervision of all offenders, not just those with

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

mental illness (Kennealy, Skeem, Manchak, & Eno Loudon, 2012). Core Correctional Practice (CCP) principles, such as developing high-quality rapports with offenders (e.g., respectful, considerate, and encouraging self-sufficiency), using high-quality interpersonal skills (e.g., modeling prosocial attitudes and behaviour, assisting in the development of problem-solving skills), and serving both as a therapeutic agent and law enforcement presence (Andrews, 2011), parallel many of the features of specialty community supervision methods.

While the vast majority of the research pertaining to CCP has focused on its utility in correctional treatment programs (Dowden & Andrews, 2004), there has been increasing research assessing its use in the community supervision context (Kennealy et al., 2012; Paparozzi & Gendreau, 2005; Skeem, Eno Loudon, Polaschek, & Camp, 2007). Research with both disordered (Skeem et al., 2007) and non-disordered offenders (Kennealy et al., 2012; Paparozzi & Gendreau, 2005) has found that the quality of the officer-offender relationship has an important impact on offender outcomes. Paparozzi and Gendreau (2005), for example, assessed the supervision orientation of 12 parole officers, supervising 240 high-risk/high-need parolees, and found that offenders being supervised by officers with a balanced orientation were two to three times less likely to experience a revocation (19%) than those supervised by officers with a law enforcement (59%) or social work (38%) orientation. These results emphasize the importance of *how* offenders are supervised in the community.

Repeat assessments of dynamic risk. While offenders were assessed to change on their levels of dynamic risk over time, this change was small (e.g., an average reduction of 0.16 total DRAOR points per month of supervision) and Protective Factor

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

subscale scores did not show any meaningful change over the first year of parole supervision. As previous research, using data temporally close to when the DRAOR was first implemented in Iowa, found that the majority of offenders assessed with the DRAOR experienced raw change in dynamic risk and protective factors and change scores improved the prediction of recidivism (Chadwick, Serin, & Lloyd, 2015), the absence of substantial change in the current data may be due to a degradation in assessment fidelity and staff engagement in using the tool over time. These findings highlight ongoing concerns in the fidelity of DRAOR assessments in the Iowa Department of Corrections, as it seems improbable that offenders would experience so little change in dynamic risk and protective factors assuming quality community supervision.

Upon further consideration, this may be due, in part, to the way DRAOR assessments are completed in the state of Iowa. The previous DRAOR assessment for each offender is auto populated within the electronic system so that the parole officer just records any changes that have occurred since the last contact with the offender (R. C. Serin, personal communication, December 30, 2019). Parole officers have historically objected to the overwhelming amount of administrative and record-keeping responsibilities imposed on them by senior management (Lynch, 1998; Viglione, Rudes, & Taxman, 2015). A benefit of having the electronic administrative system auto populate the previous assessments' results is the reduction in administrative burden on the parole officer; however, it also could decrease the amount of case analysis completed (e.g., they just have to review the previous assessment and decide whether the offender has changed in any of the items). It would be understandable that scores determined in this manner

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

would evidence less change than if parole officers had to completely analyze their clients' circumstances at each contact. Indeed, staff at the Iowa Department of Corrections have reviewed the assessments of offenders who experience sentinel events under community supervision (e.g., violently reoffend) and have noted a lack of credible analysis resulting in poor fidelity of measurement (S. Kreamer, personal communication, February 3, 2020). Additional research to examine the inter-rater reliability of the DRAOR would be beneficial to examine the quality and consistency of case analysis.⁴⁶

A further possible contributing factor to the small degree to which DRAOR scores changed could be related to the availability of community-based interventions in Iowa. Only a small proportion of offenders are referred to community-based correctional programs (S. Kreamer, personal communication, February 3, 2020); therefore, it may not necessarily be surprising that parole officers may not be seeing substantial reductions in dynamic risk. Without community-based interventions, particularly for higher risk offenders, changes in offender risk may become largely stagnate when released into a community without the necessary interventions/services available.

The absence of meaningful change in protective factors, which may be partially explained by the various fidelity concerns previously discussed, could also point to parole officers' low value in assessing and fostering offender strengths. Scholars have claimed that offender strengths and protective factors are not given an appropriate level of

⁴⁶ The absence of inter-rater reliability analysis for the DRAOR is a limitation of existing DRAOR research; however, the institutional-based DRAOR assessment (referred to as the Structured Dynamic Assessment Case-Management – 21 item; Serin & Wilson, 2012) has been shown to have acceptable inter-rater reliability (ICC values ranging from .54 to .96; Smeth, 2019).

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

importance by the criminal justice system, including front line staff (Schlager, 2018; Fortune & Ward, 2017) and there has been ongoing scholarly debate on the appropriate definition, measurement, and practical use of protective factors (for detailed summaries see Serin et al., 2016; Ward, 2017; Ward & McDonald, 2016).

Historically, parole officers have been found to embody a “crime-fighting” or “surveillance” orientation that are primarily concerned with identifying and addressing risk factors (Bourgon, Gutierrez, & Ashton, 2011; Lynch, 1998). It is, therefore, not necessarily surprising that parole officers may struggle with assessing protective factors – they are overly focused on the risk factors present in offenders’ lives. For example, Serin and associates (2016) describe extent literature focusing on dynamic risk and protective factors (also often referred to as promotive, stabilizers, desistance, resilience, positive factors, etc.). They highlight that there are several ways to conceptualize protective factors in relation to dynamic risk and criminal behaviour. Some believe that dynamic risk factors and protective factors have a cumulative effect on an individual’s propensity to behave in a criminal manner – the present dynamic risk and protective factors can be tallied and then subtracted from each other to determine the likelihood of criminal behaviour. This perspective, however, treats each protective factor as having the same degree of influence on the individual, regardless of the presence of risk factors and inter-individual differences (e.g., simply not wanting to be returned to prison would be considered to be just as important as having a strong prosocial interpersonal relationship). The authors postulate that this is an unrealistic perspective as it is likely that certain protective factors will have greater effect on an individual’s decision to desist from crime than others. Another model of protective factors described by the authors is that these

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

factors interact with and buffer the effect of risk factors in an offender's life. Therefore, when an offender has many risk factors present their life, protective factors would mitigate this risk; however, they would have little effect on recidivism when risk is low. While the research on the relationships between dynamic risk, protective factors, and criminal behaviour is ongoing, there is still much to be done to understand what these constructs are, how they affect behaviour, and how this information should be used by probation/parole officers. In light of this, it would not be surprising if correctional staff currently feel uncertain about how they should consider these aspects of offenders' lives.

More recently, however, there have been calls to recognize the unique role parole officers can fulfill in supporting offenders in successfully reintegrating into the community, not just by ensuring that they are abiding by the law and the conditions placed on their release, but also directly assisting the offender to make prosocial changes in their lives (Bourgon, Gutierrez, & Ashton, 2011; Matthews & Hubbard, 2008). It has been hypothesized that building a "helping alliance" between those on community supervision and those supervising them is an essential strategy for fostering resiliency (Matthews & Hubbard, 2008).

Optimistically, research has found that risk assessment training can improve how probation and parole officers perceive and measure offender risk (Ricks et al., 2016; Vincent, Paiva-Salisbury, Cook, Guy, & Perrault, 2012). The Iowa Department of Corrections may want to consider whether additional parole officer training would reinforce the importance of and strategies for accurately assessing changes in offender risk and fostering offender strengths.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Positively, while the degree to which dynamic risk scores changed was small, these change scores added valuable information in the prediction of technical violations. This suggests that repeatedly assessing offender risk can provide probation/parole officers relevant information to consider in their management of offenders and attention should be paid when an offender's circumstances change (e.g., they start hanging around pro-criminal peers, they express increased hostility or anger, etc.). Overall, increased efforts to address the fidelity of DRAOR assessments are needed before firm conclusions of the full predictive utility of repeat assessments can be made. Until additional research and attention is focused on understanding the effects of staff engagement with the tool, the auto-population of previous assessment data, and the availability of suitable community-based interventions, the utility of repeatedly assessing offender risk throughout community supervision cannot be determined. It is likely that addressing fidelity issues would increase the ability of baseline assessments, and repeat assessments, to better predict a wider variety of recidivism outcomes with accuracy.

Limitations and Future Directions

As with any research, there are limitations that restrict the conclusions that can be drawn from the results. There are inherent drawbacks associated with using an archival dataset due to the constraints of the data made available by the Iowa Department of Corrections. Due to health data privacy concerns, the specific mental disorder diagnoses (e.g., depression, borderline personality disorder, substance use disorder, etc.) were not provided, but this information could have enhanced our ability to assess the relationship between mental illness and criminal behaviour. Previous research has highlighted the significance of having a comorbid a substance use disorder or personality disorder,

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

alongside a clinical diagnosis, in increasing the likelihood of antisocial behaviour (Porporino & Motiuk, 1995; Stewart & Wilton, 2017). It would have been informative to conduct more detailed analyses to observe the role comorbid diagnoses can have on one's propensity to recidivate. Also, it was not possible to disaggregate results by the specific mental disorder diagnosis (e.g., assessing the utility of the DRAOR for those with schizophrenia versus those with borderline personality disorder) or to be more precise in what diagnoses were considered to be a mental disorder of interest. For example, it would have been helpful to isolate results for those with a serious mental illness (extant literature is not consistent by what disorders are considered "serious", but commonly includes schizophrenia, major depression, bipolar disorder, and psychosis disorders) or to remove individuals who only had substance misuse disorder or who only had antisocial personality disorder, those often characterized by criminal attitudes and behaviour. Perhaps, considering the current findings, the Iowa Department of Corrections will be amenable to exploring these matters in further detail in the future.

Relatedly, there are disadvantages associated with how offenders in the current research are diagnosed with a mental disorder. In the state of Iowa, when admitted into custody, all offenders are screened for possible mental health issues and, if potential issues are noted, the offender is referred to a prison psychiatrist for further assessment and possible diagnosis. One of the primary purposes of assessing mental health at admission to prison is to ascertain the correctional agency has an informed understanding of the needs of their offender population and to ensure that offenders in need are linked with appropriate services. Hence, it would not be surprising if prison psychiatrists are focused on identifying cases of acute distress rather than cases where symptoms may not

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

be as apparent, likely resulting in an underestimation of the number of offenders who have a mental disorder. This may be a particular issue for offenders with substance use disorders and antisocial personality disorder, as the 2015 Iowa offender mental disorder diagnosis profile (Table 2) reports remarkably low prevalence of substance use and personality disorders compared to other jurisdictions (e.g., Beaudette et al., 2015). This research is further limited by the fact that a significant period of time passes before offender release, allowing for the potential treatment and recovery of mental disorders. While there were parole officer assessments of current mental health-related problems on release that indicated two-thirds of offenders with a mental disorder diagnosis on file had ongoing issues, these were not clinical assessments made by a psychiatrist. It would have been preferable to have an independent clinician assess offenders just prior to their parole release to have a more accurate understanding of offenders' current mental disorder status.

As well, the results of this research were not able to speak to the causal relationships between mental disorder and criminal behaviour. As outlined by Kraemer and associates (1997), a causal risk factor must be associated with the outcome of interest, precede the outcome of interest, be changeable, and have changes in the factor change the probability of the outcome occurring. As the current research focused on simply the presence of a mental disorder diagnosis at some point during the offenders' sentence, no conclusions can be made about the causal relationship with crime or changes over time. Scholars have postulated that understanding the connection between mental disorder and crime necessitates the understanding of the complex interaction of neurobiological, sociological, and psychological factors (Bartholomew & Morgan, 2015).

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Additional research employing a longitudinal methodology with a greater number of covariates (e.g., age of the offender at the onset of both mental illness and criminal behaviour, repeatedly assessing mental disorder symptoms) would be required to better understand how the presence of mental disorder diagnoses affect one's likelihood of undertaking violent or criminal behaviour.

Further, while the current results indicate that the DRAOR does not work as well for offenders with mental disorders compared to those that do not, particularly with predicting new criminal behaviour, it cannot determine the reasons for this. Additional research is needed to better understand whether the inferior predictive accuracy of DRAOR assessments is due to the limited relevance of general risk factors for offenders with mental disorders or whether parole officers are not adequately assessing this sub-population (or perhaps some combination of the two). As a first step, a preliminary examination of Iowan parole officers' perceptions of clients with mental health issues could be completed using a series of vignettes. Parole officers would read a series of client case studies where the presence of a mental disorder diagnosis is the manipulated variable and would be asked to provide estimates for the offenders' risk of recidivism outcomes. This would provide evidence for, in similar cases, whether parole officers perceive clients who have mental disorder diagnoses to be riskier than those who do not have a disorder. Follow-up studies could then assess the effect of clients experiencing ongoing mental disorder symptoms and engagement in psychological treatment on perceived riskiness. This proposed methodology, however, would not reveal whether there are other clinical risk factors that may be relevant for offenders with mental disorder diagnoses.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

This could be further explored through a mixed-methodology research approach, where a diverse range of general (e.g., those which align with the GPCSL framework) and clinical risk factors (e.g., more detailed and comprehensive psychopathological indicators) are assessed. Ideally, a researcher would also observe parole officers' interactions with a variety of their clients (both with and without mental disorders), followed by semi-structured interviews with the parole officer to probe their perceptions of each client. The aims of these interviews would be to assess in greater detail how risky they perceive their clients, what they view to be their risk factors, and how much importance they place on mental disorder diagnoses and current symptomology.

Conclusion

Representing the first investigation into the utility of the DRAOR for use with persons with mental disorders, the results of the current studies call for reservations regarding the use of this case management tool for use in this sub-population. Further research is needed to better understand the role of mental illness in criminal behaviour and to determine best practices in the supervision of offenders with mental disorders.

References

- Adler, F. (1986). Jails as a repository for former mental patients. *International Journal of Offender Therapy and Comparative Criminology*, 30(3), 225-236.
- American Psychiatric Association. (1994). *Diagnostic and statistical manual of mental disorders (DSM-IV)*. American Psychiatric Publication.
- American Psychiatric Association. (2013). *Diagnostic and statistical manual of mental disorders (DSM-5®)*. American Psychiatric Publication.
- Andrews, D. A. (2011). Reintroducing rehabilitation to corrections. In J. A. Dvoskin, J. L. Skeem, R. W. Novaco, & K. L. Douglas (Eds.), *Applying social science to reduce violent offending* (pp. 127–156). New York, NY: Oxford University Press.
- Andrews, D. A., & Bonta, J. (2010). *The psychology of criminal conduct (fifth edition)*. New Providence: LexisNexis.
- Andrews, D. A., Bonta, J., & Wormith, S. J. (2004). *The Level of Service/Case Management Inventory (LS/CMI)*. Toronto, Ontario: Multi-Health Systems.
- Andrews, D. A., Guzzo, L., Raynor, P., Rowe, R. C., 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(1), 113-133. doi: 10.1177/0306624X10395716

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

- Angermeyer, M. C., & Dietrich, S. (2006). Public beliefs about and attitudes towards people with mental illness: a review of population studies. *Acta Psychiatrica Scandinavica*, 113(3), 163-179. doi: 10.1111/j.1600-0447.2005.00699.x
- Appelbaum, P. S., Robbins, P. C., & Monahan, J. (2000). Violence and delusions: Data from the MacArthur violence risk assessment study. *American Journal of Psychiatry*, 157(4), 566-572.
- Averill, A. E. (2016). *An investigation of the Dynamic Risk Assessment for Offender Re-Entry (DRAOR) with New Zealand Sexual Offenders* (Unpublished master's thesis), University of Canterbury: Christchurch.
- Babchishin, K. M. (2013). *Sex Offenders do Change on Risk-Relevant Propensities: Evidence from a Longitudinal Study of the ACUTE-2007* (Unpublished doctoral dissertation), Carleton University: Ottawa, Ontario, Canada.
- Balyakina, E., Mann, C., Ellison, M., Sivernell, R., Fulda, K. G., Sarai, S. K., & Cardarelli, R. (2014). Risk of future offense among probationers with co-occurring substance use and mental health disorders. *Community Mental Health Journal*, 50(3), 288-295. doi: 10.1007/s10597-013-9624-4
- Bandara, S. N., Daumit, G. L., Kennedy-Hendricks, A., Linden, S., Choksy, S., & McGinty, E. E. (2018). Mental Health Providers' Attitudes About Criminal Justice-Involved Clients with Serious Mental Illness. *Psychiatric services*, 69(4), 472-475.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Bartholomew, N. R., & Morgan, R. D. (2015). Comorbid mental illness and criminalness implications for housing and treatment. *CNS spectrums*, 20(3), 231-240.

doi:10.1017/S1092852915000231

Batastini, A. B., Lester, M. E., & Thompson, R. A. (2017). Mental illness in the eyes of the law: examining perceptions of stigma among judges and attorneys. *Psychology, Crime & Law*, 24(7), 673-686. doi: 10.1080/1068316X.2017.1406092

Beaudette, J.N., Power, J., & Stewart, L. A. (2015). *National prevalence of mental disorders among incoming federally-sentenced men offenders* (Research Report, R-357). Ottawa, Ontario: Correctional Service Canada.

Blanchard, A. J. E. (2013). *Dynamic risk factors in violence risk assessment: A multiple time-point evaluation of the HCR-20 and START* (Unpublished doctoral dissertation), Simon Fraser University: Vancouver, British Columbia.

Blumstein, A., & Cohen, J. (1987). Characterizing criminal careers. *Science*, 237(4818), 985-991

Bonta, J., Blais, J., & Wilson, H. A. (2014). A theoretically informed meta-analysis of the risk for general and violent recidivism for mentally disordered offenders. *Aggression and violent behavior*, 19(3), 278-287. doi: <http://dx.doi.org/10.1016/j.avb.2014.04.014>

Bonta, J., Law, M., & Hanson, K. (1998). The prediction of criminal and violent recidivism among mentally disordered offenders: a meta-analysis. *Psychological bulletin*, 123(2), 123-142.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Bourgon, G., Gutierrez, L., & Ashton, J. (2012). The evolution of community supervision practice: The transformation from case manager to change agent. *Fed.*

Probation, 76, 28-48.

Braithwaite, E., Charette, Y., Crocker, A. G., & Reyes, A. (2010). The predictive validity of clinical ratings of the Short-Term Assessment of Risk and Treatability

(START). *International Journal of Forensic Mental Health*, 9(4), 271-281. doi:

10.1080/14999013.2010.534378

Brennan, P. A., Mednick, S. A., & Hodgins, S. (2000). Major mental disorders and criminal violence in a Danish birth cohort. *Archives of General psychiatry*, 57(5), 494-500.

Bronson, J., & Berzofsky, M. (2017). *Indicators of mental health problems reported by prisoners and jail inmates, 2011-12*. United States Bureau of Justice Statistics.

Brown, G. P., Barker, J., McMillan, K., Norman, R., Derkzen, D., Stewart, L. A., & Wardrop, K. (2018). *Prevalence of mental disorder among federally sentenced women offenders: In-custody and intake samples*. (Research Report R-420). Ottawa, Ontario: Correctional Service of Canada.

Brown, S. L., Amand, M. D. S., & Zamble, E. (2009). The dynamic prediction of criminal recidivism: A three-wave prospective study. *Law and Human Behavior*, 33(1), 25-45. doi: 10.1007/s10 979-008-9139-7

Calhoun, S. (2018). "That's Just the Tip of It Because It Goes Deeper Than That": A Qualitative Exploration Into the Role of Mental Illness in Offending Onset and

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Subsequent Offending Behavior. *Criminal Justice Policy Review*, 29(4), 341-364.

doi: 10.1177/0887403416633267

Calsyn, R. J., Yonker, R. D., Lemming, M. R., Morse, G. A., & Klinkenberg, W. D.

(2005). Impact of assertive community treatment and client characteristics on criminal justice outcomes in dual disorder homeless individuals. *Criminal behaviour and mental health*, 15(4), 236-248. <https://doi.org/10.1002/cbm.24>

Casey, S., Day, A., Howells, K., & Ward, T. (2007). Assessing suitability for offender rehabilitation: Development and validation of the Treatment Readiness Questionnaire. *Criminal justice and behavior*, 34(11), 1427-1440. doi: 10.1177/0093854807305827

Chadwick, N. (2014). *Validating the Dynamic Risk Assessment for Offender Re-entry (DRAOR) in a sample of US probationers and parolees*. (Unpublished master's thesis), Carleton University, Ottawa, Canada.

Chadwick, C., Serin, R. C., & Lloyd, C. D. (2015, May). Measuring offender change and the impact on predicting recidivism. Paper presented at the Third North American Correctional and Criminal Justice Psychology Conference, Ottawa, Canada.

Charette, Y., Crocker, A. G., & Billette, I. (2014). Police encounters involving citizens with mental illness: use of resources and outcomes. *Psychiatric Services*, 65(4), 511-516.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

- Chen, F. F. (2007). Sensitivity of goodness of fit indexes to lack of measurement invariance. *Structural Equation Modeling: A Multidisciplinary Journal*, 14(3), 464-504.
- Cheung, G. W., & Rensvold, R. B. (1999). Testing factorial invariance across groups: A reconceptualization and proposed new method. *Journal of management*, 25(1), 1-27.
- Chu, C. M., Thomas, S. D., Ogloff, J. R., & Daffern, M. (2011). The predictive validity of the Short-Term Assessment of Risk and Treatability (START) in a secure forensic hospital: Risk factors and strengths. *International Journal of Forensic Mental Health*, 10(4), 337-345. doi: 10.1080/14999013.2011.629715
- Clark, L. A., & Watson, D. (1995). Constructing validity: Basic issues in objective scale development. *Psychological assessment*, 7(3), 309-319.
- Cloyes, K. G., Wong, B., Latimer, S., & Abarca, J. (2010). Time to prison return for offenders with serious mental illness released from prison: A survival analysis. *Criminal Justice and Behavior*, 37(2), 175-187. doi: 10.1177/0093854809354370
- Coleman, T. G., & Cotton, D. (2010). *Police interactions with persons with mental illness: Police learning in the environment of contemporary policing*. Mental Health and the Law Advisory Committee: Mental Health Commission of Canada. Retrieved from https://www.mentalhealthcommission.ca/sites/default/files/Law_Police_Interactions_Mental_Illness_Report_ENG_0_1.pdf

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Correctional Service of Canada (2016). *Serving time*. Ottawa, Ontario: Correctional

Service of Canada. Retrieved from <https://www.csc-scc.gc.ca/correctional-programs/002001-1000-eng.shtml>

Corrigan, P. W., & O'Shaughnessy, J. R. (2007). Changing mental illness stigma as it exists in the real world. *Australian Psychologist*, 42(2), 90-97. doi:

10.1080/00050060701280573

Council of State Governments (2002). *Criminal justice/mental health consensus project*.

Lexington, Kentucky: Council of State Governments. Retrieved from <https://www.ncjrs.gov/pdffiles1/nij/grants/197103.pdf>

Council of State Governments (2018). Confined and costly: How supervision violations are filling prisons and burdening budgets. Retrieved from

<https://csgjusticecenter.org/confinedandcostly/>.

Crocker, A. G., Martin, M. S., Leclair, M. C., Nicholls, T. L., & Seto, M. C. (2018).

Expanding the early and late starter model of criminal justice involvement for forensic mental health clients. *Law and human behavior*, 42(1), 83-93. doi:

<http://dx.doi.org/10.1037/lhb0000269>

Dhami, M. K., Mandel, D. R., Loewenstein, G., & Ayton, P. (2006). Prisoners' positive illusions of their post-release success. *Law and Human Behavior*, 30(6), 631-647.

doi: 10.1007/s10979-006-9040-1

Dauphinot, L. L. (1997). *The efficacy of community correctional supervision for*

offenders with severe mental illness (Unpublished doctoral dissertation), University of Texas: Austin, Texas.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Dellazizzo, L., Dugré, J. R., Berwald, M., Stafford, M. C., Côté, G., Potvin, S., &

Dumais, A. (2018). Distinct pathological profiles of inmates showcasing cluster B personality traits, mental disorders and substance use regarding violent behaviors. *Psychiatry research*, 260, 371-378.

<https://doi.org/10.1016/j.psychres.2017.12.006>

Derkzen, D., Booth, L., McConnell, A., & Taylor, K. (2012). *Mental health needs of federal women offenders* (Research Report R-267). Ottawa, Ontario: Correctional Service of Canada.

Desmarais, S. L., Nicholls, T. L., Wilson, C. M., & Brink, J. (2012). Using dynamic risk and protective factors to predict inpatient aggression: Reliability and validity of START assessments. *Psychological assessment*, 24(3), 685-699. doi: 10.1037/a0026668

Dirks-Linhorst, P., & Linhorst, D. M. (2012). Monitoring Offenders with Mental Illness in the Community. *Best Practices in Mental Health*, 8(2), 47-70.

Douglas, K. S., Guy, L. S., & Hart, S. D. (2009). Psychosis as a risk factor for violence to others: a meta-analysis. *Psychological bulletin*, 135(5), 679-706. doi: 10.1037/a0016311

Douglas, S. K., & Skeem, J. L. (2005). Violence risk assessment: Getting specific about being dynamic. *Psychology, Public Policy, and Law*, 11(3), 347-383. doi: 10.1037/1076-8971.11.3.347

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

- Douglas, K. S., Skeem, J. L., & Nicholson, E. (2011). Research methods in violence risk assessment. In B. Rosenfeld, S. D. Penrod, B. Rosenfeld, S. D. Penrod (Eds.), *Research methods in forensic psychology* (pp. 325–346). Hoboken, NJ: John Wiley & Sons.
- Dowden, C., & Andrews, D. A. (2004). The importance of staff practice in delivering effective correctional treatment: A meta-analytic review of core correctional practice. *International Journal of Offender Therapy and comparative criminology*, 48(2), 203-214. doi: 10.1177/0306624X03257765
- Druhn, N. (2007). *The criminalization hypothesis: The relationship between deinstitutionalization and the increased prevalence of individuals with mental illness in correctional systems* (Unpublished doctoral dissertation). Argosy University: Twin Cities.
- Earley P. (2017, November 02). Va. Case shows desperate need to put the mentally ill in treatment, not prison. *USA Today*. Retrieved from <https://www.usatoday.com/story/opinion/policing/spotlight/2017/11/02/va-case-shows-desperate-need-put-mentally-ill-treatment-not-prison/804515001/>
- Elbogen, E. B., & Johnson, S. C. (2009). The intricate link between violence and mental disorder: results from the National Epidemiologic Survey on Alcohol and Related Conditions. *Archives of General Psychiatry*, 66(2), 152-161.
- Eno Loudon, J., Manchak, S. M., Ricks, E. P., & Kennealy, P. J. (2018). The Role of Stigma Toward Mental Illness in Probation Officers' Perceptions of Risk and Case

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Management Decisions. *Criminal Justice and Behavior*, 45(5), 573-588. doi:
10.1177/00938548818756148

Eno Louden, J., & Skeem, J. L. (2013). How do probation officers assess and manage
recidivism and violence risk for probationers with mental disorder? An
experimental investigation. *Law and human behavior*, 37(1), 1-13. doi:
10.1037/h0093991\

Eno Louden, J., Skeem, J. L., Camp, J., & Christensen, E. (2008). Supervising
probationers with mental disorder: How do agencies respond to
violations?. *Criminal Justice and Behavior*, 35(7), 832-847. doi:
10.1177/0093854808319042

Eno Louden, J., Skeem, J. L., Camp, J., Vidal, S., & Peterson, J. (2012). Supervision
practices in specialty mental health probation: What happens in officer–probationer
meetings?. *Law and human behavior*, 36(2), doi: 10.1007/s10979-010-9260-2

Erickson, S. K., Rosenheck, R. A., Trestman, R. L., Ford, J. D., & Desai, R. A. (2008).
Risk of incarceration between cohorts of veterans with and without mental illness
discharged from inpatient units. *Psychiatric Services*, 59(2), 178-183.

Etter Sr, G. W., Birzer, M. L., & Fields, J. (2008). The jail as a dumping ground: The
incidental incarceration of mentally ill individuals. *Criminal Justice Studies*, 21(1),
79-89. doi: 10.1080/14786010801972738

Farrington, D. P., Ttofi, M. M., & Piquero, A. R. (2016). Risk, promotive, and protective
factors in youth offending: Results from the Cambridge study in delinquent

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

development. *Journal of Criminal Justice*, 45, 63-70. doi:

<http://dx.doi.org/10.1016/j.jcrimjus.2016.02.014>

Fazel, S., Gulati, G., Linsell, L., Geddes, J. R., & Grann, M. (2009). Schizophrenia and violence: systematic review and meta-analysis. *PLoS medicine*, 6(8), 1-15, doi:10.1371/journal.pmed.1000120

Ferguson, A. (2015). *An age-old issue: Evaluating the applicability of adult criminal risk assessment tools for use with youth offenders* (Unpublished master's thesis). Victoria University of Wellington: Wellington.

Field, A. (2009). *Discovering statistics using SPSS (3rd ed.)*. Los Angeles: Sage.

Fisher, W. H., Packer, I. K., Simon, L. J., & Smith, D. (2000). Community mental health services and the prevalence of severe mental illness in local jails: Are they related? *Administration and Policy in Mental Health*, 27(6), 371-382. doi:10.1023/A:1021321824606

Fitzgerald, P. B., De Castella, A. R., Filia, K. M., Filia, S. L., Benitez, J., & Kulkarni, J. (2005). Victimization of patients with schizophrenia and related disorders. *Australian and New Zealand Journal of Psychiatry*, 39(3), 169-174.

Fortune, C. A., & Ward, T. (2017). Problems in protective factor research and practice. *Aggression and violent behavior*, 32, 1-3. doi: <https://doi.org/10.1016/j.avb.2016.12.008>

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Gadermann, A. M., Guhn, M., & Zumbo, B. D. (2012). Estimating ordinal reliability for

Likert-type and ordinal item response data: A conceptual, empirical, and practical guide. *Practical Assessment, Research & Evaluation*, 17(3), 1-13.

Gaspar, M., Brown, L., Ramler, T., Scanlon, F., Gigax, G., Ridley, K., & Morgan, R. D.

(2019). Therapeutic outcomes of changing lives and changing outcomes for male and female justice involved persons with mental illness. *Criminal Justice and Behavior*, 46(12), 1678-1699. doi:10.1177/0093854819879743

Gendreau, P., Little, T., & Goggin, C. (1996). A meta-analysis of the predictors of adult

offender recidivism: What works!. *Criminology*, 34(4), 575-608.

Giordano, P. C., Cernkovich, S. A., & Rudolph, J. L. (2002). Gender, crime, and

desistance: Toward a theory of cognitive transformation. *American Journal of Sociology*, 107(4), 990-1064. <https://doi.org/10.1086/343191>

Gonen, M. (2015). *Analyzing receiver operating characteristic curves with SAS* (1st ed.)

SAS Institute.

Gray, N. S., Benson, R., Craig, R., Davies, H., Fitzgerald, S., Huckle, P., ... & Snowden,

R. J. (2011). The Short-Term Assessment of Risk and Treatability (START): A prospective study of inpatient behavior. *International Journal of Forensic Mental Health*, 10(4), 305-313. doi: 10.1080/14999013.2011.631692

Gutierrez, L., Wilson, H. A., Rugge, T., & Bonta, J. (2013). The Prediction of Recidivism

with Aboriginal Offenders: A Theoretically Informed Meta-Analysis. *Canadian*

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Journal of Criminology and Criminal Justice, 55(1), 55-99.

doi:10.3138/cjccj.2011.E.51

Hanby, L. (2013). *A longitudinal study of dynamic risk, protective factors, and criminal recidivism: Change over time and the impact of assessment timing* (Unpublished doctoral dissertation). Carleton University, Ottawa, Ontario, Canada.

Hanson, R. K. (2008). What statistics should we use to report predictive accuracy? *Crime Scene*, 15(1), 15-17.

Hanson, R. K. (2017). Assessing the calibration of actuarial risk scales: A primer on the E/O index. *Criminal Justice and Behavior*, 44(1), 26-39. doi: 10.1177/0093854816683956

Hanson, R. K., & Morton-Bourgon, K. (2004). *Predictors of sexual recidivism: An updated meta-analysis*. Ottawa Ontario: Public Safety and Emergency Preparedness Canada.

Hardy, S., & Thomas, B. (2012). Mental and physical health comorbidity: Political imperatives and practice implications. *International Journal of Mental Health Nursing*, 21(3), 289-298. doi: 10.1111/j.1447-0349.2012.00823.x

Harris, L. M., Matthews, L. R., Penrose-Wall, J., Alam, A., & Jaworski, A. (2014). Perspectives on barriers to employment for job seekers with mental illness and additional substance-use problems. *Health & social care in the community*, 22(1), 67-77. doi: 10.1111/hsc.12062

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Helmus, L. M., & Babchishin, K. M. (2017). Primer on risk assessment and the statistics used to evaluate its accuracy. *Criminal Justice and Behavior*, 44(1), 8-25. doi:

10.1177/0093854816678898

Hewawasam, S. R. (2017). *The Role of Risk and Protective Factors in Risk Management for Forensic Inpatients Using the Short-Term Assessment of Risk Treatability (START)* (Unpublished doctoral dissertation), California State University: Fullerton.

Hinshaw, S. P. (2007). *The mark of shame: Stigma of mental illness and an agenda for change*. New York: Oxford University Press.

Hirschfeld, G., & Von Brachel, R. (2014). Multiple-Group confirmatory factor analysis in R-A tutorial in measurement invariance with continuous and ordinal indicators. *Practical Assessment, Research & Evaluation*, 19(7). 1-12.

Hodgins, S., Müller-Isberner, R., Freese, R., Tiihonen, J., Repo-Tiihonen, E., Eronen, M., ... & Tuninger, E. (2007). A comparison of general adult and forensic patients with schizophrenia living in the community. *International Journal of Forensic Mental Health*, 6(1), 63-75. doi: 10.1080/14999013.2007.10471250

Jaffee, S. R. (2013). Family violence and parent psychopathology: Implications for children's socioemotional development and resilience. In *Handbook of resilience in children* (pp. 127-141). Springer, Boston, MA.

Junginger, J., Claypoole, K., Laygo, R., & Crisanti, A. (2006). Effects of serious mental illness and substance abuse on criminal offenses. *Psychiatric Services*, 57(6), 879-882.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Kaeble, D., & Cowhig, M. (2018). *Correctional populations in the United States, 2016*.

United States Bureau of Justice Statistics.

Kalinowski, P. (2010). Understanding confidence intervals (CIs) and effect size estimation. *Association for Psychological Science Observer*, 23(4).

Kamperman, A. M., Henrichs, J., Bogaerts, S., Lesaffre, E. M., Wierdsma, A. I., Ghauharali, R. R., ... & Delespaul, P. A. (2014). Criminal victimisation in people with severe mental illness: a multi-site prevalence and incidence survey in the Netherlands. *PLoS One*, 9(3), 1-13, doi:10.1371/journal.pone.0091029.

Kennealy, P. J., Skeem, J. L., Manchak, S. M., & Eno Loudon, J. (2012). Firm, fair, and caring officer-offender relationships protect against supervision failure. *Law and Human Behavior*, 36(6), 496-505. doi: 10.1037/h0093935

Klepfisz, G., Daffern, M., & Day, A. (2017). Understanding protective factors for violent reoffending in adults. *Aggression and Violent Behaviour*, 32, 80-87. doi: <http://dx.doi.org/10.1016/j.avb.2016.12.001>

Kline, R. B. (2016). *Principles and practice of structural equation modeling (4th Ed.)*. New York: The Guilford Press.

Kraemer, H. C., Kazdin, A. E., Offord, D. R., Kessler, R. C., Jensen, P. S., & Kupfer, D. J. (1997). Coming to terms with the terms of risk. *Archives of general psychiatry*, 54(4), 337-343.

Lamb, H. R., Weinberger, L. E., & DeCuir Jr, W. J. (2002). The police and mental health. *Psychiatric services*, 53(10), 1266-1271.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Latalova, K., Kamaradova, D., & Prasko, J. (2014). Violent victimization of adult

patients with severe mental illness: a systematic review. *Neuropsychiatric disease and treatment*, 10, 1925-1939. doi: <http://dx.doi.org/10.2147/NDT.S68321>

Little, T. D. (2013). *Longitudinal structural equation modeling*. New York: Guilford press.

Lloyd, C. D. (2015). *Can a dynamic risk instrument make short--term predictions in "real time"? Developing a framework for testing proximal assessment of offender recidivism risk during re-entry* (Doctoral dissertation), Carleton University Ottawa, Canada.

Lowder, E. M., Desmarais, S. L., Rade, C. B., Johnson, K. L., & Van Dorn, R. A. (2017). Reliability and validity of START and LSI-R assessments in mental health jail diversion clients. *Assessment*, doi: <https://doi.org/10.1177/1073191117704505>

Lowder, E. M., Ray, B. R., & Gruenewald, J. A. (2019). Criminal Justice Professionals' Attitudes Toward Mental Illness and Substance Use. *Community mental health journal*, 55(3), 428-439. doi: <https://doi.org/10.1007/s10597-019-00370-3>

Lowenkamp, C. T., Johnson, J. L., Trevino, P., & Serin, R. (2016). Enhancing Community Supervision through the Application of Dynamic Risk Assessment. *Federal Probation*, 80 (2), 16-20.

Lowery, W., Kindy, Kimberly, Alexander, K. L., Jenkins, J., & Rich, S. (2015, June 30). Distraught people, deadly results. *Washington Post*. Retrieved from

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

<http://www.washingtonpost.com/sf/investigative/2015/06/30/distraught-people-deadly-results/>

Luciano, A., & Meara, E. (2014). Employment status of people with mental illness: national survey data from 2009 and 2010. *Psychiatric Services*, 65(10), 1201-1209.

Lynch, M. (1998). Waste Managers-The New Penology, Crime Fighting, and Parole Agent Identity. *Law & Society Review.*, 32(4), 839-869.

Mackrael, K. (2017, March 26). Canada's prisons becoming warehouses for the mentally ill. *The Globe and Mail*. Retrieved from <https://www.theglobeandmail.com/news/politics/canadas-prisons-becoming-warehouses-for-the-mentally-ill/article4236899/>

Manchak, S. M., Skeem, J. L., Kennealy, P. J., & Loudon, J. E. (2014). High-fidelity specialty mental health probation improves officer practices, treatment access, and rule compliance. *Law and Human Behavior*, 38(5), 1-12. doi: 10.1037/lhb0000076

Markowitz, F. E. (2006). Psychiatric hospital capacity, homelessness, and crime and arrest rates. *Criminology*, 44(1), 45-72. doi: <https://doi.org/10.1111/j.1745-9125.2006.00042.x>

Markowitz, F. E. (2011). Mental illness, crime, and violence: Risk, context, and social control. *Aggression and violent behavior*, 16(1), 36-44.
doi:10.1016/j.avb.2010.10.003

Maruna, S. (2001). *Making Good: How Ex-convicts Reform and Rebuild their Lives*. Washington, DC: American Psychological Association Books.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Maruna, S. (2010). *Understanding desistance from crime*. A report for the Ministry of

Justice and National Offender Management Services. Retrieved from

www.safeground.org.uk/wp-content/uploads/desistance-fact-sheet.pdf

Matejkowski, J., Severson, M. E., & Manthey, T. J. (2015). Strategies for postrelease

supervision of individuals with serious mental illness: Comparing specialized

community corrections officers to those not serving on a specialized

team. *Journal of Offender Rehabilitation*, 54(7), 520-537. doi:

10.1080/10509674.2015.1076106

Matthews, B., & Hubbard, D. (2007). The helping alliance in juvenile probation: The

missing element in the “what works” literature. *Journal of Offender*

Rehabilitation, 45(1-2), 105-122. doi: 10.1300/J076v45n01_09

Messina, N., Burdon, W., Hagopian, G., & Prendergast, M. (2004). One year return to

custody rates among co-disordered offenders. *Behavioral Sciences & the*

Law, 22(4), 503-518. doi: 10.1002/bsl.600

Michalski, J. H. (2017). Mental health issues and the Canadian criminal justice

system. *Contemporary justice review*, 20(1), 2-25. doi:

<https://doi.org/10.1080/10282580.2016.1226817>

Monahan, J. (1988). Risk assessment of violence among the mentally disordered:

generating useful knowledge. *International journal of law and psychiatry*, 11, 249-

257.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

- Monahan, J. (1992). Mental disorder and violent behavior: Perceptions and evidence. *American Psychologist*, 47(4), 511-521.
- Morgan, R. D., Flora, D. B., Kroner, D. G., Mills, J. F., Varghese, F., & Steffan, J. S. (2012). Treating offenders with mental illness: A research synthesis. *Law and human behavior*, 36(1), 37-50. doi: 10.1037/h0093964
- Morgan, R. D., Kroner, D. G., & Mills, J. F. (2018). *A treatment manual for justice involved persons with mental illness: Changing lives and changing outcomes*. Routledge.
- Morgan, R. D., Kroner, D. G., Mills, J. F., Bauer, R. L., & Serna, C. (2014). Treating justice involved persons with mental illness: Preliminary evaluation of a comprehensive treatment program. *Criminal Justice and Behavior*, 41(7), 902-916. doi: 10.1177/0093854813508553
- Morgan, R., Scanlon, F., & Van Horn, S. (2019). Criminogenic risk and mental health: a complicated relationship. *CNS Spectrums*, 1–8.
<https://doi.org/10.1017/S109285291900141X>
- Morrissey, J., Meyer, P., & Cuddeback, G. (2007). Extending assertive community treatment to criminal justice settings: Origins, current evidence, and future directions. *Community mental health journal*, 43(5), 527-544.
- Moshagen, M., & Musch, J. (2014). Sample size requirements of the robust weighted least squares estimator. *Methodology*, 10(2), 60-70, doi: 10.1027/1614-2241/a000068.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Muirhead, J. (2016). *Risky business: Evaluating the Dynamic Risk Assessment for*

Offender Re-Entry for use with New Zealand youth (Unpublished master's thesis),

Victoria University of Wellington: Wellington.

Naanyu, V. (2009). *Social context, stigma, and the role of causal attributions: Public*

evaluations of mental illness in South Africa (Unpublished doctoral dissertation),

Indiana University: Indiana.

Nicholls, T. L., Brink, J., Desmarais, S. L., Webster, C. D., & Martin, M. L. (2006). The

Short-Term Assessment of Risk and Treatability (START) A prospective validation study in a forensic psychiatric sample. *Assessment*, 13(3), 313-327. doi:

10.1177/1073191106290559

Nishio, A., Horita, R., Sado, T., Mizutani, S., Watanabe, T., Uehara, R., & Yamamoto,

M. (2017). Causes of homelessness prevalence: Relationship between homelessness and disability. *Psychiatry and clinical neurosciences*, 71(3), 180-188.

doi:10.1111/pcn.12469

Nonstad, K., Nettet, M. B., Kroppan, E., Pedersen, T. W., Nøttestad, J. A., Almvik, R., &

Palmstierna, T. (2010). Predictive validity and other psychometric properties of the Short-Term Assessment of Risk and Treatability (START) in a Norwegian high secure hospital. *International Journal of Forensic Mental Health*, 9(4), 294-299.

doi: 10.1080/14999013.2010.534958

Norton, E. C., Yoon, J., Domino, M. E., & Morrissey, J. P. (2006). Transitions between

the public mental health system and jail for persons with severe mental illness: A

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Markov analysis. *Health Economics*, 15(7), 719-733. doi:

<https://doi.org/10.1002/hec.1100>

Nunnally, J. C. (1978). *Psychometric theory* (2nd ed.). New York: McGraw-Hill.

Ogloff, J. R., & Daffern, M. (2006). The dynamic appraisal of situational aggression: an instrument to assess risk for imminent aggression in psychiatric inpatients. *Behavioral sciences & the law*, 24(6), 799-813. doi: 10.1002/bsl.741

Onifade, E., Davidson, W., Campbell, C., Turke, G., Malinowski, J., & Turner, K. (2008). Predicting recidivism in probationers with the youth level of service case management inventory (YLS/CMI). *Criminal Justice and Behavior*, 35(4), 474-483. doi: 10.1177/0093854807313427

O'shea, L. E., & Dickens, G. L. (2014). Short-Term Assessment of Risk and Treatability (START): Systematic review and meta-analysis. *Psychological Assessment*, 26(3), 990-1002. doi: <http://dx.doi.org/10.1037/a0036794>

Paparozzi, M. A., & Gendreau, P. (2005). An intensive supervision program that worked: Service delivery, professional orientation, and organizational supportiveness. *The Prison Journal*, 85(4), 445-466. doi: 10.1177/0032885505281529

Pearson, C., Janz, T., & Ali, J. (2013). *Mental and substance use disorders in Canada*. Ottawa, Ontario: Statistics Canada.

Perera, D. N., Short, L., & Fernbacher, S. (2014). "It's not that straightforward": When family support is challenging for mothers living with mental illness. *Psychiatric rehabilitation journal*, 37(3), 170-175. doi: <http://dx.doi.org/10.1037/prj0000074>

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Peters G (2018). _userfriendlyscience: Quantitative analysis made accessible. doi:

10.17605/osf.io/txequ (URL: <https://doi.org/10.17605/osf.io/txequ>), R package version 0.7.2, <URL: <https://userfriendlyscience.com>>.

Peterson, J., Skeem, J. L., Hart, E., Vidal, S., & Keith, F. (2010). Analyzing offense patterns as a function of mental illness to test the criminalization hypothesis. *Psychiatric Services*, 61(12), 1217-1222.

Peugh, J. L. (2010). A practical guide to multilevel modeling. *Journal of school psychology*, 48(1), 85-112. doi:10.1016/j.jsp.2009.09.002

Pratt, L. A. (2012). Characteristics of adults with serious mental illness in the United States household population in 2007. *Psychiatric Services*, 63(10), 1042-1046.

Prell, L., Vitacco, M. J., & Zavodny, D. (2016). Predicting violence and recidivism in a large sample of males on probation or parole. *International Journal of Law and Psychiatry*, 49, 107-113. doi: <http://dx.doi.org/10.1016/j.ijlp.2016.08.003>

Porporino, F. J., & Motiuk, L. L. (1995). The prison careers of mentally disordered offenders. *International Journal of Law and Psychiatry*, 18(1), 29-44. doi: [http://dx.doi.org/10.1016/0160-2527\(94\)00025-5](http://dx.doi.org/10.1016/0160-2527(94)00025-5)

Quinn, R., Miles, H., & Kinane, C. (2013). The validity of the Short-Term Assessment of Risk and Treatability (START) in a UK medium secure forensic mental health service. *International Journal of Forensic Mental Health*, 12(3), 215-224. doi: 10.1080/14999013.2013.832714

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

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. doi:

10.1007/s10979-005-6832-7

Ricks, E. P., Eno Loudon, J., & Kennealy, P. J. (2016). Probation officer role emphases

and use of risk assessment information before and after training. *Behavioral*

sciences & the law, 34(2-3), 337-351. doi: 10.1002/bsl.2219

Ringhoff, D., Rapp, L., & Robst, J. (2013). The criminalization hypothesis: Practice and

policy implications for persons with serious mental illness in the criminal justice

system. *Best Practices in Mental Health*, 8(2), 1-19.

Rogers, R. (2000). The uncritical acceptance of risk assessment in forensic practice. *Law*

and Human Behavior, 24(5), 595-605. doi: 10.1023/A:1005575113507

Rosenfeld, B., Foellmi, M., Khadivi, A., Wijetunga, C., Howe, J., Nijdam-Jones, A., ... &

Rotter, M. (2017). Determining when to conduct a violence risk assessment:

Development and initial validation of the Fordham Risk Screening Tool

(FRST). *Law and human behavior*, 41(4), 1-8, doi: 10.1037/lhb0000247.

Schlager, M. D. (2018). Through the looking glass: Taking stock of offender

reentry. *Journal of Contemporary Criminal Justice*, 34(1), 69-80. doi:

10.1177/1043986217750443

Schomerus, G., Schwahn, C., Holzinger, A., Corrigan, P. W., Grabe, H. J., Carta, M. G.,

& Angermeyer, M. C. (2012). Evolution of public attitudes about mental illness: a

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

systematic review and meta-analysis. *Acta Psychiatrica Scandinavica*, 125(6), 440-452. doi: 10.1111/j.1600-0447.2012.01826.x

Serin, R. C. (2007). *The Dynamic Risk Assessment Scale for Offender Re-Entry (DRAOR)*. Unpublished scale. Carleton University, Ottawa, Ontario.

Serin, R. C. (2015). *Dynamic Risk Assessment for Offender Re-Entry: Pilot implementation manual*. Unpublished manuscript. Carleton University, Ottawa, Ontario.

Serin, R. C. (2019, December 30). Personal phone conversation.

Serin, R. C., Chadwick, N., & Lloyd, C. D. (2016). Dynamic risk and protective factors. *Psychology, Crime & Law*, 22(1-2), 151-170. doi: 10.1080/1068316X.2015.1112013

Serin, R.C., Chadwick, N. & Prell, L. (in preparation). Assessing dynamic risk and protective factors among probationers and parolees in Iowa: The utility of the Dynamic Risk Assessment for Offender Re-entry

Serin, R. C., & Lloyd, C. D. (2009). Examining the process of offender change: The transition to crime desistance. *Psychology, Crime & Law*, 15(4), 347-364. doi: 10.1080/10683160802261078

Serin, R. C., Lloyd, C. D., & Hanby, L. J. (2010). Enhancing offender re-entry: An integrated model for enhancing offender re-entry. *European Journal of Probation*, 2(2), 53-75.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Serin, R. C., Mailloux, D. L., & Kennedy, S. M. (2007). Development of a clinical rating scale for offender readiness: Implications for assessment and offender change. *Issues in Forensic Psychology*, 7, 70-80.

Serin, R. C. & Prell, L. (2012). *Pathways to crime desistance for probationers*. Paper Presented at American Psychology-Law Society Annual Conference, March, San Juan, Puerto Rico.

Serin, R., & Wilson, N. J. (2012). *Structured Dynamic Assessment Case-management - 21 item (SDAC-21). Guidelines for case management using structured assessment of dynamic risk, responsivity, and protective factors*. Unpublished document.

Simourd, L., & Andrews, D. A. (1994). Correlates of delinquency: A look at gender differences. In *Forum on Corrections Research*, 6(1).

Singer, J. D., & Willett, J. B. (2003). *Applied longitudinal data analysis: Modeling change and event occurrence*. Oxford university press.

Singh, J. P. (2013). Predictive validity performance indicators in violence risk assessment: A methodological primer. *Behavioral Sciences & the Law*, 31(1), 8-22.
doi: 10.1002/bsl.2052

Shepherd, S. M., Strand, S., Viljoen, J. L., & Daffern, M. (2018). Evaluating the utility of 'strength' items when assessing the risk of young offenders. *The Journal of Forensic Psychiatry & Psychology*, 29(4), 597-616. doi: 10.1080/14789949.2018.1425474

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

- Shlay, A. B., & Rossi, P. H. (1992). Social science research and contemporary studies of homelessness. *Annual Review of Sociology*, 18(1), 129-160.
- Short, T., Thomas, S., Mullen, P., & Ogloff, J. R. (2013). Comparing violence in schizophrenia patients with and without comorbid substance-use disorders to community controls. *Acta Psychiatrica Scandinavica*, 128(4), 306-313. doi: 10.1111/acps.12066
- Skeem, J. L., & Eno Loudon, J. (2006). Toward evidence-based practice for probationers and parolees mandated to mental health treatment. *Psychiatric Services*, 57(3), 333-342.
- Skeem, J. L., Eno Loudon, J., Polaschek, D., & Camp, J. (2007). Assessing relationship quality in mandated community treatment: Blending care with control. *Psychological assessment*, 19(4), 397-410. doi: 10.1037/1040-3590.19.4.397
- Skeem, J. L., Manchak, S., & Montoya, L. (2017). Comparing public safety outcomes for traditional probation vs specialty mental health probation. *JAMA psychiatry*, 74(9), 942-948. doi:10.1001/jamapsychiatry.2017.1384
- Skeem, J. L., Manchak, S., & Peterson, J. K. (2011). Correctional policy for offenders with mental illness: Creating a new paradigm for recidivism reduction. *Law and human behavior*, 35(2), 110-126. doi 10.1007/s10979-010-9223-7
- Skeem, J. L., Winter, E., Kennealy, P. J., Eno Loudon, J., Tatar, I. I., & Joseph, R. (2014). Offenders with mental illness have criminogenic needs, too: Toward

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

recidivism reduction. *Law and human behavior*, 38(3), 212-224. doi:
10.1037/lhb0000054

Smeth, A. (2013). *Evaluating risk assessments among sex offenders: a comparative analysis of static and dynamic factors* (Master's thesis). Carleton University, Ottawa, Canada.

Smeth, A. (2019). *Validating the Structured Dynamic Assessment Case-Management 21-item (SDAC-21) in a sample of incarcerated offenders* (Doctoral dissertation). Carleton University, Ottawa, Canada.

Solomon, E. (2017, March 3), The mental health crisis in Canadian prisons. *Macleans*. Retrieved from <http://www.macleans.ca/news/canada/the-mental-health-crisis-in-canadian-prisons/>

Steadman, H. J., Monahan, J., Duffee, B., Hartstone, E., Clark Robbins, P. (1984). The impact of state mental hospital deinstitutionalization on united states prison populations, 1968-1978. *The Journal of Criminal Law & Criminology*, 75(2), 474-490.

Steury, E. H. (1991). Specifying "criminalization" of the mentally disordered misdemeanant. *The Journal of Criminal Law and Criminology*, 82(2), 334-359.

Stewart, L., Wardrop, K., Wilton, G., Thompson, J., Derkzen, D., & Motiuk, L. (2017). *Reliability and validity of the Dynamic Factors Identification and Analysis – Revised* (Research Report R-395). Ottawa, Ontario: Correctional Service of Canada.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Stewart, L.A., & Wilton G (2017). *Comorbid mental disorders: Prevalence and impact on institutional outcomes*. (Research Report R-379). Ottawa, Ontario: Correctional Service of Canada.

Stewart, L., Wilton, G., & Cousineau, C. (2012) *Federally Sentenced Offenders with Mental Disorders: Correctional Outcomes and Correctional Response* (Research Report R-268). Ottawa, Ontario: Correctional Service of Canada.

Swanson, J. W., Swartz, M. S., Van Dorn, R. A., Elbogen, E. B., Wagner, H. R., Rosenheck, R. A., ... & Lieberman, J. A. (2006). A national study of violent behavior in persons with schizophrenia. *Archives of general psychiatry*, 63(5), 490-499.

Tamatea, A., & Wilson, N. (2009). *Dynamic Risk Assessment for Offender Re-entry (DRAOR): A pilot study*. New Zealand Department of Corrections.

Teplin, L. A. (1984). Criminalizing mental disorder: The comparative arrest rate of the mentally ill. *American Psychologist*, 39(7), 794-803.

Teplin, L. A. (2000). Keeping the peace: police discretion and mentally ill persons. *National Institute of Justice Journal*, 244, 8-15.

Teplin, L. A., McClelland, G. M., Abram, K. M., & Weiner, D. A. (2005). Crime victimization in adults with severe mental illness: comparison with the National Crime Victimization Survey. *Archives of General Psychiatry*, 62(8), 911-921.

Toch, H., & Adams, K. (1987). The prison as dumping ground: mainlining disturbed offenders. *The Journal of Psychiatry & Law*, 15(4), 539-553.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Travis, J. (2001). *But they all come back: Rethinking prisoner re-entry*. Washington, DC: United States.

Travis, L. F., & Stacey, J. (2010). A half century of parole rules: Conditions of parole in the United States, 2008. *Journal of Criminal Justice*, 38(4), 604-608. doi: <https://doi.org/10.1016/j.jcrimjus.2010.04.032>

Troquete, N. A., van den Brink, R. H., Beintema, H., Mulder, T., van Os, T. W., Schoevers, R. A., & Wiersma, D. (2015). Predictive validity of the Short-Term Assessment of Risk and Treatability for violent behavior in outpatient forensic psychiatric patients. *Psychological assessment*, 27(2), 377-391. doi: <http://dx.doi.org/10.1037/a0038270>

Valuri, G. M., Morgan, F., Jablensky, A., Ambrosi, T. L., & Morgan, V. A. (2019). Impact of substance use and other risk factor exposures on conviction rates by people with a psychotic illness and other mental disorders. *Social psychiatry and psychiatric epidemiology*, 1-9. doi:10.1007/s00127-019-01751-5

van den Brink, R. H., Troquete, N. A., Beintema, H., Mulder, T., van Os, T. W., Schoevers, R. A., & Wiersma, D. (2015). Risk assessment by client and case manager for shared decision making in outpatient forensic psychiatry. *BMC psychiatry*, 15(1), 1-10. doi: 10.1186/s12888-015-0500-3

Van Deinse, T. B., Cuddeback, G. S., Wilson, A. B., & Burgin, S. E. (2018). Probation officers' perceptions of supervising probationers with mental illness in rural and urban settings. *American Journal of Criminal Justice*, 43(2), 267-277. doi: 10.1007/s12103-017-9392-8

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

- Van de Schoot, R., Lugtig, P., & Hox, J. (2012). A checklist for testing measurement invariance. *European Journal of Developmental Psychology*, 9(4), 486-492. doi: 10.1080/17405629.2012.686740
- Van Horn, S. A., Morgan, R. D., Brusman-Lovins, L., Littlefield, A. K., Hunter, J. T., Gigax, G., & Ridley, K. (2018). Changing lives and changing outcomes: "What works" in an intervention for justice-involved persons with mental illness. *Psychological services*, 16(4), 693-700. doi: <http://dx.doi.org/10.1037/ser0000248>
- Viglione, J., Rudes, D. S., & Taxman, F. S. (2015). Misalignment in supervision: Implementing risk/needs assessment instruments in probation. *Criminal Justice and Behavior*, 42(3), 263-285. doi: <https://doi.org/10.1177/0093854814548447>
- Viljoen, J. L., Beneteau, J. L., Gulbransen, E., Brodersen, E., Desmarais, S. L., Nicholls, T. L., & Cruise, K. R. (2012). Assessment of multiple risk outcomes, strengths, and change with the START: AV: A short-term prospective study with adolescent offenders. *International journal of forensic mental health*, 11(3), 165-180. doi:10.1080/14999013.2012.737407
- Vincent, G. M., Paiva-Salisbury, M. L., Cook, N. E., Guy, L. S., & Perrault, R. T. (2012). Impact of risk/needs assessment on juvenile probation officers' decision making: Importance of implementation. *Psychology, Public Policy, and Law*, 18(4), 549-576. doi: 10.1037/a0027186
- Volavka, J. (2014). Comorbid personality disorders and violent behavior in psychotic patients. *Psychiatric quarterly*, 85(1), 65-78. doi 10.1007/s11126-013-9273-3

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

- de Vries Robbé, M., de Vogel, V., Koster, K., & Bogaerts, S. (2015). Assessing protective factors for sexually violent offending with the SAPROF. *Sexual Abuse, 27*(1), 51-70. doi: 10.1177/1079063214550168
- Walters, G. D., & Crawford, G. (2014). Major mental illness and violence history as predictors of institutional misconduct and recidivism: Main and interaction effects. *Law and human behavior, 38*(3), 238-247. doi: 10.1037/lhb0000058
- Wang, J., & Wang, X. (2012). *Structural equation modeling: Applications using mplus*. Retrieved from <https://ebookcentral-proquest-com.proxy.library.carleton.ca>
- Ward, T. (2002). The management of risk and the design of good lives. *Australian Psychologist, 37*(3), 172-179. doi: 10.1080/00050060210001706846
- Ward, T. (2017). Prediction and agency: The role of protective factors in correctional rehabilitation and desistance. *Aggression and violent behavior, 32*, 19-28. doi: <http://dx.doi.org/10.1016/j.avb.2016.11.012>
- Ward, T., & McDonald, I. (2016). Title of chapter. In C. Trotter, G. McIvor, & F. McNeill (Eds.), *Beyond the Risk Paradigm – Rethinking Practices in Criminal Justice*. London, UK: Routledge.
- Ward, T., Day, A., Howells, K., & Birgden, A. (2004). The multifactor offender readiness model. *Aggression and violent behavior, 9*(6), 645-673. doi:10.1016/j.avb.2003.08.001
- Watson, A. C., Ottati, V., Lurigio, A., & Heyrman, M. (2005). Stigma and the police. *On the stigma of mental illness, 197-217*. doi: <http://dx.doi.org/10.1037/10887-009>

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

- Webster, C. D., Douglas, K. S., Eaves, D., & Hart, S. D. (1997). *HCR-20: Assessing risk for violence (Version 2)*. Burnaby, BC: Mental Health, Law, and Policy Institute, Simon Fraser University.
- Webster, C. D., Martin, M. L., Brink, J., Nicholls, T. L., & Middleton, C. (2004). *Manual for the Short-Term Assessment of Risk and Treatability (START), Version 1.0 (consultation ed.)*. St. Joseph's Healthcare Hamilton: Ontario, Canada—Forensic Psychiatric Services Commission: Port Coquitlam, British Columbia, Canada.
- White, M. C., Chafetz, L., Collins-Bride, G., & Nickens, J. (2006). History of arrest, incarceration and victimization in community-based severely mentally ill. *Journal of Community Health, 31*(2), 123-135. doi: 10.1007/s10900-005-9005-1
- Wilson, C. M., Desmarais, S. L., Nicholls, T. L., & Brink, J. (2010). The role of client strengths in assessments of violence risk using the Short-Term Assessment of Risk and Treatability (START). *International Journal of Forensic Mental Health, 9*(4), 282-293. doi: 10.1080/14999013.2010.534694
- Witt, K., Van Dorn, R., & Fazel, S. (2013). Risk factors for violence in psychosis: systematic review and meta-regression analysis of 110 studies. *PloS one, 8*(2), 1-15 doi:10.1371/journal.pone.0055942
- Woldgabreal, Y., Day, A., & Ward, T. (2014). The community-based supervision of offenders from a positive psychology perspective. *Aggression and violent behavior, 19*(1), 32-41. doi: <http://dx.doi.org/10.1016/j.avb.2013.12.001>

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

- Yang, M., Guo, B., Olver, M. E., Polaschek, D. L., & Wong, S. C. (2017). Assessing associations between changes in risk and subsequent reoffending: An introduction to relevant statistical models. *Criminal Justice and Behavior*, 44(1), 59-84. doi: 10.1177/0093854816678648
- Yesberg, J. A., & Polaschek, D. L. (2015). Assessing dynamic risk and protective factors in the community: Examining the validity of the Dynamic Risk Assessment for Offender Re-entry. *Psychology, Crime & Law*, 21(1), 80-99. doi: 10.1080/1068316X.2014.935775
- Yesberg, J. A., Scanlan, J. M., Hanby, L. J., Serin, R. C., & Polaschek, D. L. (2015). Predicting women's recidivism: Validating a dynamic community-based 'gender-neutral' tool. *Probation Journal*, 62(1), 33-48. doi: 10.1177/0264550514562851
- Yoon, J. (2011). Effect of increased private share of inpatient psychiatric resources on jail population growth: Evidence from the United States. *Social Science & Medicine*, 72(4), 447-455. doi:10.1016/j.socscimed.2010.07.023
- Zinger, I. (2012, June 18). *Mental Health in Federal Corrections*. Paper presented at the CASHRA Annual Conference, Winnipeg, Manitoba. Retrieved from <http://www.oci-bec.gc.ca/cnt/comm/pdf/presentations/presentations20120618-eng.pdf>

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Appendix A: Psychometric Properties of the Baseline DRAOR Assessment

Table A1

Polychoric Correlations of DRAOR Items for Offenders with and without a Mental Disorder Diagnosis

	Offenders without mental disorder																		
	S1	S2	S3	S4	S5	S6	A1	A2	A3	A4	A5	A6	A7	P1	P2	P3	P4	P5	P6
S1	-																		
S2	0.44	-																	
S3	0.45	0.37	-																
S4	0.42	0.32	0.62	-															
S5	0.34	0.67	0.34	0.41	-														
S6	0.34	0.45	0.33	0.37	0.51	-													
A1	0.40	0.21	0.44	0.44	0.16	0.13	-												
A2	0.24	0.56	0.35	0.25	0.58	0.47	0.15	-											
A3	0.26	0.31	0.23	0.28	0.31	0.21	0.11	0.31	-										
A4	0.17	0.24	0.24	0.24	0.26	0.31	0.19	0.28	0.15	-									
A5	0.34	0.18	0.25	0.32	0.21	0.17	0.29	0.16	0.13	0.21	-								
A6	0.41	0.24	0.34	0.41	0.30	0.37	0.11	0.34	0.27	0.24	0.18	-							
A7	0.33	0.25	0.28	0.33	0.22	0.24	0.20	0.24	0.20	0.24	0.27	0.40	-						
P1	-0.30	-0.56	-0.29	-0.37	-0.47	-0.37	-0.23	-0.31	-0.20	-0.18	-0.31	-0.23	-0.22	-					
P2	-0.28	-0.31	-0.34	-0.32	-0.37	-0.30	-0.35	-0.28	-0.27	-0.18	-0.30	-0.30	-0.20	0.55	-				
P3	-0.20	-0.31	-0.33	-0.36	-0.29	-0.30	-0.15	-0.27	-0.09	-0.23	-0.31	-0.23	-0.26	0.46	0.64	-			
P4	-0.33	-0.38	-0.33	-0.39	-0.31	-0.24	-0.29	-0.19	-0.29	-0.16	-0.23	-0.21	-0.13	0.59	0.62	0.56	-		
P5	-0.28	-0.26	-0.11	-0.22	-0.26	-0.31	-0.11	-0.27	-0.18	-0.19	-0.26	-0.26	-0.31	0.44	0.41	0.59	0.48	-	
P6	-0.39	-0.33	-0.34	-0.34	-0.38	-0.40	-0.24	-0.41	-0.22	-0.23	-0.28	-0.33	-0.30	0.59	0.59	0.60	0.57	0.74	-

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table A1 *Continued.*

	Offenders with mental disorder																		
	S1	S2	S3	S4	S5	S6	A1	A2	A3	A4	A5	A6	A7	P1	P2	P3	P4	P5	P6
S1	-																		
S2	0.36	-																	
S3	0.47	0.36	-																
S4	0.57	0.34	0.73	-															
S5	0.21	0.58	0.29	0.31	-														
S6	0.33	0.36	0.33	0.38	0.34	-													
A1	0.43	0.30	0.57	0.44	0.23	0.13	-												
A2	0.22	0.55	0.34	0.29	0.46	0.46	0.21	-											
A3	0.13	0.17	0.20	0.17	0.17	0.25	-0.02	0.33	-										
A4	0.24	0.21	0.37	0.32	0.21	0.27	0.31	0.30	0.21	-									
A5	0.30	0.21	0.24	0.33	0.15	0.12	0.26	0.08	0.01	0.20	-								
A6	0.45	0.18	0.30	0.37	0.17	0.33	0.24	0.22	0.13	0.21	0.25	-							
A7	0.37	0.09	0.28	0.29	0.14	0.21	0.17	0.08	0.10	0.19	0.14	0.33	-						
P1	-0.33	-0.48	-0.40	-0.41	-0.43	-0.29	-0.29	-0.34	-0.04	-0.16	-0.22	-0.24	-0.06	-					
P2	-0.38	-0.42	-0.37	-0.38	-0.27	-0.28	-0.36	-0.26	-0.09	-0.18	-0.29	-0.26	-0.15	0.52	-				
P3	-0.22	-0.26	-0.30	-0.31	-0.24	-0.28	-0.22	-0.15	0.04	-0.12	-0.19	-0.17	-0.28	0.42	0.66	-			
P4	-0.32	-0.30	-0.35	-0.39	-0.23	-0.23	-0.31	-0.17	0.06	-0.21	-0.33	-0.24	-0.08	0.43	0.62	0.51	-		
P5	-0.28	-0.19	-0.19	-0.25	-0.14	-0.35	-0.19	-0.16	0.06	-0.07	-0.14	-0.21	-0.31	0.33	0.44	0.59	0.42	-	
P6	-0.36	-0.37	-0.37	-0.36	-0.24	-0.25	-0.32	-0.21	-0.02	-0.07	-0.25	-0.15	-0.18	0.52	0.66	0.64	0.57	0.64	-

Note. S1 = Peer associations; S2 = Attitudes towards authority; S3 = Impulse control; S4 = Problem-solving; S5 = Sense of entitlement; S6 = Attachment with others; A1 = Substance abuse; A2 = Anger; A3 = Access to victims; A4 = Negative mood; A5 = Employment; A6 = Interpersonal relationships; A7 = Living situation; P1 = Responsiveness to advice; P2 = Prosocial identity; P3 = High expectations; P4 = Costs/Benefits; P5 = Social support; P6 = Social control.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table A2

Item-Total Correlations for the Stable Subscale for Offenders with and without a Mental Disorder

	Offenders without a mental disorder		Offenders with a mental disorder	
	Correlation	Alpha if item removed	Correlation	Alpha if item removed
Peer associations	0.69***	0.80 (0.77 – 0.83)	0.71***	0.77 (0.74 – 0.80)
Attitudes towards authority	0.77***	0.78 (0.75 – 0.81)	0.74***	0.78 (0.73 – 0.80)
Impulse control	0.75***	0.79 (0.76 – 0.82)	0.77***	0.75 (0.72 – 0.79)
Problem-solving	0.75***	0.78 (0.75 – 0.82)	0.81***	0.74 (0.70 – 0.78)
Sense of entitlement	0.77***	0.78 (0.74 – 0.81)	0.70***	0.79 (0.75 – 0.82)
Attachment with others	0.71***	0.80 (0.77 – 0.82)	0.68***	0.78 (0.75 – 0.82)

^{ns} not significant, * $p < .05$, ** $p < .01$, *** $p < .001$.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table A3

Item-Total Correlations for the Acute Subscale for Offenders with and without a Mental Disorder

	Offenders without a mental disorder		Offenders with a mental disorder	
	Correlation	Alpha if item removed	Correlation	Alpha if item removed
Substance abuse	0.57***	0.66 (0.61 – 0.70)	0.61***	0.57 (0.52 – 0.63)
Anger	0.62***	0.62 (0.56 – 0.67)	0.59***	0.57 (0.51 – 0.63)
Access to victims	0.55***	0.65 (0.60 – 0.70)	0.47***	0.62 (0.56 – 0.67)
Negative mood	0.57***	0.63 (0.58 – 0.68)	0.65***	0.55 (0.48 – 0.61)
Employment	0.64***	0.64 (0.59 – 0.69)	0.57***	0.60 (0.54 – 0.65)
Interpersonal relationships	0.65***	0.61 (0.56 – 0.67)	0.63***	0.55 (0.49 – 0.61)
Living situation	0.64***	0.61 (0.56 – 0.66)	0.53***	0.59 (0.53 – 0.65)

^{ns} not significant, * $p < .05$, ** $p < .01$, *** $p < .001$.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table A4

Item-Total Correlations for the Protective Factors Subscale for Offenders with and without a Mental Disorder

	Offenders without a mental disorder		Offenders with a mental disorder	
	Correlation	Alpha if item removed	Correlation	Alpha if item removed
Responsiveness to advice	0.77***	0.87 (0.85 – 0.89)	0.70***	0.87 (0.85 – 0.89)
Prosocial identity	0.81***	0.86 (0.84 – 0.88)	0.85***	0.84 (0.81 – 0.86)
High expectations	0.83***	0.86 (0.84 – 0.88)	0.84***	0.84 (0.82 – 0.86)
Cost/Benefits	0.82***	0.86 (0.84 – 0.88)	0.78***	0.85 (0.83 – 0.88)
Social support	0.78***	0.87 (0.85 – 0.89)	0.76***	0.86 (0.84 – 0.88)
Social control	0.86***	0.85 (0.83 – 0.87)	0.87***	0.83 (0.81 – 0.85)

^{ns} not significant, * $p < .05$, ** $p < .01$, *** $p < .001$.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table A5

Item-Total Correlations for The Risk Factor (Amalgamating the Stable and Acute Subscales) For Offenders with and without a Mental Disorder

	Offenders without a mental disorder		Offenders with a mental disorder	
	Correlation	Alpha if item removed	Correlation	Alpha if item removed
Peer associations	0.67***	0.83 (0.81 – 0.85)	0.67***	0.81 (0.79 – 0.84)
Attitudes towards authority	0.68***	0.83 (0.81 – 0.85)	0.64***	0.82 (0.79 – 0.84)
Impulse control	0.69***	0.83 (0.81 – 0.85)	0.73***	0.81 (0.78 – 0.83)
Problem-solving	0.71***	0.83 (0.81 – 0.85)	0.74***	0.81 (0.78 – 0.83)
Sense of entitlement	0.69***	0.83 (0.81 – 0.85)	0.60***	0.82 (0.80 – 0.84)
Attachment with others	0.63***	0.84 (0.81 – 0.86)	0.61***	0.82 (0.79 – 0.84)
Substance abuse	0.52***	0.85 (0.83 – 0.87)	0.59***	0.82 (0.80 – 0.84)
Anger	0.64***	0.83 (0.81 – 0.86)	0.62***	0.82 (0.79 – 0.84)
Access to victims	0.50***	0.85 (0.83 – 0.87)	0.40***	0.84 (0.81 – 0.86)
Negative mood	0.49***	0.85 (0.83 – 0.87)	0.56***	0.82 (0.80 – 0.85)
Employment	0.53***	0.85 (0.83 – 0.87)	0.48***	0.83 (0.81 – 0.85)
Interpersonal relationships	0.61***	0.84 (0.82 – 0.86)	0.57***	0.82 (0.80 – 0.85)
Living situation	0.55***	0.84 (0.82 – 0.86)	0.47***	0.83 (0.81 – 0.85)

^{ns} not significant, * $p < .05$, ** $p < .01$, *** $p < .001$.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Appendix B: ROC Curve Figures

Figure B1. ROC Curve for the DRAOR Stable subscale predicting any recidivism.

Figure B2. ROC Curve for the DRAOR Acute subscale predicting any recidivism.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Figure B3. ROC Curve for the DRAOR Protective Factors subscale predicting any recidivism.

Figure B4. ROC Curve for the amalgamated Risk Factor (Stable + Acute) predicting any recidivism.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Figure B5. ROC Curve for the DRAOR Stable subscale predicting new charges.

Figure B6. ROC Curve for the DRAOR Acute subscale predicting new charges.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Figure B7. ROC Curve for the DRAOR Protective Factors subscale predicting new charges.

Figure B8. ROC Curve for the total DRAOR score predicting new charges.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Figure B9. ROC Curve for the amalgamated Risk Factor (Stable + Acute) predicting new charges.

Figure B10. ROC Curve for the DRAOR Stable subscale predicting technical violations.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Figure X. ROC Curve for the DRAOR Acute subscale predicting technical violations.

Figure X. ROC Curve for the DRAOR Protective Factors subscale predicting technical violations.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Figure X. ROC Curve for the total DRAOR score predicting technical violations.

Figure X. ROC Curve for the amalgamated Risk Factor (Stable + Acute) predicting technical violations.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Appendix C: Calibration Results

Table C1

E/O Index Assessing the Calibration Between Observed and Expected Recidivism Numbers for Any Recidivism with DRAOR Total Score

DRAOR Total Score		Observed			Expected		E/O Index	Lower 95% CI	Upper 95% CI
		N	n recidivists	%	Proportion	Expected n recidivists			
-12	very low	0	0	0.0%	0.000	0.000			
-11	very low	1	0	0.0%	0.000	0.000			
-10	very low	0	0	14.3%	0.143	0.000			
-9	very low	5	0	16.7%	0.167	0.835			
-8	very low	6	3	0.0%	0.000	0.000	0.000	0.000	0.000
-7	very low	6	0	12.5%	0.125	0.750			
-6	very low	4	1	7.7%	0.077	0.308	0.308	0.043	2.187
-5	very low	9	4	21.4%	0.214	1.926	0.482	0.181	1.283
-4	low	8	3	0.0%	0.000	0.000	0.000	0.000	0.000
-3	low	7	1	21.1%	0.211	1.477	1.477	0.208	10.486
-2	low	9	3	25.0%	0.250	2.250	0.750	0.242	2.325
-1	low	12	2	12.5%	0.125	1.500	0.750	0.188	2.999
0	low	20	5	16.0%	0.160	3.200	0.640	0.266	1.538
1	low	16	4	26.9%	0.269	4.304	1.076	0.404	2.867
2	low	26	7	17.4%	0.174	4.524	0.646	0.308	1.356
3	low	30	10	16.1%	0.161	4.830	0.483	0.260	0.898
4	medium	35	12	43.8%	0.438	15.330	1.278	0.725	2.250
5	medium	25	10	36.4%	0.364	9.100	0.910	0.490	1.691

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table C1 *Continued.*

DRAOR Total Score		Observed			Expected				
		N	n	%	Proportion	Expected n recidivists	E/O Index	Lower 95% CI	Upper 95% CI
			recidivists						
6	medium	21	12	41.7%	0.417	8.757	0.730	0.414	1.285
7	medium	28	12	40.0%	0.400	11.200	0.933	0.530	1.643
8	medium	30	12	50.0%	0.500	15.000	1.250	0.710	2.201
9	medium	35	18	30.8%	0.308	10.780	0.599	0.377	0.951
10	medium	31	8	41.2%	0.412	12.772	1.597	0.798	3.192
11	high	25	5	57.1%	0.571	14.275	2.855	1.188	6.859
12	high	17	7	61.5%	0.615	10.455	1.494	0.712	3.133
13	high	9	4	50.0%	0.500	4.500	1.125	0.422	2.998
14	high	14	4	72.7%	0.727	10.178	2.545	0.955	6.780
15	high	14	7	50.0%	0.500	7.000	1.000	0.477	2.098
16	high	12	5	60.0%	0.600	7.200	1.440	0.599	3.460
17	high	3	0	50.0%	0.500	1.500			
18	high	8	4	33.3%	0.333	2.664	0.666	0.250	1.775
19	very high	4	1	50.0%	0.500	2.000	2.000	0.282	14.199
20	very high	3	1	0.0%	0.000	0.000	0.000	0.000	0.000
21	very high	0	1	50.0%	0.500	0.000	0.000	0.000	0.000
22	very high	1	0	0.0%	0.000	0.000			
23	very high	3	1	0.0%	0.000	0.000			
24	very high	0	0	0.0%	0.000	0.000			
25	very high	1	1	0.0%	0.000	0.000			
26	very high	0	0	0.0%	0.000	0.000			

Note. Confidence Intervals (Cis) that contain 1 indicate that the observed and expected number of recidivists do not significantly differ.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table C2

E/O Index Assessing the Calibration Between Observed and Expected Recidivism Numbers for New Charges with DRAOR Total Score

		Observed		Expected			E/O Index	Lower 95% CI	Upper 95% CI
DRAOR Total Score		N	n recidivists	%	Proportion	Expected n recidivists			
-12	very low	0	0	0.0%	0.0000	0.000			
-11	very low	1	0	0.0%	0.0000	0.000			
-10	very low	0	0	0.0%	0.0000	0.000			
-9	very low	5	0	16.7%	0.1670	0.835			
-8	very low	6	2	0.0%	0.0000	0.000			
-7	very low	6	0	12.5%	0.1250	0.750			
-6	very low	4	0	7.7%	0.0770	0.308			
-5	very low	9	4	14.3%	0.1430	1.287	0.322	0.121	0.857
-4	low	8	2	0.0%	0.0000	0.000	0.000	0.000	0.000
-3	low	7	1	0.0%	0.0000	0.000	0.000	0.000	0.000
-2	low	9	1	12.5%	0.1250	1.125	1.125	0.158	7.987
-1	low	12	1	12.5%	0.1250	1.500	1.500	0.211	10.649
0	low	20	1	8.0%	0.0800	1.600	1.600	0.225	11.359
1	low	16	1	15.4%	0.1540	2.464	2.464	0.347	17.493
2	low	26	4	4.4%	0.0440	1.144	0.286	0.107	0.762
3	low	30	4	6.5%	0.0650	1.950	0.488	0.183	1.299
4	medium	35	6	18.8%	0.1880	6.580	1.097	0.493	2.441
5	medium	25	5	21.2%	0.2120	5.300	1.060	0.441	2.547
6	medium	21	6	22.2%	0.2220	4.662	0.777	0.349	1.730
7	medium	28	6	16.0%	0.1600	4.480	0.747	0.335	1.662
8	medium	30	6	22.2%	0.2220	6.660	1.110	0.499	2.471

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table C2 *Continued.*

		Observed			Expected		E/O Index	Lower 95% CI	Upper 95% CI
DRAOR Total Score		N	n recidivists	%	Proportion	Expected n recidivists			
9	medium	35	9	7.7%	0.0770	2.695	0.299	0.156	0.576
10	medium	31	3	23.5%	0.2350	7.285	2.428	0.783	7.529
11	high	25	3	33.3%	0.3330	8.325	2.775	0.895	8.604
12	high	17	4	30.8%	0.3080	5.236	1.309	0.491	3.488
13	high	9	2	20.0%	0.2000	1.800	0.900	0.225	3.599
14	high	14	1	36.4%	0.3640	5.096	5.096	0.718	36.178
15	high	14	2	33.3%	0.3330	4.662	2.331	0.583	9.321
16	high	12	1	40.0%	0.4000	4.800	4.800	0.676	34.077
17	high	3	0	50.0%	0.5000	1.500			
18	high	8	1	33.3%	0.3330	2.664	2.664	0.375	18.913
19	very high	4	0	50.0%	0.5000	2.000			
20	very high	3	1	0.0%	0.0000	0.000	0.000	0.000	0.000
21	very high	0	0	50.0%	0.5000	0.000			
22	very high	1	0	0.0%	0.0000	0.000			
23	very high	3	0			0.000			
24	very high	0	0			0.000			
25	very high	1	0			0.000			
26	very high	0	0	0.0%	0.0000	0.000			

Note. Confidence Intervals (Cis) that contain 1 indicate that the observed and expected number of recidivists do not significantly differ.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table C3

E/O Index Assessing the Calibration Between Observed and Expected Recidivism Numbers for Technical Violations with DRAOR Total Score

DRAOR Total Score		Observed			Expected		E/O Index	Lower 95% CI	Upper 95% CI
		N	n recidivists	%	Proportion	Expected n recidivists			
-12	very low	0	0	0.0%	0.000	0.000			
-11	very low	1	0	0.0%	0.000	0.000			
-10	very low	0	0	14.3%	0.143	0.000			
-9	very low	5	0	16.7%	0.167	0.835			
-8	very low	6	3	0.0%	0.000	0.000	0.000	0.000	0.000
-7	very low	6	0	0.0%	0.000	0.000			
-6	very low	4	1	0.0%	0.000	0.000	0.000	0.000	0.000
-5	very low	9	1	7.1%	0.071	0.639	0.639	0.090	4.536
-4	low	8	1	0.0%	0.000	0.000	0.000	0.000	0.000
-3	low	7	0	21.1%	0.211	1.477			
-2	low	9	2	12.5%	0.125	1.125	0.563	0.141	2.249
-1	low	12	2	4.2%	0.042	0.504	0.252	0.063	1.008
0	low	20	4	12.0%	0.120	2.400	0.600	0.225	1.599
1	low	16	4	15.4%	0.154	2.464	0.616	0.231	1.641
2	low	26	5	17.4%	0.174	4.524	0.905	0.377	2.174
3	low	30	7	12.9%	0.129	3.870	0.553	0.264	1.160
4	medium	35	9	34.4%	0.344	12.040	1.338	0.696	2.571
5	medium	25	8	24.2%	0.242	6.050	0.756	0.378	1.512
6	medium	21	10	27.8%	0.278	5.838	0.584	0.314	1.085

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table C3 *Continued.*

DRAOR Total Score		Observed			Expected		E/O Index	Lower 95% CI	Upper 95% CI
		N	n recidivists	%	Proportion	Expected n recidivists			
7	medium	28	8	32.0%	0.320	8.960	1.120	0.560	2.240
8	medium	30	7	38.9%	0.389	11.670	1.667	0.795	3.497
9	medium	35	17	30.8%	0.308	10.780	0.634	0.394	1.020
10	medium	31	6	23.5%	0.235	7.285	1.214	0.545	2.703
11	high	25	2	28.6%	0.286	7.150	3.575	0.894	14.295
12	high	17	5	46.2%	0.462	7.854	1.571	0.654	3.774
13	high	9	2	30.0%	0.300	2.700	1.350	0.338	5.398
14	high	14	4	36.4%	0.364	5.096	1.274	0.478	3.395
15	high	14	6	16.7%	0.167	2.338	0.390	0.175	0.867
16	high	12	4	60.0%	0.600	7.200	1.800	0.676	4.796
17	high	3	0	50.0%	0.500	1.500			
18	high	8	3	0.0%	0.000	0.000	0.000	0.000	0.000
19	very high	4	1	50.0%	0.500	2.000	2.000	0.282	14.199
20	very high	3	0	0.0%	0.000	0.000			
21	very high	0	0	50.0%	0.500	0.000			
22	very high	1	0	0.0%	0.000	0.000			
23	very high	3	1			0.000	0.000	0.000	0.000
24	very high	0	0			0.000			
25	very high	1	1			0.000	0.000	0.000	0.000
26	very high	0	0	0.0%	0.000	0.000			

Note. Confidence Intervals (Cis) that contain 1 indicate that the observed and expected number of recidivists do not significantly differ.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Appendix D: Psychometric Properties of the DRAOR over Time

Table D1

Polychoric Correlations of DRAOR Items at Time One (1-2 Months)

	S1	S2	S3	S4	S5	S6	A1	A2	A3	A4	A5	A6	A7	P1	P2	P3	P4	P5	P6
S1	-																		
S2	0.33	-																	
S3	0.34	0.27	-																
S4	0.36	0.23	0.69	-															
S5	0.10	0.59	0.13	0.13	-														
S6	0.18	0.24	0.23	0.21	0.39	-													
A1	0.29	0.24	0.30	0.24	0.07	0.04	-												
A2	0.19	0.58	0.22	0.12	0.46	0.36	0.06	-											
A3	0.02	0.18	0.30	0.24	0.16	0.14	-0.04	0.25	-										
A4	0.14	0.18	0.32	0.37	0.14	0.20	0.22	0.25	0.08	-									
A5	0.28	0.22	0.20	0.24	0.11	0.05	0.13	-0.02	0.10	0.13	-								
A6	0.40	0.13	0.34	0.39	0.10	0.19	0.13	0.16	0.05	0.27	0.14	-							
A7	0.32	0.07	0.22	0.35	0.17	0.21	-0.01	0.20	0.30	0.19	0.20	0.34	-						
P1	-0.38	-0.44	-0.33	-0.36	-0.46	-0.24	-0.36	-0.31	-0.10	-0.29	-0.23	-0.21	-0.06	-					
P2	-0.24	-0.24	-0.27	-0.24	-0.32	-0.22	-0.35	-0.02	-0.06	-0.05	-0.11	-0.20	0.01	0.39	-				
P3	-0.09	-0.22	-0.33	-0.38	-0.25	-0.23	-0.17	0.02	-0.06	-0.12	-0.18	-0.22	-0.20	0.41	0.65	-			
P4	-0.31	-0.27	-0.27	-0.25	-0.26	-0.25	-0.30	-0.21	-0.08	-0.06	-0.16	-0.18	0.02	0.42	0.65	0.41	-		
P5	-0.24	-0.23	-0.24	-0.22	-0.13	-0.33	-0.16	-0.07	0.14	-0.28	-0.17	-0.21	-0.33	0.41	0.29	0.55	0.43	-	
P6	-0.18	-0.32	-0.29	-0.24	-0.23	-0.23	-0.26	-0.07	0.02	-0.18	-0.10	-0.06	-0.06	0.49	0.60	0.64	0.52	0.65	-

Note. S1 = Peer associations; S2 = Attitudes towards authority; S3 = Impulse control; S4 = Problem-solving; S5 = Sense of entitlement; S6 = Attachment with others; A1 = Substance abuse; A2 = Anger; A3 = Access to victims; A4 = Negative mood; A5 = Employment; A6 = Interpersonal relationships; A7 = Living situation; P1 = Responsiveness to advice; P2 = Prosocial identity; P3 = High expectations; P4 = Costs/Benefits; P5 = Social support; P6 = Social control.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table D2

Polychoric Correlations of DRAOR Items at Time Two (3-4 Months)

	S1	S2	S3	S4	S5	S6	A1	A2	A3	A4	A5	A6	A7	P1	P2	P3	P4	P5	P6
S1	-																		
S2	0.36	-																	
S3	0.36	0.16	-																
S4	0.48	0.23	0.68	-															
S5	0.16	0.61	0.16	0.21	-														
S6	0.17	0.20	0.21	0.17	0.35	-													
A1	0.39	0.27	0.33	0.27	0.17	0.06	-												
A2	0.18	0.57	0.17	0.17	0.45	0.36	0.03	-											
A3	0.05	0.28	0.38	0.27	0.18	0.17	0.08	0.22	-										
A4	0.09	0.17	0.32	0.12	0.13	0.15	0.18	0.25	0.08	-									
A5	0.28	0.21	0.25	0.33	0.23	0.10	0.11	0.01	0.05	0.02	-								
A6	0.29	0.11	0.34	0.38	0.08	0.21	0.12	0.13	0.08	0.23	0.06	-							
A7	0.29	0.11	0.30	0.35	0.21	0.25	0.12	0.11	0.25	0.22	0.19	0.22	-						
P1	-0.36	-0.45	-0.35	-0.31	-0.43	-0.12	-0.01	-0.35	-0.12	-0.17	-0.34	-0.13	-0.10	-					
P2	-0.25	-0.25	-0.21	-0.20	-0.25	-0.10	-0.40	-0.04	-0.11	-0.07	-0.25	-0.12	0.02	0.45	-				
P3	-0.19	-0.22	-0.34	-0.37	-0.23	-0.18	-0.38	0.06	-0.15	-0.08	-0.25	-0.30	-0.26	0.40	0.64	-			
P4	-0.27	-0.27	-0.23	-0.23	-0.26	-0.10	-0.22	-0.14	-0.07	-0.04	-0.29	-0.08	0.01	0.47	0.59	0.42	-		
P5	-0.29	-0.15	-0.34	-0.29	-0.14	-0.34	-0.31	-0.01	0.07	-0.21	-0.18	-0.18	-0.44	0.29	0.21	0.46	0.35	-	
P6	-0.34	-0.32	-0.32	-0.25	-0.21	-0.23	-0.37	-0.10	-0.12	-0.18	-0.25	-0.05	-0.19	0.43	0.52	0.58	0.52	0.67	-

Note. S1 = Peer associations; S2 = Attitudes towards authority; S3 = Impulse control; S4 = Problem-solving; S5 = Sense of entitlement; S6 = Attachment with others; A1 = Substance abuse; A2 = Anger; A3 = Access to victims; A4 = Negative mood; A5 = Employment; A6 = Interpersonal relationships; A7 = Living situation; P1 = Responsiveness to advice; P2 = Prosocial identity; P3 = High expectations; P4 = Costs/Benefits; P5 = Social support; P6 = Social control.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table D3

Polychoric Correlations of DRAOR Items at Time Three (5-6 Months)

	S1	S2	S3	S4	S5	S6	A1	A2	A3	A4	A5	A6	A7	P1	P2	P3	P4	P5	P6
S1	-																		
S2	0.38	-																	
S3	0.43	0.17	-																
S4	0.51	0.28	0.68	-															
S5	0.21	0.54	0.25	0.26	-														
S6	0.23	0.16	0.22	0.17	0.37	-													
A1	0.46	0.27	0.37	0.27	0.14	0.12	-												
A2	0.20	0.51	0.10	0.08	0.39	0.26	0.16	-											
A3	0.10	0.23	0.39	0.34	0.23	0.21	0.05	0.15	-										
A4	0.14	0.23	0.33	0.47	0.14	0.18	0.11	0.18	0.11	-									
A5	0.39	0.18	0.44	0.40	0.11	0.09	0.30	-0.01	0.08	0.22	-								
A6	0.34	0.20	0.37	0.26	0.21	0.19	0.18	0.21	0.16	0.22	0.10	-							
A7	0.35	0.18	0.30	0.36	0.16	0.14	0.10	0.19	0.27	0.23	0.18	0.21	-						
P1	-0.42	-0.31	-0.35	-0.29	-0.33	-0.12	-0.41	-0.25	-0.20	-0.26	-0.38	-0.09	-0.14	-					
P2	-0.29	-0.26	-0.18	-0.21	-0.23	-0.09	-0.33	-0.06	-0.05	-0.13	-0.28	-0.23	0.08	0.46	-				
P3	-0.19	-0.20	-0.30	-0.28	-0.20	-0.16	-0.16	0.07	-0.11	-0.15	-0.25	-0.26	-0.19	0.44	0.63	-			
P4	-0.28	-0.20	-0.27	-0.29	-0.25	-0.05	-0.31	-0.13	-0.09	-0.17	-0.33	-0.05	-0.05	0.53	0.66	0.37	-		
P5	-0.38	-0.15	-0.42	-0.28	-0.22	-0.24	-0.26	0.07	-0.01	-0.23	-0.28	-0.20	-0.42	0.35	0.15	0.42	0.33	-	
P6	-0.30	-0.31	-0.36	-0.27	-0.19	-0.24	-0.38	-0.10	-0.14	-0.18	-0.32	-0.19	-0.13	0.55	0.49	0.58	0.45	0.62	-

Note. S1 = Peer associations; S2 = Attitudes towards authority; S3 = Impulse control; S4 = Problem-solving; S5 = Sense of entitlement; S6 = Attachment with others; A1 = Substance abuse; A2 = Anger; A3 = Access to victims; A4 = Negative mood; A5 = Employment; A6 = Interpersonal relationships; A7 = Living situation; P1 = Responsiveness to advice; P2 = Prosocial identity; P3 = High expectations; P4 = Costs/Benefits; P5 = Social support; P6 = Social control.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table D4

Item-Total Correlations for The Stable Subscale Across Time

	Time 1 (1-2 months)		Time 2 (3-4 months)		Time 3 (5-6 months)	
	Correlation	Alpha if item removed	Correlation	Alpha if item removed	Correlation	Alpha if item removed
Peer associations	0.61***	0.69 (0.62 – 0.76)	0.68***	0.68 (0.61 – 0.75)	0.72***	0.69 (0.62 – 0.76)
Attitudes towards authority	0.74***	0.65 (0.58 – 0.72)	0.73***	0.67 (0.60 – 0.74)	0.69***	0.71 (0.65 – 0.77)
Impulse control	0.71***	0.65 (0.58 – 0.73)	0.69***	0.67 (0.60 – 0.74)	0.73***	0.69 (0.63 – 0.76)
Problem-solving	0.70***	0.65 (0.58 – 0.73)	0.74***	0.65 (0.57 – 0.72)	0.76***	0.67 (0.60 – 0.74)
Sense of entitlement	0.69***	0.68 (0.62 – 0.75)	0.73***	0.68 (0.61 – 0.75)	0.74***	0.70 (0.64 – 0.76)
Attachment with others	0.63***	0.70 (0.63 – 0.76)	0.59***	0.70 (0.66 – 0.78)	0.59***	0.75 (0.69 – 0.80)

^{ns} not significant, * $p < .05$, ** $p < .01$, *** $p < .001$.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table D5

Item-Total Correlations for The Acute Subscale Across Time

	Time 1 (1-2 months)		Time 2 (3-4 months)		Time 3 (5-6 months)	
	Correlation	Alpha if item removed	Correlation	Alpha if item removed	Correlation	Alpha if item removed
Substance abuse	0.46***	0.56 (0.47 – 0.65)	0.50***	0.50 (0.39 – 0.60)	0.58***	0.54 (0.45 – 0.64)
Anger	0.54***	0.51 (0.41 – 0.61)	0.52***	0.46 (0.35 – 0.57)	0.52***	0.55 (0.45 – 0.64)
Access to victims	0.49***	0.53 (0.43 – 0.63)	0.51***	0.46 (0.35 – 0.57)	0.50***	0.55 (0.46 – 0.65)
Negative mood	0.63***	0.48 (0.37 – 0.58)	0.61***	0.42 (0.30 – 0.54)	0.59***	0.52 (0.43 – 0.62)
Employment	0.56***	0.54 (0.44 – 0.63)	0.52***	0.50 (0.40 – 0.61)	0.60***	0.55 (0.46 – 0.64)
Interpersonal relationships	0.60***	0.49 (0.38 – 0.59)	0.55***	0.45 (0.33 – 0.56)	0.57***	0.52 (0.42 – 0.62)
Living situation	0.61***	0.47 (0.36 – 0.58)	0.58***	0.42 (0.31 – 0.54)	0.61***	0.51 (0.41 – 0.61)

^{ns} not significant, * $p < .05$, ** $p < .01$, *** $p < .001$.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table D6

Item-Total Correlations for The Protective Factors Subscale Across Time

	Time 1 (1-2 months)		Time 2 (3-4 months)		Time 3 (5-6 months)	
	Correlation	Alpha if item removed	Correlation	Alpha if item removed	Correlation	Alpha if item removed
Responsiveness to advice	0.70***	0.85 (0.81 – 0.88)	0.70***	0.83 (0.79 – 0.86)	0.77***	0.81 (0.77 – 0.85)
Prosocial identity	0.79***	0.82 (0.78 – 0.86)	0.79***	0.80 (0.76 – 0.84)	0.78***	0.80 (0.76 – 0.85)
High expectations	0.84***	0.82 (0.78 – 0.86)	0.84***	0.79 (0.75 – 0.84)	0.83***	0.80 (0.76 – 0.84)
Cost/Benefits	0.77***	0.83 (0.80 – 0.87)	0.77***	0.80 (0.76 – 0.85)	0.77***	0.81 (0.77 – 0.85)
Social support	0.77***	0.84 (0.80 – 0.87)	0.71***	0.83 (0.79 – 0.86)	0.68***	0.84 (0.80 – 0.87)
Social control	0.86***	0.81 (0.77 – 0.85)	0.84***	0.79 (0.74 – 0.83)	0.84***	0.79 (0.75 – 0.83)

^{ns} not significant, * $p < .05$, ** $p < .01$, *** $p < .001$.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table D7

Item-Total Correlations for the Risk Factor (Amalgamating the Stable and Acute Subscales) Across Time

	Time 1 (1-2 months)		Time 2 (3-4 months)		Time 3 (5-6 months)	
	Correlation	Alpha if item removed	Correlation	Alpha if item removed	Correlation	Alpha if item removed
Peer associations	0.58***	0.76 (0.72 – 0.81)	0.60***	0.77 (0.72 – 0.81)	0.67***	0.78 (0.74 – 0.83)
Attitudes towards authority	0.64***	0.76 (0.71 – 0.80)	0.65***	0.76 (0.72 – 0.81)	0.62***	0.79 (0.75 – 0.83)
Impulse control	0.66***	0.75 (0.70 – 0.80)	0.69***	0.76 (0.71 – 0.80)	0.73***	0.78 (0.74 – 0.82)
Problem-solving	0.67***	0.75 (0.70 – 0.80)	0.71***	0.75 (0.70 – 0.80)	0.72***	0.78 (0.73 – 0.82)
Sense of entitlement	0.56***	0.77 (0.72 – 0.81)	0.62***	0.77 (0.72 – 0.81)	0.58***	0.79 (0.75 – 0.83)
Attachment with others	0.51***	0.77 (0.73 – 0.82)	0.51***	0.78 (0.73 – 0.82)	0.48***	0.80 (0.76 – 0.84)
Substance abuse	0.42***	0.78 (0.74 – 0.82)	0.47***	0.78 (0.74 – 0.82)	0.53***	0.80 (0.76 – 0.84)
Anger	0.59***	0.76 (0.72 – 0.81)	0.55***	0.77 (0.73 – 0.82)	0.50***	0.80 (0.76 – 0.84)
Access to victims	0.42***	0.78 (0.74 – 0.82)	0.48***	0.78 (0.74 – 0.82)	0.48***	0.80 (0.76 – 0.84)
Negative mood	0.55***	0.77 (0.72 – 0.81)	0.51***	0.78 (0.73 – 0.82)	0.53***	0.80 (0.76 – 0.84)
Employment	0.47***	0.78 (0.74 – 0.82)	0.47***	0.78 (0.74 – 0.83)	0.55***	0.80 (0.76 – 0.84)
Interpersonal relationships	0.55***	0.77 (0.72 – 0.81)	0.49***	0.78 (0.73 – 0.82)	0.53***	0.80 (0.76 – 0.84)
Living situation	0.53***	0.77 (0.72 – 0.81)	0.53***	0.77 (0.73 – 0.82)	0.54***	0.80 (0.76 – 0.84)

ns not significant, * $p < .05$, ** $p < .01$, *** $p < .001$.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Appendix E: Quadratic Hierarchical Modeling Results

Table E1

Quadratic HLM Model Summaries: Total DRAOR Score

Parameters	Model 1: Unconditional	Model 2: Adding Time	Model 3: Adding Mental Disorder Status
Regression coefficients (fixed effects)			
Intercept (γ_{00})	5.39 (0.23)***	5.73 (0.26)***	4.88 (0.36)***
Time (γ_{10})	-	-0.01 (0.003)**	-0.01 (0.01)*
Mental disorder status (γ_{01})	-	-	1.67 (0.51)**
Time*Mental disorder status (γ_{11})	-	-	-0.002 (0.01) ^{ns}
Variance components (random effects)			
Residual (σ^2)	6.57 (0.18)***	3.11 (0.10)***	3.12 (0.10)***
Intercept (τ_{00})	27.94 (1.78)***	33.54 (2.18)***	32.89 (2.14)***
Slope (τ_{11})	-	0.004 (0.000)***	0.004 (0.000)***
Covariance (τ_{01})	-	-0.13 (0.02)***	-0.13 (0.02)***
Model Summary			
-2 Log Likelihood	17,236.1	16,115.1	16,111.2
Number of estimated parameters	3	6	8

Note. Parameter estimate standard errors are listed in parentheses. ^{ns} non-significant, * $p < .05$, ** $p < .01$, *** $p < .001$.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table E2

Quadratic HLM Model Summaries: Stable Subscale

Parameters	Model 1: Unconditional	Model 2: Adding Time	Model 3: Adding Mental Disorder Status
Regression coefficients (fixed effects)			
Intercept (γ_{00})	5.76 (0.09)***	5.86 (0.10)***	5.63 (0.15)***
Time (γ_{10})	-	-0.004 (0.001)***	-0.004 (0.001)*
Mental disorder status (γ_{01})	-	-	0.46 (0.21)*
Time*Mental disorder status (γ_{11})	-	-	-0.0003 (0.002) ^{ns}
Variance components (random effects)			
Residual (σ^2)	0.91 (0.02)***	0.44 (0.01)***	0.44 (0.01)***
Intercept (τ_{00})	4.56 (0.29)***	5.40 (0.35)***	5.36 (0.35)***
Slope (τ_{11})	-	0.001 (0.00)***	0.0006 (0.00)***
Covariance (τ_{01})	-	-0.02 (0.003)***	-0.02 (0.003)***
Model Summary			
-2 Log Likelihood	10,830.4	9,717.9	9,723.9
Number of estimated parameters	3	6	8

Note. Parameter estimate standard errors are listed in parentheses. ^{ns} non-significant, * $p < .05$, ** $p < .01$, *** $p < .001$.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table E3

Quadratic HLM Model Summaries: Acute Subscale

Parameters	Model 1: Unconditional	Model 2: Adding Time	Model 3: Adding Mental Disorder Status
Regression coefficients (fixed effects)			
Intercept (γ_{00})	5.99 (0.10)***	6.16 (0.11)***	5.75 (0.15)***
Time (γ_{10})	-	-0.01 (0.001)***	-0.01 (0.002)**
Mental disorder status (γ_{01})	-	-	0.81 (0.21)***
Time*Mental disorder status (γ_{11})	-	-	0.001 (0.003) ^{ns}
Variance components (random effects)			
Residual (σ^2)	1.47 (0.04)***	0.86 (0.03)***	0.86 (0.03)***
Intercept (τ_{00})	4.77 (0.31)***	5.71 (0.38)***	5.54 (0.37)***
Slope (τ_{11})	-	0.001 (0.000)***	0.001 (0.000)***
Covariance (τ_{01})	-	-0.02 (0.004)***	-0.02 (0.004)***
Model Summary			
-2 Log Likelihood	12,189.6	11,432.4	11,425.6
Number of estimated parameters	3	6	8

Note. Parameter estimate standard errors are listed in parentheses. ^{ns} non-significant, * $p < .05$, ** $p < .01$, *** $p < .001$.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table E4

Quadratic HLM Model Summaries: Protective Factors Subscale

Parameters	Model 1: Unconditional	Model 2: Adding Time	Model 3: Adding Mental Disorder Status
Regression coefficients (fixed effects)			
Intercept (γ_{00})	6.36 (0.10)***	6.30 (0.11)***	6.51 (0.16)***
Time (γ_{10})	-	0.002 (0.001)*	0.001 (0.001) ^{ns}
Mental disorder status (γ_{01})	-	-	-0.43 (0.22) ^{ns}
Time*Mental disorder status (γ_{11})	-	-	0.003 (0.003) ^{ns}
Variance components (random effects)			
Residual (σ^2)	0.93 (0.03)***	0.42 (0.01)***	0.42 (0.01)***
Intercept (τ_{00})	5.15 (0.33)***	6.23 (0.40)***	6.19 (0.40)***
Slope (τ_{11})	-	0.001 (0.000)***	0.0007 (0.000)***
Covariance (τ_{01})	-	-0.02 (0.003)***	-0.02 (0.003)***
Model Summary			
-2 Log Likelihood	10,943.7	9,718.3	9,725.6
Number of estimated parameters	3	6	8

Note. Parameter estimate standard errors are listed in parentheses. ^{ns} non-significant, * $p < .05$, ** $p < .01$, *** $p < .001$.

DRAOR VALIDATION FOR OFFENDERS WITH MENTAL DISORDER

Table E5

HLM Model Summaries: Risk Factor (Stable + Acute subscales)

Parameters	Model 1: Unconditional	Model 2: Adding Time	Model 3: Adding Mental Disorder Status
Regression coefficients (fixed effects)			
Intercept (γ_{00})	11.75 (0.17)***	12.03 (0.19)***	11.39 (0.27)***
Time (γ_{10})	-	-0.01 (0.002)***	-0.01 (0.003)**
Mental disorder status (γ_{01})	-	-	1.26 (0.37)***
Time*Mental disorder status (γ_{11})	-	-	0.0006 (0.01) ^{ns}
Variance components (random effects)			
Residual (σ^2)	3.72 (0.10)***	1.91 (0.06)***	1.91 (0.06)***
Intercept (τ_{00})	15.00 (0.96)***	17.94 (1.18)***	17.57 (1.16)***
Slope (τ_{11})	-	0.002 (0.0002)***	0.002 (0.0002)***
Covariance (τ_{01})	-	-0.07 (0.01)***	-0.07 (0.01)***
Model Summary			
-2 Log Likelihood	15,341.8	14,356.5	14,352.1
Number of estimated parameters	3	6	8

Note. Parameter estimate standard errors are listed in parentheses. * $p < .05$, ** $p < .01$, *** $p < .001$.