

**Risk Assessment with Intellectually Disabled Offenders**

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## **Abstract**

This thesis presents a detailed perspective of the use and predictive ability of the Historical Clinical Risk Management-20 (HCR-20) violence risk assessment tool with intellectually disabled (ID) offenders. The aim is to explore the use of the HCR-20 within this population and aid clinicians in considering risk related needs of these offenders. A systematic review is presented focused on the predictive abilities of the HCR-20 across different mental health diagnoses. The review identified seven publications that compared the predictive ability of the HCR-20 across diagnostic categories. The review further identified four publications focused on predictive ability of the HCR-20 specifically with ID offenders, five focused on personality disordered offenders and three focused on offenders with a diagnosis of schizophrenia. Findings indicated that whilst the HCR-20 had good predictive abilities in general, there were differences in effect sizes across diagnostic groups and HCR-20 scales. This was followed by an empirical study that investigated the predictive ability of the HCR-20 for violent incidents across ID and mental health pathways within a high secure and low secure forensic setting. Results highlighted which of the HCR-20 scales, for both Version 2 and Version 3 of the tool, were positively correlated to frequency of violent incidents. This was followed by a case study of an older adult male offender with a diagnosis of ID, where the HCR-20 was used to inform psychological treatment and risk management. Limitations of the HCR-20 within clinical practice are also discussed. Finally, a critical appraisal of the HCR-20, with focus on application with ID offenders, is

presented. Results indicated good levels of inter-rater reliability and predictive validity of the tool. The differences in the reported predictive ability of the HCR-20 across the research studies presented throughout the thesis are discussed, and further research recommended in line with these findings.

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## **List of Acronyms**

ARPI – Adapted Relapse Prevention Interview

AUC – Area Under the Curve

BADS – Behavioural Assessment of Dysexecutive Function

BPS – British Psychological Society

CASP – Critical Appraisal Skills Programme

CBT – Cognitive Behavioural Therapy

CJS – Criminal Justice System

CQUIN – Commissioning for Quality and Innovation

DoH – Department of Health

DSM-IV – The Diagnostic and Statistical Manual of Mental Disorders-5

EPS-BRS – Emotional Problem Scales-Behaviour Rating Scales

FAB – Frontal Assessment Battery

FAM – Female Additional Manual

FSIQ – Full Scale Intelligence Quotient

GLM – Good Lives Model

HCR-20 – Historical Clinical Risk Management-20

HCR-20V2 – Historical Clinical Risk Management-20 Version 2

HCR-20V3 – Historical Clinical Risk Management-20 Version 3

ICC – Intraclass Correlation Co-efficient

ICD-10 – International Classification of Diseases-10

ID – Intellectual Disability

IQ – Intelligence Quotient

KPI – Key Performance Indicators



MDT – Multi-Disciplinary Team

MH – Mental Health

MHA – Mental Health Act

MSIS – Miller Social Intimacy Scale

NICE – The National Institute for Health and Care Excellence

NHS – National Health Service

PCL-R – Psychopathy Checklist-Revised

PCL-SV – Psychopathy Checklist-Screening Version

PD – Personality Disorder

PRI – Perceptual Reasoning Index

PRISMA – Preferred Reporting Items for Systematic Reviews and Meta-Analyses

PSI – Processing Speed Index

QACSO – Questionnaire on Attitudes Consistent with Sexual Offending

RCT – Randomised Controlled Trials

RNR – Risk-Need-Responsivity

ROC – Receiver Operating Curve

SJ – Structured Judgement

SOTP – Sex Offender Treatment Programme

SPJ – Structured Professional Judgement

START – The Short Term Assessment of Risk and Treatability

ToM – Theory of Mind

VCI – Verbal Comprehension Index

VRAG – Violence Risk Appraisal Guide

WAIS-IV – Wechsler Adult Intelligence Scale-Fourth Edition

WMI – Working Memory Index

## **Chapter 1 – Introduction**

### Intellectual Disability

The Diagnostic and Statistical Manual of Mental Disorders-5 (DSM-V: American Psychiatric Association, 2013) provides the definition of intellectual disability (ID) as a disability that impairs intellectual functioning, and which has an impact on an individual's adaptive functioning across three domains: conceptual, social and practical. The DSM-V indicates that adaptive functioning is related to the specific skills required for everyday independent living, such as an individual's personal care, ability to work and home living, for example. These impairments must be present from childhood. Various terms have been used within the literature to define the same cluster of criteria identified by the DSM-V (2013), such as mental retardation, intellectual disability, developmental disability and learning disability. In line with the current DSM-V definition for diagnosis and in line with recommendations within the research (Carulla et al., 2011), the term intellectual disability (ID), will be used throughout the thesis.

It has been noted by The British Psychological Society (BPS; 2015), that psychologists are often required to assess whether an individual has an ID. The outcome of the assessment can subsequently be used by professionals to aid correct care planning of the assessed person within both community and mental health provisions, and determine whether they have access to appropriate legal and civil rights. As such, the BPS documentation provides

a set of guidelines for psychologists when assessing ID within clinical practice. Firstly, the Society recommends that a diagnosis of ID requires evidence across three criteria:

1. Evidence of significant impairment of intellectual functioning.
2. Evidence of significant impairment of adaptive behaviour.
3. Evidence of onset before adulthood.

It has been generally accepted that the 'intelligence quotient', or IQ, is an appropriate standardised measure to represent if an individual has a 'significant impairment of intellectual functioning'. The recommended assessment of intellectual functioning is the Wechsler Adult Intelligence Scale–Fourth Edition (WAIS-IV; Wechsler, 2010). This assessment provides the Full Scale Intelligence Quotient (FSIQ) and produces four index scores: Verbal Comprehension Index (VCI), Perceptual Reasoning Index (PRI), Working Memory Index (WMI) and Processing Speed Index (PSI). If an individual's FSIQ score is below 70, and there are no other reasons from their history or performance to indicate otherwise, then it may be concluded that the criteria for 'significant impairment of intellectual functioning' has been met. Until relatively recently, it was common to identify 'levels' of ID, specifically based upon an individual's IQ score. These levels were mild (IQ score between 50-55 and 70), moderate (35-40 and 50-55), severe (20-25 and 35-40) and profound (lower than 20-25) ID. The BPS notes that sub classification of ID on IQ alone is not particularly beneficial. It is recognised that it may be more appropriate to distinguish between ID and severe ID,

as this may have an impact on the individual's support levels and care considerations. In clinical practice, the BPS recommends that 'significant' impairments are best represented by scores on standardized and norm-referenced measures that fall more than two standard deviations away from the mean, whereas 'severe' impairments are scores that fall more than three standard deviations away from the mean.

The Society also indicates that 'significant impairment of adaptive behaviour' is being increasingly assessed by norm referenced measures with appropriate psychometric properties. Finally, the Society specifies that the criteria of 'onset before adulthood' is evidenced by the presence of significant impairment of intellectual functioning and adaptive behaviour prior to the age of 18. For a diagnosis of ID to be made, all three of these criteria should be met.

A significantly high number of children and adults with ID enter the Criminal Justice System (CJS) (National Health Service, 2015). The Offender Health Collaborative (2015) indicated that it is generally accepted that 5-10% of the offender population has an ID. This figure may even be as high as 30% (Criminal Justice Joint Inspection, 2014). However, given the uncertainty across criminal justice, health and social care services surrounding the definition of ID, it is difficult to ascertain with certainty the prevalence of this subset of offenders specifically. This has been identified as problematic within CJS services. This lack of clarity has a significant impact on the

individual, as their specific needs are not adequately met by services (Criminal Justice Joint Inspection, 2014) and this makes it less likely that a fair, just and appropriate outcome will be achieved (National Health Service, 2015). Offenders with ID may be diverted away from the CJS and into specialist treatment and care services (Offender Health Collaborative, 2015). Subsequently this population make up a significant proportion of patients who reside in forensic psychiatric and specialist services within the UK (Morrissey et al., 2007).

It has been suggested that this sub group of offenders may pose a recurrent risk to the public (Barron, Hassiotis & Banes, 2002) and there is evidence to support that this population re-offends at comparable rates to general offenders (Lindsay & Taylor, 2005). Additionally, research has indicated that ID offenders may display elevated levels of aggression and violence whilst detained in institutions (MacMillan, Hastings & Caldwell, 2004) and that individuals with ID are involved in a disproportionate level of aggressive incidents within secure settings (O'Shea, Picchioni, McGarthy, Mason & Dickens, 2015). Dickens, Picchioni & Long (2013) found that a greater proportion of patients within the ID pathway were involved in incidents (violence and self-harm) in comparison to patients within the mental health pathway across medium secure, low secure and locked rehabilitation services, with 72.1% and 47.2% respectively. The authors also commented that incidents of aggression were elevated in the ID sub group and self-harm incidents were also comparable across the two groups.

Having said this, there were a greater frequency of severe rated incidents within the mental health population (59.1%) as opposed to the ID population (40.9%), suggesting that whilst individuals with ID may be more likely to engage in violence within these settings, the severity of this violence is lower in comparison to other populations. Additionally, Fitzgerald et al., (2013) indicated twice as many individuals with ID had engaged in violence as opposed to patients without ID within a 6-month period, with 80% and 40% respectively. Violent acts within mental health settings can have a detrimental impact upon the therapeutic environment (O'Shea et al., 2015) and patient/staff relationships, whilst also having significant financial costs to the organisation and staff retention (Lanctôt & Guay, 2014). As a result of this, it is of upmost importance that clinicians have access to accurate prediction tools to aid risk assessment and management of violence in these settings, to ensure the safety of staff, patients and the public following release (O'Shea et al., 2015), in particular for individuals with ID who appear to present with a higher frequency of violence in secure settings.

### Risk Assessment

The field of risk assessment has developed vastly over the past 15 years and there has been much focus on the predictive abilities of various risk assessment tools utilised with offending populations (Lindsay et al., 2008). Initially, risk assessment was guided by unstructured clinical judgement, where professionals used their own knowledge and clinical impression

(Harris & Lurigio, 2007). However, further research found that unstructured clinical judgements of risk were no more valid than chance (Hurducas, Singh, de Ruiter & Petrila, 2014). Actuarial tools for risk assessment were introduced to replace unstructured clinical judgement, for example the Violence Risk Appraisal Guide (VRAG; Harris, Rice & Quinsey, 1993; Quinsey et al., 1998). These tools combine a set of static risk variables, highlighted by the literature or construction samples, as predictive of future violence, with a mathematical formula to quantify the level of risk for each individual being assessed (MacMillan et al., 2004). Despite this approach improving consistency of risk assessment (Dolan & Doyle, 2000) the actuarial approach to risk prediction is entirely focused on static variables and consequently does not allow for adjustments to reflect effective interventions (Johnston, 2002) and is therefore not sensitive to changes in risk over time. Subsequently, the approach to risk assessment has developed with an increasing use of the Structured Professional Judgement (SPJ) model of violence risk assessment, which combines actuarial and clinical data (Heilbrun, Yasuhara & Shah, 2009), with emphasis on the dynamic nature of risk and situational triggers (Turner, 2000). Whilst there is no golden standard of risk assessment (The National Institute for Health and Clinical Excellence; NICE guidelines, 2005), the Department of Health (DoH; 2007) indicates that the best practice of risk assessment is for clinicians to adopt tools that follow the SPJ approach and suggests this approach offers the most potential to meet the objective of violence risk management. This should incorporate clinicians considering an assessment



of specific and clearly defined risk factors, which are evidenced based, alongside their own clinical experience and knowledge of individual, and the carer/individual's views and experiences. The DoH (2007) also recommends that any tool-based assessments conducted by clinicians should be one component of a thorough overall clinical assessment.

### Overview of HCR-20 Risk Assessment

The SPJ approach to risk assessment is still developing within the literature on risk assessment of offenders (Tully, Chou & Browne, 2013). The Historical Clinical Risk Management-20 (HCR-20; Webster, Eaves, Douglas & Wintrup, 1995), HCR-20V2 (Webster et al., 1997) and more recently the HCR-20V3 (Douglas, Hart, Webster & Belfrage, 2013) is one example of a well-researched and widely used SPJ aid to risk assessment and management of violent offenders (Morrissey, Belley & Milton, 2014) that is used within correctional, forensic, general or civil psychiatric settings and across inpatient and community services (Singh, Fazel, Gueorguiva & Buchanan, 2014).

The HCR-20 was first published by Webster et al. (1995) and subsequently updated by Webster et al., (1997). The original HCR-20 was subject to early evaluative research, which indicated that the tool had the potential in the association of identified risk factors and subsequent violence (Douglas, 2014). Since this time, research into the SPJ approach to risk assessment, alongside the HCR-20 specifically, has grown enormously (Douglas, 2014).

The HCR-20 has subsequently been updated to Version 2 and more recently Version 3.

The HCR-20V3 built upon previous versions (Version 1 and Version 2) of the risk assessment tool. The authors stated that their goal was to produce an updated Version 3 that would be comparable with Version 2 so as to provide a “continuity of concept” (Douglas et al., 2013). They highlighted that this would infer that decisions such as risk level and the number of risk factors identified by a professional or clinical team would be largely the same. In a HCR-20 review and annotated bibliography by Douglas et al., (2014), the authors explain that HCR-20V2 data was collected (i.e. 5000+ cases) and evaluated to determine the risk assessment tools performance to guide the development of the HCR-20V3. Clinicians were consulted as to what was useful in practice and in depth beta-testing and feedback was completed in the development of the HCR-20V3. Consequently, changes were made to the HCR-20V2, which included the addition of sub items for risk factors, rating of presence and relevance of each factor, and more explicit focus and links to risk formulation and management. The HCR-20V3 was published in 2013.

The HCR-20V2 has been translated into 20 languages and has been adopted or evaluated in more than 35 countries (Fazel, Singh & Bjørkly, 2016). The updated Version 3 of the risk assessment has been translated into 6 different languages to date.

The HCR-20V3 is a standardised tool used for the assessment of risk of future violence (Douglas et al., 2013), and is currently the most up to date version of the risk assessment tool utilized in clinical practice. It provides a set of guidelines for professionals to assess and subsequently provide risk management recommendations for violence. The authors define violence within the manual as “actual, attempted, or threatened infliction of bodily harm of another person” (Douglas et al., 2013, page 2).

It comprises of 20 risk factors that are shown to be associated with a risk of future violence in adult males and females (Douglas et al., 2013). It is designed to be utilised by professionals who have an expertise in violence risk and knowledge surrounding the underlying aetiology and management of violent behaviour. In addition, the authors of the HCR-20 state that assessors should have prior training in conducting individual assessments and prior experience of assessment and diagnosis of mental, personality and substance related disorders, and in using SPJ tools (Douglas et al., 2013).

The HCR-20V2 and V3 assessment contain 20 risk factors across three sub domains: Historical (H) factors, Clinical (C) factors and Risk management (R) factors. Each factor is rated as to whether it is present (Y), partially or possibly present (P) or not present (N). Table 1 presents the risk factors contained within both HCR-20V2 and HCR-20V3.

Table 1. *Risk factors in HCR-20V2 and HCR-20V3 assessments.*

HCR-20 sub categories	HCR-20 items	HCR-20V2 risk factors	HCR-20V3 risk factors
Historical Factors	H1	Previous violence	Violence
	H2	Young age at first violent incident	Other antisocial behaviour
	H3	Relationship instability	Relationships
	H4	Employment problems	Employment
	H5	Substance use problems	Substance use
	H6	Major mental illness	Major mental disorder
	H7	Psychopathy	Personality disorder
	H8	Early maladjustment	Traumatic experiences
	H9	Personality disorder	Violent attitudes
	H10	Prior supervision failure	Treatment or supervision response

Clinical Factors	C1	Lack of insight	Insight
	C2	Negative attitudes	Violent ideation or intent
	C3	Active symptoms of major mental disorder	Symptoms of major mental disorder
	C4	Impulsivity	Instability
	C5	Unresponsive to treatment	Treatment or supervision response
Risk Management Factors	R1	Plans lack feasibility	Professional services and plans
	R2	Exposure to destabilizers	Living situation
	R3	Lack of personal support	Personal support
	R4	Noncompliance with remediation attempts	Treatment or supervision response
	R5	Stress	Stress or coping

In addition to this, within the HCR-20V3 risk assessment, the evaluator is required to rate the relevance of each factor to risk of violence as either low, medium or high. A risk summary judgement is also determined, where

the evaluator is required to rate the individual as low, moderate or high risk of future violence and determine whether there is risk for serious physical harm and risk of imminent violence. In addition to rating the factors, evaluators are guided by the tool to develop a clinical risk formulation that provides hypotheses into the function of violence for the individual. The evaluator is also guided to highlight potential risk scenarios for the individual, where the focus is on the likelihood, severity, duration and potential victims of future violence. The present/absent risk factors, formulation and scenario planning is then used to help the development of risk management strategies and decision making for treatment of the individual. The authors recommend that the HCR-20V3 assessment should be updated for each individual every 6-12 months, which reflects the changing nature of violence risk (Douglas et al., 2013).

#### *Supplementary Guidance for HCR-20*

There are supplementary materials to go alongside the HCR-20V3 assessment for clinicians to utilize, specifically for female offenders. There is also additional guidance suggested for the use of HCR-20V2 with offenders with a diagnosis of ID.

The Female Additional Manual (FAM; de Vogel, de Vries Robbé, Kalmthout & Place, 2014) is a tool that provides additional guidelines for utilizing the HCR-20V3 when assessing violence risk in females who have demonstrated violent behaviour previously. The FAM adheres to the SPJ approach and

also adds two further coding mechanisms, which are marking the final judgement on a five-point scale as opposed to a three-point scale, and coding the extra risk ratings. In terms of the risk factors, the FAM provides additional guidelines for women for personality disorder (H7) and traumatic experiences (H8), and includes further specific historical risk factors: prostitution (H11), parenting difficulties (H12), pregnancy at young (H13) and suicidality/self-harm (H14). Furthermore, the FAM includes further clinical risk factors: covert/manipulative behaviour (C6) and low self-esteem (C7), alongside additional risk management items: problematic child care responsibility (R6) and problematic intimate relationship (R7).

There are also supplementary guidelines for the HCR-20V2 risk assessment for use with offenders with ID (Boer, Frize, Pappas, Morrissey, & Lindsay, 2010). It is suggested that clinicians should review the HCR-20 assessment manual and then review the ID supplement (Verbrugge, Goodman-Delahunty & Frize, 2011). For example, the HCR-20V2 assesses an individual's ability to form and maintain intimate relationships with others. Verbrugge et al., (2011) indicates that as few as 2% of male offenders with ID have experienced an intimate relationship, and presented the hypothesis that this may be due to a lack of opportunity as opposed to inability to form and maintain relationships. Table 2 provides a summary of guidelines for clinicians utilising the HCR-20 with ID offenders (Boer et al., 2010).

Table 2. *Summary of recommendations for ID supplement of HCR-20V2.*

HCR-20V2	Adaption for ID Offenders
Risk Factor	
H1	Examine intent and severity of aggressive behaviour
H2	Consider mental age
H3	Scoring adjusted to include non-intimate relationships
H4	Scoring adjusted to broaden definition of employment
H5	Examine intentionality of drug and alcohol use
H6	Operationally defines IQ levels but does not change the scoring
H7	Employ guidelines by Morrissey et al., (2006)
H8	Consider reason for maladjustment and out of home placement
H9	Scoring adjusted to consider longer development of Personality Disorder: Score of 1 when Personality Disorder present and aged under 25
H10	Scoring adjusted to include any sort of imposed supervision in addition to legally imposed ones
C1	Do not automatically score 1 or 2 based on ID. Consider insight as related to offending
C2	Greater time in interview may be necessary to obtain
C3	Emphasizes this is limited to what is described major mental illness (H6) and not ID



C4	Do not assume impulsivity. Include evaluation of motor and emotional impulsivity and their relationship with violence
C5	Scoring adjusted to consider intentionality of noncompliance. Evaluate appropriateness of treatment (match between client and treatment)
<hr/>	
R1	Additionally considers the ability and willingness
R2	Considers the types of typical destabilizers that may be different
R3	Scoring adjusted so active support not automatically scored as 0. Evaluate quality and level of support provided
R4	Scoring adjusted to consider association between intervention and offending behaviour as opposed to intervention related to other adaptive needs of the client
R5	Scoring adjusted to broaden definition of serious stressors
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*Application of HCR-20 within national context*

In UK forensic services, the HCR-20 risk assessment is recommended by the National Health Services of England (NHS England, 2014/2015) in their standard contract. It is also a key performance indicator (KPI) incorporated within the Commissioning for Quality and Innovation (CQUINS) framework, which was set up to ensure ongoing optimal standards of care (Department of Health, 2007). More specifically it is a risk assessment currently incorporated within a national framework strategy for transforming the care of individuals with a diagnosis of ID and/or autism (NHS England, 2017).

The Transforming Care programme (NHS England, 2017) was introduced with the aim of improving the care and quality of life for these individuals. It is also focused on reducing the number of inappropriate hospital admissions and individual length of inpatient stay. Specifically, the Community-based forensic support function within the programme indicates that the HCR-20 is a potential outcome measure for core aims such as reducing the number of individuals with ID who reside in inpatient services, reducing behaviours that may lead individuals into coming into contact with the CJS and improving support for individuals through the CJS. The national context and implementation of the HCR-20 risk assessment across forensic services, alongside its recommended use within ID populations as part of a recent national strategy in transforming care for these individuals, highlights the importance of exploring the HCR-20 risk assessment specifically, above other risk assessment tools.

To this end, research has started to focus on the application of risk assessment tools with ID offenders and the predictive efficacy of such tools, to ensure that clinicians are equipped with correct risk assessments for different diagnoses and complexities of patients within forensic services (O'Shea et al., 2015). Specific risk assessment for ID offenders has also been noted to be a crucial component in aiding the planning of service provision from national strategic frameworks and individual case management for these individuals (Lindsay & Beail, 2004). The thesis aims to provide further evidence into the use of HCR-20 risk assessment with ID

offenders, given the smaller evidence base for its application with this population, and its highlighted importance within national and local risk management for these individuals. Firstly, the results of a systematic review into the effectiveness of the HCR-20 in predicting violence with mentally disordered offenders more generally will be presented to orientate the reader to the published evidence base currently available.

## **Chapter 2 – A Systematic Review on the Effectiveness of the HCR-20 Risk Assessment Tool in Predicting Violence in Mentally Disordered Offenders**

### Abstract

This paper presents the results from a systematic review of studies for the predictive validity of the HCR-20 violence risk assessment tool specifically with mentally disordered offenders, for violent outcomes such as reoffending or institutional aggression. The review identified 1085 papers, which were examined using pre-defined criteria. This left 59 studies to be reviewed and analysed. The results are presented. Moderate to high levels of mean effect sizes were found, demonstrating that the HCR-20 is predictive within mentally disordered offenders. Seven of these studies explicitly examined comparisons between psychiatric diagnoses. The reported AUC statistics are provided for all studies reviewed and explained in the context of the wider literature. The studies contained within the review that focus on one of the sub categories of mentally disordered offenders (for example ID offenders) are also explored.

## Introduction

### *Background*

Mentally disordered offenders can be diverted away from the CJS and detained with forensic psychiatric services. The process of diversion involves placing the individual in a setting where they can receive appropriate treatment, whilst also taking into consideration safety of the individual, safety of the public and the nature of the offence (Bradley Report, 2009). Risk assessments are often integral to offender pathways within forensic services and ongoing pressure has been placed upon clinicians working within the forensic field to ensure robust risk assessment and management of these individuals (BPS, 2006). Differentiating between an offender's level of risk has also been encompassed within the Risk-Need-Responsivity (RNR; Andrews & Bonta, 1990) principle to aid clinicians and treating teams with allocation of treatment resources (Tully, Chou & Browne, 2013).

The field of risk assessment has developed vastly over the past 15 years and there has been much focus on the predictive abilities of various risk assessment tools utilised with offending populations (Lindsay et al., 2008), and with offenders who have a mental disorder diagnosis. Receiver Operating Characteristic (ROC) curve and the resulting Area Under the Curve (AUC) statistic is the recommended method of analysing the predictive abilities of risk assessment tools (Singh et al., 2013) as the method is resistant to the effects of outcome base rates (Douglas, Otto,

Desmarais, & Borum, 2012). There are also other methods of measurement, such as Cohen’s *d* (Rice & Harris, 2005). Table 3 represents the effect sizes in comparison to these methods:

Table 3: *AUC statistics and corresponding Cohen’s d value (Rice and Harris, 2005).*

AUC statistic	Cohen’s <i>d</i>	Effect size
0.556	0.200	Small
0.639	0.500	Moderate
0.714	0.800	Large

Actuarial risk assessment tools combine a set of static variables, highlighted by the literature and construction samples, as predictive of future violence, with a mathematical formula to quantify the level of risk for each individual being assessed (MacMillan et al., 2004). The VRAG (Quinsey, Harris, Rice, & Cromnier, 1998) is one of the most widely researched actuarial risk assessments and is often used as a comparison to other risk assessments (Lindsay et al., 2008). The VRAG has demonstrated large effect sizes when utilised in assessing and predicting institutional violence in medium secure units in the UK (Doyle, Dolan & McGovern, 2002), with effect sizes AUC =0.71 and AUC =0.70 for violence that led to injury to the victim and threats of violence/damage of property,

respectively. Similar AUC results were reported when the VRAG was used for identification of high risk offenders two years post discharge (AUC =0.78 for violent offences and AUC =0.74 for general offences). Large effect sizes for general (AUC =0.74) and violent offences (AUC =0.78) have also been found for patients discharged from medium secure units (Gray, Taylor & MacCulloch, 2007) at two years post discharge.

Despite good levels of predictive accuracy, the actuarial approach to risk prediction has been noted to focus on static variables, which does not allow for adjustments to reflect effective interventions (Johnston, 2002). Subsequently, other risk assessment tools have been developed that contain historic actuarial, clinical and dynamic elements that reflect treatment responsiveness (Johnston, 2002), known as SPJ. Whilst there is no gold standard of risk assessment (NICE guidelines, 2005), the DoH (2007) indicates that the best practice of risk assessment is for clinicians to adopt tools that follow the SPJ approach.

The HCR-20V2 (Webster et al., 1997) and more recently the HCR-20V3 (Douglas, Hart, Webster & Belfrage, 2013) are examples of a well-researched and widely used SPJ aid to risk assessment and management of violent offenders (Morrissey, Belley & Milton, 2014). The HCR-20V2 and V3 have demonstrated good predictive abilities (Gray et al., 2003; Judges, Egan & Broad, 2016). For example, Doyle et al., (2014) reported moderate to large effect sizes when examining the predictive ability of the HCR-20V3

for violence when individuals were discharged from medium secure settings in the UK at 6 and 12 months. AUC values were reported as AUC =0.73 and AUC =0.70 for the overall assessment, with AUC =0.63 and AUC =0.63 for historical factors, AUC =0.75 and AUC =0.71 for clinical factors, AUC =0.67 and AUC =0.63 for risk management factors.

A large body of the research has primarily focused on mentally disordered offenders or forensic patients more generally, with studies often reporting diagnosis as part of demographic information and not as a factor in analysis (Gray, Taylor & Snowden, 2008). Research has begun to focus on the predictive efficacy of risk assessment tools across more specific diagnoses. For example, Morrissey et al., (2007) focused on a population of ID offenders residing in a high security forensic ID service in the UK where patients were rated on the Psychopathy Checklist-Revised (PCL-R; Hare, 2003), HCR-20V2 and the Emotional Problem Scales-Behaviour Rating Scales (EPS-BRS; Prout & Strohmer, 1991). The PCL-R items were not significantly correlated with institutional aggression. However, the HCR-20V2 total score and EPS-BRS externalising scale, in comparison, were significantly related to both interpersonal physical aggression, and verbal and property aggression. The EPS-BRS was also significantly correlated to high-risk aggression (significant actual or potential of harms to others). Furthermore, the PCL-R total score did not produce a large effect size, whereas the HCR-20V2 total score (AUC =0.68-0.77) and EPS externalising scale (AUC =0.72-0.77) significantly predicted interpersonal physical



aggression and verbal and property aggression, demonstrating good predictive properties of the tools.

Gray et al., (2011) examined the predictive efficacy of the HCR-20V2 for violent and non-violent reconvictions across a wide range of mental health diagnoses following discharge from a medium secure setting. Specifically, they found that the HCR-20V2 was a good predictor of violent reconvictions in ID offenders, with all three domains of the risk assessment tool displaying large/medium effect sizes (HCR-20-H AUC =0.84, HCR-20-C AUC =0.68 and HCR-20-R AUC =0.70). The HCR-20V2 was more predictive for violent reconvictions of ID offenders in comparison to offenders with a diagnosis of PD. Gray et al., (2011) hypothesised that for other sub groups of mental health diagnoses, such as PD, the clinical factors are dynamic and are expected to change over time. For example, clinical features of a PD diagnosis are typified by impulsivity and risky behaviours whereas for ID offenders, clinical factors may remain more stable over time. This could explain why the HCR-20 is more predictive in this sub category of mentally disordered offenders. This study also identified that it is crucial to consider the type of diagnosis when evaluating the effectiveness of risk assessments, as there are differences in predictive abilities across diagnoses, and these subtle differences could prove powerful for clinicians working directly with complex offending populations with mental health diagnoses.

### *Existing meta-analyses*

O'Shea, Mitchell, Picchioni and Dickens (2013) conducted a systematic review and meta-analysis on moderators of the predictive efficacy of the HCR-20 risk assessment tool for aggression in psychiatric facilities. They examined how the predictive efficacy differs based on the HCR-20 subscales and type of aggressive outcome being predicted, and they examined demographics and clinical groups as moderators of predictive ability of the tool. The meta-analysis converted AUC values reported into Cohen's  $d$  (Cohen, 1992). The results showed that the majority of the weighted mean effect sizes obtained were within the medium to large range, suggesting that higher scores on the HCR-20 are predictive of a variety of aggressive acts in psychiatric settings. Additionally, the results identified that the risk summary judgement, whereby clinicians rate the overall risk as low, moderate or high, was the strongest predictor of aggressive behaviour. This was identified within the review as a pertinent finding for clinicians making decisions on risk, as this approach is advocated by the authors of the HCR-20 (Douglas et al., 2001) for use in clinical practice. Additionally, O'Shea et al., (2015) suggested that focusing on risk assessment items that have stronger predictability within specific offender populations, may improve risk management interventions and overall treatment for individuals.

This meta-analysis also found that the HCR-20 clinical and risk management domains were more predictive than the historical domain in predicting inpatient aggression. The historical and risk management

domains were stronger predictors in samples that contained higher proportions of individuals with a diagnosis of schizophrenia. In comparison, the HCR-20 total effect size was a smaller predictor in samples that contained higher proportions of PD, suggesting that the HCR-20 has more utility for those with mental health diagnoses as opposed to those with PD, which replicates similar findings from Gray et al., (2011).

This review and meta-analysis did not focus on a wider variety of clinical characteristics, particularly results relating to predictive efficacy of HCR-20 with ID offenders as a sub group of mentally disordered offenders. It has been suggested that this sub group of offenders may pose a recurrent risk to the public (Barron, Hassiotis & Banes, 2002) and there is evidence to support that this population re-offends at comparable rates to general offenders (Lindsay & Taylor, 2005). Additionally, research has indicated that ID offenders may display elevated levels of aggression and violence whilst detained in institutions (MacMillan, Hastings & Caldwell, 2004), and that individuals with ID are involved in a disproportionate level of aggressive incidents within secure settings (O'Shea, Picchioni, McGarthy, Mason & Dickens, 2015). Therefore, it is also important to consider this sub group of offenders when exploring predictive efficacy of tools used within these populations.

During the initial scoping procedure prior to the systematic review, it was identified that the research base examining the predictive abilities of the

HCR-20 risk assessment with ID offenders was relatively small. This has also been identified within the literature (Lindsay et al., 2008). Therefore, the review criteria were extended to focus on different diagnoses contained under the umbrella term 'mentally disordered offenders', with a focus on comparison across diagnoses alongside specific scrutiny of those studies which included individuals with a diagnosis of ID.

### Aims and objectives

To date there has not been a recent systematic review that evaluates the most widely used violence risk assessment tool, the HCR-20, with specific focus on different mental disorders. This review aims to further the knowledge within the risk assessment field by determining the predictive efficacy of the HCR-20 risk assessment tool specifically in relation to mentally disordered offenders and the different diagnoses that fall under this umbrella term. This will aid clinicians in their practice of risk assessment and alert them to differences, if any, across diagnoses. Clarification of the effectiveness of this tool with these sub-populations may impact on the weighting of the tools outcome when making clinical decisions e.g. relating to discharge or progression. In addition to this, mental health, ID and PD patients are often detained on different wards because the clinical and treatment approach required is different. Specialist inpatient services for ID patients for example are reportedly designed for patients who are extremely vulnerable, have complex needs and require the specialist assessment and treatment, which may differ from mental

health and PD pathways (Royal College of Nursing, 2013). Consequently, it is clinically useful to understand the applicability and predictive efficacy of the HCR-20 risk assessment across sub-groups of diagnoses.

## Method

The systematic review was conducted in accordance with the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) statement (Moher, Liberati, Tetzlaff, Altman & The PRISMA group, 2009). This is a 27-item checklist designed to facilitate transparent reporting of results.

### *Search Strategy: Sources of Literature*

Relevant publications were identified using the following sources. As the review was focused on the HCR-20 specifically, the search was limited to references published from 1995 onwards, as this is when the first HCR-20 risk assessment was published:

#### *a) Online electronic databases*

OVID: PsycInfo (1995-21<sup>st</sup> August 2017)

OVID: MEDLINE (1995-21<sup>st</sup> August 2017)

OVID: EMBASE (1995-21<sup>st</sup> August 2017)

Web of Science/Knowledge (1995-21<sup>st</sup> August 2017)

Applied Social Science Index and Abstracts (ASSIA) (1995-21<sup>st</sup> August 2017)

#### *b) Gateways*

Cochrane Central (1995-21<sup>st</sup> August 2017)

*c) Meta-analyses*

Meta-analyses were also identified through electronic and hand searching. The reference lists of these studies were hand searched and publications considered in line with the inclusion and exclusion criteria.

*d) Contact experts*

Experts in the field (identified as Mick Doyle and Jay Singh) were contacted as experts in the field in order to obtain further publications.

*Search strategy: Search terms*

The following search terms were applied to all databases identified above. The search terms were modified depending on differences in fields. Appendix 1 provides full search syntax for each database.

*Search strategy:*

(Mental\* ill\*/mental health/mental\* disorder\*/  
psychiatric/schizophreni\*/psychotic/psychosis/depression/manic/mania/p  
ersonality disorder\*/learning disab\*/intellectual disability\*/mental  
retardation/mentally handicapped/learning difficult\*/developmental  
disabili\*/patient)

AND

(risk/Risk assess\*/risk manage\*/HCR-20/historical clinical risk  
management-20/violence/structured professional judgement/structured  
professional judgment/SPJ/structured clinical judgement/structured

clinical judgment/SCJ/structured risk assess\*/historical risk/clinical risk/risk

management/risk/recidivism/reoffend/violence/violent/aggression)

AND

(Predict\*/validity/predictive validity/area under curve/auc/receiver operating

characteristic/ROC/accuracy/sensitivity/specificity/measurement/accuracy

/test validity/test reliability/statistical analysis/statistical

validity/predictive value/statistical measurement)

*Study selection: Inclusion and exclusion criteria*

Prior to the application of inclusion and exclusion criteria, identified studies were manually sorted to eliminate any irrelevant or duplicate studies (see appendix 2 for inclusion/exclusion forms). Pre-defined inclusion and exclusion criteria were applied (see Table 4).

Table 4: *Definitions of inclusion and exclusion criteria.*

	<b>Inclusion</b>	<b>Exclusion</b>
<b>Population</b>	Adult male or female offenders/forensic patients (age 18 and over) with any mental health diagnosis.	Any sample aged under 18.
<b>Exposure</b>	All versions of the HCR-20 risk assessment tool (V1, 2 or 3).	Not using specifically HCR-20.
<b>Outcome</b>	Violent or aggressive behaviours. This will include	Offending/reoffending that is not violent.

	institutional violence and violent offending/reoffending.	Acts of self-harm.
<b>Study type</b>	Cohort or case control.	Opinion papers, letters, editorials and reviews.
<b>Language</b>	No restriction.	No restriction.
<b>Date of publication</b>	1995 onwards.	Before 1995.

This systematic review focused specifically on the application of the HCR-20 with adult male and female offenders over the age of 18. The HCR-20 was developed for use with adult violent offenders and consequently the adolescent and child population (any sample aged under 18) were excluded from the review. Where samples were mixed age, adult data was separated from child data if possible to allow for inclusion.

In an attempt to collect the optimum amount of relevant studies, the outcome measure was set as 'violent behaviours', so as to include studies within a variety of institutional settings as well as violent behaviour in the community.

The review focused on cohort and case control studies as it was anticipated that there would not be any randomised controlled trials (RCT) conducted in this particular area of research, as no intervention/treatment is implemented in studies focused on examining the predictive efficacy of risk



assessment tools. Opinion papers, letters, editorials and reviews were excluded also as they do not empirically evaluate risk assessment tools. Finally, the review focused on publications from 1995 onwards as the first version of the HCR-20 version 1 was published in 1995.

### Quality Assessment

After the inclusion/exclusion process was completed, the quality of the remaining studies was assessed in two steps.

#### *Step 1 – Threshold criteria*

The threshold criteria were:

- Clarity that the HCR-20 was applied.
- Clear description of the outcome measure.
- Appropriate statistical analysis of predictive ability of the HCR-20.

Studies that did not meet all the threshold criteria were excluded before the quality assessment was undertaken (see appendix 3 for excluded studies and the reasoning for such).

#### *Step 2 – Quality assessment forms*

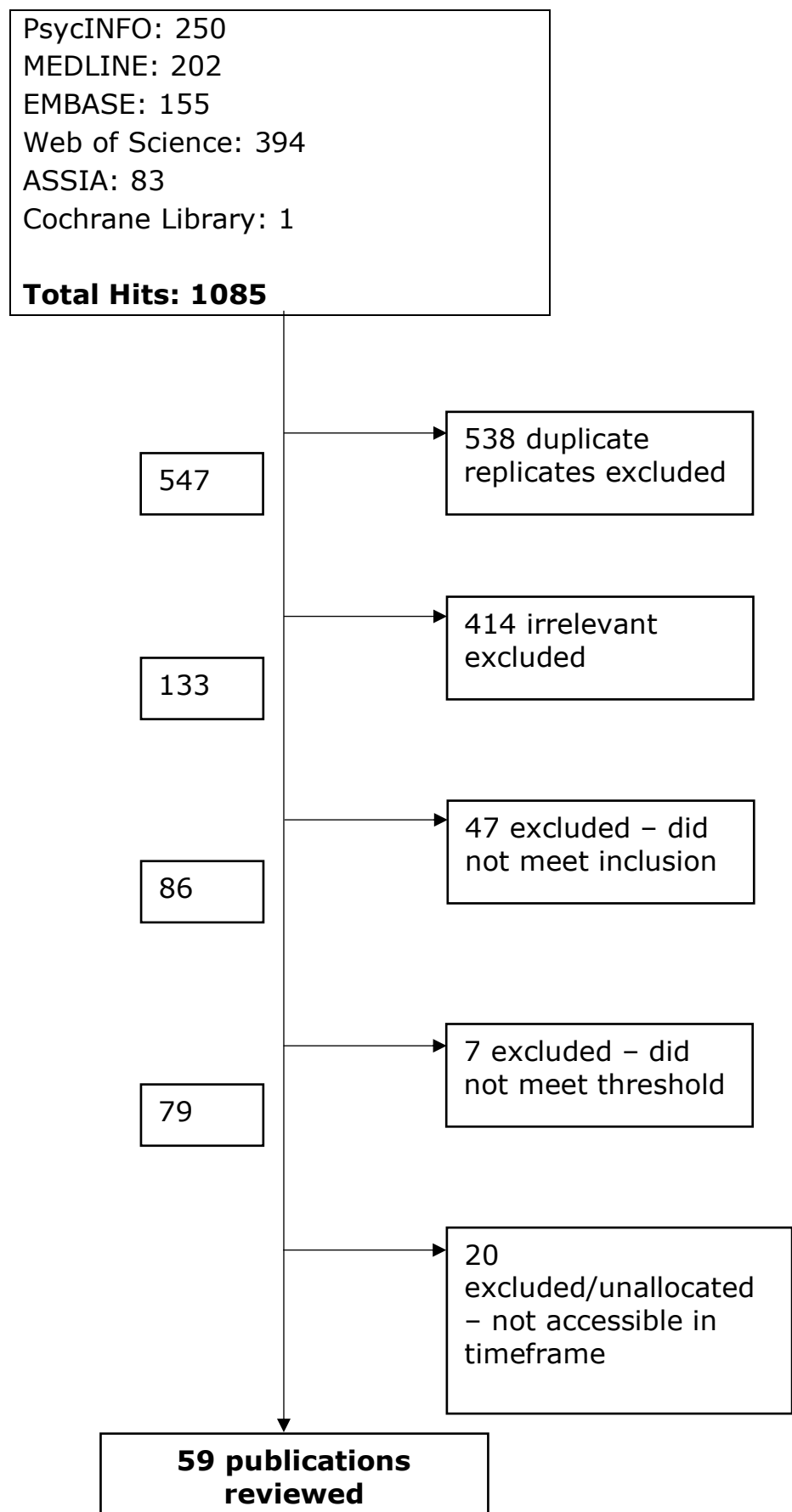
The remaining studies were assessed for quality. The quality assessment forms of cohort (see appendix 4) and case control (see appendix 5) studies were adapted from the Critical Appraisal Skills Programme (CASP, 2004).

The author assessed the quality for all remaining studies and a secondary assessor assessed 20% of the remaining studies to ensure consistency and

inter-rater reliability. The Intraclass Correlation Co-efficient (ICC) was .67, indicating good inter-rater reliability. A pre-defined data extraction proforma (see appendix 6) was used to extract the correct information from the included studies.

Figure 1 shows the overall systematic review search strategy.

Figure 1: *Systematic Review Search Strategy.*



## Results

The full search yielded 1085 hits. 538 were duplicates and were excluded. 414 irrelevant studies were identified and excluded from their titles and abstracts. A total of 47 were excluded based on the inclusion and exclusion criteria depicted in table 4. A total of 7 did not meet the threshold criteria and were subsequently excluded. Due to time constraints of the author, 20 publications were excluded or unallocated as they could not be accessed within these constraints. Whilst the PRISMA checklist does not identify an appropriate time frame for accessing publications, researcher time constraints have been identified as a source of bias within systematic reviews as a research strategy (Mallett, Hagen-Zanker, Slater & Duvendack, 2012). This should be taken into consideration when interpreting the results of the review. Therefore, 59 publications were included in the review. The below table (table 5) presents a summary of the results.

Overall, there were 58 cohort studies and 1 case control study. Studies included were conducted in the United Kingdom (29), United States (7), The Netherlands (5), Australia (4), Canada (3), Sweden (3), Japan (1), Spain (1), Germany (1), Argentina (1), Hong Kong (1), Israel (1), Greece (1). In 1 study it was unclear as to where the research was conducted.

### *AUC statistics*

The reported AUC statistic for each included study is reported within table 5. There was some variety in the results of AUC statistics across studies. The highest total HCR-20 score value was AUC =.96 for violent reconvictions, with the lowest being AUC =.50 for "all" violent incidents. In terms of the HCR-20 historical factors the highest value was AUC =.84 for prediction of violent reconviction with ID populations. The lowest value was AUC= .277, which was for verbal abuse. For clinical factors the highest value was AUC =.813 for verbal abuse, with AUC=.478 being the lowest value. Finally, risk management factors data highlighted highest AUC= .91 for any violence and a lowest AUC=.53 for any violence and nonphysical violence.

The mean AUC statistics for each HCR-20 domain were as follows: HCR-20 total score (AUC =.702), HCR-20 historical factors (AUC =.623), HCR-20 clinical factors (AUC =.677), HCR-20 risk management factors (AUC =.676) and overall judgement (AUC =.68).

A total of 58 of the studies reported the diagnostic percent of the sample population. Whilst reporting of clinical data, such as individual diagnosis, is useful demographic information, it does not allow for comparisons of the risk assessment tool across diagnoses and the potential impact this may have. Seven of the studies included in the review compared the predictive abilities of the HCR-20 specifically across different diagnoses.

Coid et al., (2013) demonstrated that there were differences within the AUC statistics across diagnoses for violent reconviction; No DSM-IV Axis I disorder AUC =.68, DSM-IV Axis I disorder AUC =.64, schizophrenia AUC =.62, lifetime depression AUC =.63, drug dependence AUC =.63, alcohol disorder AUC =.60, no DSM-IV Axis II disorder AUC =.70, Axis II disorder (not ASPD) AUC =.58, ASPD AUC =.60. Grann et al., (2000) reported AUC statistics for the historical element of the HCR-20 risk assessment for offenders discharged from forensic psychiatric treatment, or prison, with either a diagnosis of PD or schizophrenia. Results demonstrated AUC =.71 for individuals with PD and AUC =.66 for individuals with schizophrenia. Fitzgerald et al., (2013) indicated that for the ID group, the resulting AUC statistics were HCR-20 total score (AUC =.77), historical items (AUC =.77), clinical items (AUC =.66), risk management items (AUC =.73) and clinical judgement (AUC =.88) for predicting any physical aggression within the institution. These results were greater than for the control sample (AUC =.58 for total HCR-20 score, AUC =.42 for historical items, AUC =.67 for clinical items, AUC =.63 for risk management items, and AUC =.62 for overall clinical judgement). Similar results were also found for the ID sub group for application of the HCR-20 in predicting severe physical aggression (AUC =.64 – AUC =.90) in comparison to the control sample (AUC =.62 – AUC =.73). In addition to this, Gray et al., (2007) demonstrated further support that the HCR-20 was indeed slightly more predictive for ID offenders as opposed to non-ID group, but for recidivism. The HCR-20 historical items demonstrated the largest predictive value (AUC =.81) for

the sub group of ID offenders, in comparison to non-ID group (AUC =.68) for general reconvictions after a five year follow up. Additionally, clinical items showed good levels of predictive efficacy for ID offenders (AUC =.71) as opposed to non-ID group (AUC =.55) for violent reconvictions after a five year follow up. A following study by Gray et al., (2011) examined diagnostic criteria in more detail, by exploring the difference in HCR-20 predictive ability across patients with diagnoses of schizophrenia, PD, ID and mood disorder. Again, the HCR-20 appeared to be more predictive within the population of ID offenders for predicting violent reconviction at follow up (AUC =.68 – AUC =.84). The historical factors within the HCR-20 provided the highest AUC value for ID offenders when examining violent reconvictions as the outcome. These results were compared to the other diagnoses; schizophrenia (AUC =.54 – AUC =.75), PD (AUC =.50 – AUC =.63) and mood disorder (AUC =.57 – AUC =.69). O’Shea et al., (2014) reported AUC statistics across diagnoses with particular focus on inpatient aggression. For any inpatient aggression, the following AUC statistics were reported for individuals with schizophrenia (HCR-20 total AUC =.738, HCR-20 H AUC =.541, HCR-20 C AUC =.782, HCR-20 R AUC =.681 and SJ AUC =.535), PD (HCR-20 total AUC =.714, HCR-20 H AUC =.522, HCR-20 C AUC =.750, HCR-20 R AUC =.705 and SJ AUC =.548), schizophrenia and PD (HCR-20 total AUC =.690, HCR-20 H AUC =.504, HCR-20 C AUC =.715, HCR-20 R =.729, SJ AUC =.562), developmental (HCR-20 total AUC =.665, HCR-20 H AUC =.485, HCR-20 C AUC =.678, HCR-20 R AUC =.751, SJ AUC =.575) and organic (HCR-20 total AUC =.639, HCR-20 H AUC =.466, HCR-

20 C AUC =.640, HCR-20 R AUC =.773, SJ AUC =.588). A further study by O'Shea et al., (2015) also compared a sample of ID offenders with non-ID offenders. Analyses showed that additional diagnoses within these two groups were significantly different, with individuals in the ID group being less likely to have a further diagnosis of schizophrenia or organic disorder but being significantly more likely to have PD or have multiple diagnoses. Results demonstrated that for any aggression within the ID group that HCR-20 total AUC =.669, HCR-20 H AUC =.546, HCR-20 C AUC =.658, HCR-20 R AUC =.691, and SJ AUC =.640. For the comparator group; HCR-20 total AUC =.674, HCR-20 H AUC =.521, HCR-20 C AUC =.741, HCR-20 R AUC =.646 and SJ AUC =.546.

In addition to this, four studies focused on the predictive abilities of the HCR-20 with ID offenders specifically. The average scores from the reported AUC statistics for the total HCR-20 score and sub risk factors for these studies were as follows: HCR-20 total score AUC =.782, HCR-20 H AUC =.76, HCR-20 C AUC =.70, HCR-20 R AUC =.787 and SJ AUC =.845. One study within this cohort also reported AUC statistics for the application of the HCR-20 with the ID supplement (Verbrugge et al., 2011). Results indicated for violent recidivism that the HCR-20 total AUC =.80, HCR-20 H AUC =.75, HCR-20 C AUC =.68, HCR-20 R AUC =.76 and SJ AUC =.82. Additionally, for general recidivism results found HCR-20 total score AUC =.97, HCR-20 H AUC =.90, HCR-20 C AUC =.80, HCR-20 R AUC =.99 and SJ AUC =.88.



A further five studies focused on PD offenders. The average scores from the reported AUC statistics within these studies indicated for the HCR-20 total score AUC =.668, HCR-20 H AUC =.615, HCR-20 C AUC =.657, HCR-20 R AUC =.71 and HCR-20 SJ AUC =.787.

Finally, three studies focused on offenders who had a diagnosis of schizophrenia. The average reported AUC statistics indicated that HCR-20 total score AUC =.717, HCR-20 H AUC =.668, HCR-20 C AUC =.711, HCR-20 R AUC =.645 and HCR-20 SJ AUC =.75. One study did not report demographic information. Therefore, 38 studies reported sample demographic information but did not incorporate diagnostic differences as part of the analysis for predictive efficacy of the HCR-20 risk assessment.

Studies that focused on ID offenders reported a range between AUC =.608 and AUC =.94 for HCR-20 total score (average score across studies of AUC =.778), a range between AUC =.481 and AUC =.85 for HCR-20 H score (average score across studies of AUC =.729), a range between AUC =.58 and AUC =.76 for HCR-20 C score (average score across studies of AUC =.671), a range between AUC =.62 and AUC =.99 for HCR-20 R score (average score across studies of AUC =.734), and a range between AUC =.621 and AUC =.90 for HCR-20 SJ score (average score across studies of AUC =.789). Studies that focused on PD offenders reported a range between AUC =.58 and AUC =.88 for HCR-20 total score (average across

studies of AUC = .663), a range between AUC = .41 and AUC = .83 for HCR-20 H score (average score across studies of AUC = .601), a range between AUC = .50 and AUC = .75 for HCR-20 C score (average score across studies of AUC = .646), a range between AUC = .52 and AUC = .88 for HCR-20 R score (average score across studies of AUC = .694), and a range between AUC = .548 and AUC = .91 for HCR-20 SJ score (average score across studies of AUC = .731). Studies focused on individuals with a diagnosis of schizophrenia reported a range between AUC = .57 and AUC = .80 for HCR-20 total score (average score across studies of AUC = .709), a range between AUC = .52 and AUC = .75 for HCR-20 H score (average score across studies of AUC = .615), a range between AUC = .50 and AUC = .782 for HCR-20 C score (average score across studies of AUC = .692), a range between AUC = .46 and AUC = .77 for HCR-20 R score (average score across studies of AUC = .655), and a range between AUC = .535 and AUC = .79 for HCR-20 SJ score (average score across studies of AUC = .688).

Table 5: Summary of results for the predictiveness of HCR-20 risk assessment amongst mentally disordered offenders.

Reference	Sample size	Follow up	Setting	Diagnosis	Outcome	AUC
Abidin et al. (2013)	100	181.9 days (mean)	Forensic secure hospital with low, medium and high security integrated UK	Schizophrenia – 69% Schizoaffective disorder – 16% Bipolar affective disorder – 7% Recurrent depressive disorder – 5% Intellectual disability – 3%	Any adverse event focused on violence and self-harm	HCR-20 total score AUC =.872
Arai et al. (2016)	133 (for 3 months) and 109 (for 6 months)	3 months and 6 months	Japanese forensic psychiatric wards	F00-F09 – 3.1% F10-F19 – 14.2% F20-F29 – 74.8% F30-F39 – 5.5% F40-F48 – 0.08% F60-F69 – 0.8% F70-F79 – 0% F80-F89 – 0.8%	Violence	3 months HCR-20 total score AUC=.84 HCR-20 H AUC =.58 HCR-20 C AUC =.90 HCR-20 R AUC =.85  6 months HCR-20 total score AUC =.80 HCR-20 H AUC =.62

						HCR-20 C AUC =.77 HCR-20 R AUC =.79
Arbach et al. (2011)	78	12 months	Medium and long term psychiatric units in Barcelona	Paranoid schizophrenia – 55% Other schizophrenia – 14.1% Schizoaffective disorder – 10.3% Affective disorder – 3.8% Personality disorder – 10.3% Organic disorder – 3.8% Other disorders – 1.3%	Violence	1-4 months HCR-20 total score AUC=.75 HCR-20 H AUC =.65 HCR-20 C AUC = .77 HCR-20 R AUC =.71 SCJ AUC =.78  5-8 months HCR-20 total score AUC =.69 HCR-20 H AUC =.59 HCR-20 C AUC =.81 HCR-20 R AUC =.61 SCJ AUC =.78  9-12 months HCR-20 total score AUC =.77

						HCR-20 H AUC =.65 HCR-20 C AUC =.76 HCR-20 R AUC =.73 SCJ AUC =.77
Blum (2003)	53	3 years (average)	Inpatient offenders in state hospital California	All patients had a diagnosis of either schizophrenia or schizoaffective disorder. Schizophrenia – 38 Schizoaffective – 15 Other diagnoses Antisocial PD – 16 Borderline PD – 3 Borderline intellectual functioning – 1 Dependent PD – 1 Schizotypal PD – 1 Personality disorder NOS – 3	Violent and nonviolent reoffending	HCR-20 total score (without R scores) AUC =.727
Chaplin et al. (2015)	22	3, 6, 9 and 12 months	Low secure service UK	All patients had a diagnosis of intellectual disability	Aggression	No AUC reported
Chu et al. (2011)	70	6 months	Acute wards in Australia	Psychotic disorders – 84.8% Personality disorder – 19.7% Comorbid diagnosis – 6.1%	Inpatient aggression	Interpersonal Violence Up to 1 month HCR-20 total score AUC =.78

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HCR-20 H AUC  
=.67  
HCR-20 C AUC  
=.73  
HCR-20 R AUC  
=.75

Up to 3 months  
HCR-20 total score  
AUC =.75  
HCR-20 H AUC  
=.64  
HCR-20 C AUC  
=.75  
HCR-20 R AUC  
=.75

Up to 6 months  
HCR-20 total score  
AUC =.62  
HCR-20 H AUC  
=.59  
HCR-20 C AUC  
=.61  
HCR-20 R AUC  
=.67

Verbal threat  
Up to 1 month

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HCR-20 total score  
AUC = .68  
HCR-20 H AUC  
= .60  
HCR-20 C AUC  
= .73  
HCR-20 R AUC  
= .73

Up to 3 months  
HCR-20 total score  
AUC = .69  
HCR-20 H AUC  
= .60  
HCR-20 C AUC  
= .77  
HCR-20 R AUC  
= .74

Up to 6 months  
HCR-20 total score  
AUC = .62  
HCR-20 H AUC  
= .56  
HCR-20 C AUC  
= .72  
HCR-20 R AUC  
= .62

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Any inpatient  
aggression  
Up to 1 month  
HCR-20 total score  
AUC = .72  
HCR-20 H AUC  
= .62  
HCR-20 C AUC  
= .73  
HCR-20 R AUC  
= .73

Up to 3 months  
HCR-20 total score  
AUC = .78  
HCR-20 H AUC  
= .67  
HCR-20 C AUC  
= .78  
HCR-20 R AUC  
= .76

Up to 6 months  
HCR-20 total score  
AUC = .59  
HCR-20 H AUC  
= .55  
HCR-20 C AUC  
= .60

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						HCR-20 R AUC =.62
Chu et al. (2013)	70	24 hour	Acute units in Australia	Psychotic disorders – 80% Substance abuse/dependence – 74.3% Personality disorder – 20% Mood disorders – 11.4%	Aggression	Inpatient aggression HCR-20 C score - .68  Interpersonal violence HCR-20 C score - .72  Verbal threat HCR-20 C score .68
Coid et al. (2013)	1396	3 years	Released male prisoners UK	No DSM-IV Axis I disorder – 425 DSM-IV Axis I disorder – 799 Schizophrenia – 125 Lifetime depression – 370 Drug dependence – 491 Alcohol disorder – 254  No DSM-IV Axis II disorder – 320 Axis II disorder (not ASPD) – 94 ASPD - 801	Conviction for 1 violent offence	HCR-20 total scores No DSM-IV Axis I disorder AUC =.68 DSM-IV Axis I disorder AUC =.64 Schizophrenia AUC =.62 Lifetime depression AUC =.63 Drug dependence AUC =.63 Alcohol disorder AUC =.60

						No DSM-IV Axis II disorder AUC =.70 Axis II disorder (not ASPD) =.58 ASPD AUC =.60
Coid et al. (2011)	1353	1.97 years (mean)	Released male prisoners UK	Personality disorder – 74.2% Schizophrenia – 7.8% Delusional disorder – 2.7% Depressive disorder – 30.4% Drug dependence – 38.7% Alcohol use disorder – 20.4%	Violent recidivism	HCR-20 total score AUC =.67 HCR-20 H AUC =.66 HCR-20 C AUC =.64 HCR-20 R AUC =.59
Coid et al (2015)	409	6 and 12 months	Patients discharged from UK medium secure services	Schizophrenia/schizoaffective disorder – 80.9% Bipolar disorder – 7.2% Personality disorder – 5.4% Anxiety disorder – 3.8% Depression – 1.3% Substance use – 0.3% Other diagnoses – 4.1%	Violent incidents	HCR-20 H1 AUC =.49 HCR-20 H2 AUC =.57 HCR-20 H3 AUC =.51 HCR-20 H4 AUC =.55 HCR-20 H5 AUC =.53 HCR-20 H6 AUC =.49 HCR-20 H7 AUC =.54 HCR-20 H8 AUC =.59

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HCR-20 H9 AUC  
=.59  
HCR-20 H10 AUC  
=.56  
HCR-20 total score  
AUC =.60  
HCR-20 C1 AUC  
=.61  
HCR-20 C2 AUC  
=.64  
HCR-20 C3 AUC  
=.52  
HCR-20 C4 AUC  
=.64  
HCR-20 C5 AUC  
=.66  
HCR-20 C total  
AUC =.67  
HCR-20 R1 AUC  
=.53  
HCR-20 R2 AUC  
=.57  
HCR-20 R3 AUC  
=.58  
HCR-20 R4 AUC  
=.67  
HCR-20 R5 AUC  
=.60  
HCR-20 R total  
AUC =.67

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Coid et al. (2009)	1396 male and 321 female prisoners	1.97 years (mean)	Male and female offenders released from prison UK	Male prisoners ASPD – 64% Other PD – 41.1% No PD – 26.5% Schizophrenia – 7.8% Delusional disorder – 2.7% Lifetime depression – 30.4% Drug dependence – 38.7% Alcohol disorder – 20.4%  Female prisoners ASPD – 53% Other PD – 40.1% No PD – 31.1% Schizophrenia – 19.4% Delusional disorder – 3.9% Lifetime depression – 67.8% Drug dependence – 60.1% Alcohol disorder – 27.8%	Reconviction of violent, acquisitive and any reoffending	Violence Male HCR-20 total AUC =.67 HCR-20 H AUC =.66 HCR-20 C AUC =.64 HCR-20 R AUC =.59  Female HCR-20 total AUC =.70 HCR-20 H AUC =.73 HCR-20 C AUC =.69 HCR-20 R AUC =.59
Daffern & Howells (2007)	38	4 months	Peaks high secure unit UK	All have severe personality disorder	Aggression and self- harm	Aggression HCR-20 C AUC = .63
Daffern & Howells (2009)	51	24 hours	Peaks high secure unit UK	All have severe personality disorder	Aggression	HCR-20 C AUC =.629

De Vogel & de Ruiters (2005)	135	10.2 months (mean)	Forensic psychiatric institution in Netherlands	<p>Male patients  ASPDP – 48%  BPD – 24%  Narcissistic PD – 35%</p> <p>Female patients  ASPDP – 25%  BPD – 75%  Narcissistic PD – 9%</p>	Violence	<p>Females  HCR-20 total AUC =.59  HCR-20 H AUC =.63  HCR-20 C AUC =.61  HCR-20 R AUC =.52  Risk judgement AUC =.86</p> <p>Males  HCR-20 total AUC =.88  HCR-20 H AUC =.83  HCR-20 C AUC =.75  HCR-20 R AUC =.91</p>
De Vogel & de Ruiters (2006)	127	21.5 months	Forensic psychiatric hospital in Netherlands	One or more Axis II disorders – 66% History of psychiatric treatment – 49% inpatient and 34 received outpatient treatment	Physical violence	<p>HCR-20 total score AUC= .85  HCR-20 H AUC =.77  HCR-20 C AUC =.80  HCR-20 R AUC =.79</p>

						Final risk judgement AUC =.86
De Vries Robbé et al. (2011)	126	3 years	Forensic psychiatric hospital in Netherlands	Axis II PD – 83% Axis 1 disorders – 19%	Violent recidivism	1 year HCR-20 total score AUC =.81  2 year HCR-20 total score AUC =.77  3 year HCR-20 total AUC =.68
De Vries Robbé et al. (2016)	185	10 months	Forensic psychiatric hospital in Netherlands	At least one PD – 89% Major mental illness, such as psychotic disorders – 53%	Aggression	HCR-20 total score AUC= .73 HCR-20 H AUC =.64 HCR-20 C AUC =.72 HCR-20 R AUC =.70
Delatot (2013)	102	5 weeks	Maximum security treatment facility in Florida	Schizophrenia and other psychotic disorders – 81.4% Mood disorders – 8.8% Anxiety disorders – 1% Adjustment disorder -1% Substance related disorders – 6.9%	Aggression	HCR-20 total score AUC =.649

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Delirium, dementia and other  
cognitive disorders – 1%

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Desmairais (2012)	120	1 year	Secure forensic psychiatric hospital Canada	Schizophrenia spectrum disorders – 85% Comorbid substance use disorders – 52.5%	Aggression	Any aggression HCR-20 total score AUC= .80 HCR-20 H AUC =.73 HCR-20 C AUC =.74 HCR-20 R AUC =.77 Violence risk estimate AUC =.79  Verbal aggression HCR-20 total score AUC= .80 HCR-20 H AUC =.71 HCR-20 C AUC =.74 HCR-20 R AUC =.77 Violence risk estimate AUC =.74  Physical-objects
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HCR-20 total score  
AUC= .79  
HCR-20 H AUC  
=.66  
HCR-20 C AUC  
=.78  
HCR-20 R AUC  
=.77  
Violence risk  
estimate AUC =.70

Physical others  
HCR-20 total score  
AUC= .75  
HCR-20 H AUC  
=.69  
HCR-20 C AUC  
=.71  
HCR-20 R AUC  
=.75  
Violence risk  
estimate AUC =.77

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Dolan & Fullam (2007)	136	12 months	Medium secure psychiatric unit in UK	Schizophrenia – 76.4% Schizoaffective disorder – 10.3% Affective disorder – 3.7% Personality disorder – 4.4% Organic brain syndrome – 0.7%	Violence	HCR-20 total score AUC= .715 HCR-20 H AUC =.658 HCR-20 C AUC =.727
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				Psychosis unspecified – 4.4%		HCR-20 R AUC =.673
Douglas & Ogloff (2003)	193	626.48 days (mean)	Civil psychiatric in hospital Canada	Schizophrenia – 44% Affective disorders – 16% Schizoaffective disorders – 14%	Violence	Any violence HCR-20 combined sources AUC = .75  Physical violence HCR-20 combined sources AUC = .76  Nonphysical violence HCR-20 combined sources AUC = .76
Douglas et al. (2003)	100	45.27 months (mean)	Forensic psychiatric patients USA	Schizophrenia – 73% Mood disorders -18% Substance related disorders – 5% Other – 3% PD – 24%	Violence	Any violence HCR-20 total score AUC = .67 HCR-20 H AUC = .63 HCR-20 C AUC = .68 HCR-20 R AUC = .53 Risk judgement AUC = .69  Physical violence

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HCR-20 total score  
AUC = .70  
HCR-20 H AUC  
=.65  
HCR-20 C AUC  
=.70  
HCR-20 R AUC =  
.55  
Risk judgement  
AUC = .74

Nonphysical  
violence  
HCR-20 total score  
AUC = .67  
HCR-20 H AUC  
=.64  
HCR-20 C AUC  
=.68  
HCR-20 R AUC =  
.53  
Risk judgement  
AUC = .68

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Doyle et al., (2012)	114	20 weeks	Forensic acute mental health units UK	Schizophreniform disorder or mania/bipolar disorder – 53.3% PD – 4.4%	Violence	HCR-20 total score AUC = .676 HCR-20 H AUC = .658
Doyle & Dolan (2006)	112	24 weeks	Patients discharged from in-patient care UK	Schizophrenia – 46% Schizoaffective disorder – 7% Bipolar disorder – 16% Depression – 13% PD – 4% Substance misuse – 8%	Violence	HCR-20 total score AUC = .797 HCR-20 H AUC = .675
Doyle et al. (2002)	87	12 weeks	Medium secure unit UK	Schizophrenia – 68% Schizoaffective – 10% Affective disorder – 6% PD – 5% Organic disorder – 1%	Violence	HCR-20 total score AUC = .70
Eisenbarth et al. (2012)	80	8 years	Female offenders referred for forensic psychiatric evaluation Germany	PD – 13% Addiction/Abuse – 25% Psychotic – 9% Affective – 16% Others – 19% No disorder – 18%	Reconvictions	HCR-20 total score AUC = .59 HCR-20 H = .61 HCR-20 C = .56 HCR-20 R = .56
Finch et al. (2017)	74	6 months	Low and medium secure psychiatric hospital Australia	Schizophrenia – 81% Schizoaffective disorder – 10% Bipolar disorder – 7% Delusional disorder – 1%	Aggression	1 month Interpersonal violence HCR-20 total score AUC = .89

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Substance induced psychosis  
- 1%

HCR-20 H AUC  
=.63  
HCR-20 C AUC  
=.93  
HCR-20 R = .85

Verbal threat  
HCR-20 total score  
AUC = .80  
HCR-20 H AUC  
=.54  
HCR-20 C AUC  
=.86  
HCR-20 R = .77

Any aggression  
HCR-20 total score  
AUC = .85  
HCR-20 H AUC  
=.59  
HCR-20 C AUC  
=.89  
HCR-20 R = .83

3 month  
Interpersonal  
violence  
HCR-20 total score  
AUC = .82

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HCR-20 H AUC  
=.68  
HCR-20 C AUC  
=.86  
HCR-20 R = .73

Verbal threat  
HCR-20 total score  
AUC = .80  
HCR-20 H AUC  
=.55  
HCR-20 C AUC  
=.80  
HCR-20 R = .79

Any aggression  
HCR-20 total score  
AUC = .85  
HCR-20 H AUC  
=.63  
HCR-20 C AUC  
=.85  
HCR-20 R = .80

6 months  
Interpersonal  
violence  
HCR-20 total score  
AUC = .80

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						HCR-20 H AUC =.64 HCR-20 C AUC =.84 HCR-20 R = .73  Verbal threat HCR-20 total score AUC = .74 HCR-20 H AUC =.58 HCR-20 C AUC =.70 HCR-20 R = .72  Any aggression HCR-20 total score AUC = .80 HCR-20 H AUC =.64 HCR-20 C AUC =.78 HCR-20 R = .76
Fitzgerald et al. (2013)	74	6 months	Medium secure units UK	Group with ID (25 patients in total) All had diagnosis of ID however 20% had no co- morbid diagnosis Mental illness - 4% PD - 28%	Institutional violence	ID group Any physical aggression HCR-20 total score AUC =.77 HCR-20 H AUC =.77

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Other diagnosis – 16%	HCR-20 C AUC
Mental illness and PD – 2%	=.66
Mental illness and other diagnosis – 8%	HCR-20 R AUC
PD and other diagnosis – 12%	=.73
Mental illness, PD and other diagnosis – 0%	Clinical judgement AUC =.88
	Control group
	HCR-20 total score AUC =.58
Group without ID (45 patients in total)	HCR-20 H AUC =.42
Mental illness – 35.9%	HCR-20 C AUC =.67
PD – 8.9%	HCR-20 R AUC =.63
Other diagnosis – 0%	Clinical judgement AUC =.62
Mental illness and PD – 22.2%	
Mental illness and other diagnosis – 8.9%	
PD and other diagnosis – 4.4%	
Mental illness, PD and other diagnosis – 17.8%	Severe physical aggression
	HCR-20 total score AUC =.79
	HCR-20 H AUC =.70
	HCR-20 C AUC =.64
	HCR-20 R AUC =.81

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						Clinical judgement AUC =.90
						Control group HCR-20 total score AUC =.66 HCR-20 H AUC =.73 HCR-20 C AUC =.62 HCR-20 R AUC =.66 Clinical judgement AUC =.70
Folino (2015)	178	1277 days (mean)	Males released from prison Argentina	No diagnosis on Axis I -34% Mood disorder otherwise not specified – 0.7% ASPD – 69.3% PD otherwise not specified – 9.8% Narcissistic PD – 0.7%	Violent and general recidivism	Violent recidivism HCR-20 total scale AUC =.623 HCR-20 H AUC =.607 HCR-20 C AUC - .567 HCR-20 R AUC =.601
Fujii et al. (2004)	169	Unclear	Inpatient of psychiatric facility Hawaii	Schizoaffective disorder – 22 Paranoid schizophrenia – 14 Psychotic disorder not otherwise specified – 12 Bipolar disorder – 12 Chronic undifferentiated schizophrenia – 11	Violent episodes	Result separated by ethnic group Asian Americans HCR-20 total AUC=.58 HCR-20 H AUC =.47



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Other - 23

HCR-20 C AUC  
=.58  
HCR-20 R AUC  
=.55

Euro Americans  
HCR-20 total  
AUC=.64  
HCR-20 H AUC  
=.62  
HCR-20 C AUC  
=.58  
HCR-20 R AUC  
=.64

Native Hawaiians  
HCR-20 total  
AUC=.73  
HCR-20 H AUC  
=.59  
HCR-20 C AUC  
=.74  
HCR-20 R AUC  
=.73

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Garcia- Mansilla et al. (2011)	827	20 weeks	Civil inpatient USA	Psychotic disorder – 20.4% Unipolar mood disorder – 42.8% Bipolar disorder, mania or cyclothymia - 12.1% Substance abuse or dependence – 15.1% PD – 2.4%	Violence	Males HCR-20 HC scale AUC =.68 HCR-20 H =.72 HCR-20 C =.54 HCR-20 H1 AUC =.69 HCR-20 H2 AUC =.65 HCR-20 H3 AUC =.57 HCR-20 H4 AUC =.50 HCR-20 H5 AUC =.57 HCR-20 H6 AUC =.47 HCR-20 H7 AUC =.67 HCR-20 H8 AUC =.61 HCR-20 H9 AUC =.50 HCR-20 C1 AUC =.52 HCR-20 C2 AUC =.58 HCR-20 C3 AUC =.47
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HCR-20 C4 AUC  
=.53  
HCR-20 C5 AUC  
=.51

Females

HCR-20HC AUC  
=.60  
HCR-20 H AUC  
=.60  
HCR-20 C =.52  
HCR-20 H1 AUC  
=.62  
HCR-20 H2 AUC  
=.61  
HCR-20 H3 AUC  
=.55  
HCR-20 H4 AUC  
=.45  
HCR-20 H5 AUC  
=.64  
HCR-20 H6 AUC  
=.40  
HCR-20 H7 AUC  
=.59  
HCR-20 H8 AUC  
=.52  
HCR-20 H9 AUC  
=.49

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						HCR-20 C1 AUC =.55 HCR-20 C2 AUC =.56 HCR-20 C3 AUC =.41 HCR-20 C4 AUC =.55 HCR-20 C5 AUC =.49
Grann et al (2000)	560	2 years	Forensic psychiatric evaluation facility Sweden	PD – 358 (298 in the follow up) Schizophrenia – 202 (111 in the follow up)	Violent crime	All offenders HCR-20 H AUC =.71  PD offenders HCR-20 H AUC =.71  Schizophrenia offenders HCR-20 H AUC =.66
Gray et al. (2007)	1312	2 years	Independent sector hospitals in UK	Organic mental disorders – 1.9% Mental and behavioural disorders due to psychoactive substance use – 9.6%	Recidivism	ID group HCR-20 total score AUC =.79 HCR-20 H AUC =.81 HCR-20 C AUC =.71

			Schizophrenia and delusional disorders – 47.7% Affective disorders – 10% Neurotic and somatoform disorders 1.5% Behavioural syndromes associated with physiological disturbances and physical factors – 0.1% Disorders of personality and behaviour – 18.5% Mental impairment – 9.8% Disorders of psychological development – 0.4% Behavioural and emotional disorders with onset usually occurring in childhood and adolescence – 0.5% Sexual and identity disorders – 0.1%		HCR-20 R AUC =.64  Non-ID group HCR-20 total score AUC =.68 HCR-20 H AUC =.69 HCR-20 C AUC =.55 HCR-20 R AUC =.63	
Gray et al. (2003)	34	3 months	Medium secure units UK	Paranoid schizophrenia – 44.1% Depression – 23.5% PD – 14.7% Other diagnoses – 17.6%	Aggression and self-harm	Verbal aggression HCR-20 total score AUC =.79 HCR-20 H AUC =.73 HCR-20 C AUC =.74

						Violence to property HCR-20 total score AUC = .83 HCR-20 H AUC = .82 HCR-20 C AUC = .77  Physical aggression HCR-20 total score AUC = .81 HCR-20 H AUC = .77 HCR-20 C AUC = .79
Gray et al. (2004)	315	2 years minimum	Medium secure units UK	Affective disorder – 9.8% PD – 16.8% Schizophrenia – 49.2% Drug induced psychosis – 6.3% Mental retardation – 1% Substance misuse disorder – 1% Other diagnoses – 3.2% Unknown – 8.6%	Reoffending	All offences HCR-20 total score AUC = .61 HCR-20 H AUC = .62 HCR-20 C AUC = .48 HCR-20 R AUC = .62  Serious offences HCR-20 total score AUC = .56

						HCR-20 H AUC =.57 HCR-20 C AUC =.47 HCR-20 R AUC =.56
Gray et al. (2008)	887	5 years	Medium secure units UK	Affective disorders – 9.9% PD – 9% Schizophrenia or psychotic disorder – 56.2% Drug induced psychosis – 4.7% Mental retardation – 8.5% Other diagnoses – 3.2%	Reconviction	Violent reconviction 1/2 year HCR-20 total score AUC =.76 HCR-20 H AUC =.77 HCR-20 C AUC =.61 HCR-20 R AUC =.69  1 year HCR-20 total score AUC =.76 HCR-20 H AUC =.76 HCR-20 C AUC =.61 HCR-20 R AUC =.68  2 year HCR-20 total score AUC =.71

						HCR-20 H AUC =.71 HCR-20 C AUC =.54 HCR-20 R AUC =.65
						5 year HCR-20 total score AUC =.70 HCR-20 H AUC =.68 HCR-20 C AUC =.57 HCR-20 R AUC =.63
Gray et al. (2011)	996	2 years	Medium secure units UK	Organic – 2.4% Substance misuse – 13% Schizophrenia – 63.8% Mood disorder – 11.2% Neurotic – 2% Physiological – 0% PD – 18% Mental retardation – 12.9% Development – 1.7% Childhood – 0.7% Unspecified – 2.7%	Violent reconviction	All mental disorders HCR-20 total score AUC =.73 HCR-20 H AUC =.72 HCR-20 C AUC = .55 HCR-20 R AUC =.70  Schizophrenia HCR-20 total score AUC =.74



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HCR-20 H AUC  
=.75  
HCR-20 C AUC =  
.54  
HCR-20 R AUC  
=.68

PD  
HCR-20 total score  
AUC =.62  
HCR-20 H AUC  
=.63  
HCR-20 C AUC =  
.50  
HCR-20 R AUC  
=.62

Mental retardation  
HCR-20 total score  
AUC =.80  
HCR-20 H AUC  
=.84  
HCR-20 C AUC =  
.68  
HCR-20 R AUC  
=.70

Mood Disorder  
HCR-20 total score  
AUC =.67

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						HCR-20 H AUC =.69 HCR-20 C AUC = .57 HCR-20 R AUC =.69
Grevatt et al. (2004)	53	6 months	Independent secure psychiatric facility UK	Schizophrenia – 21% Paranoid type psychosis – 34% PD - 25% Dual diagnosis – 14%	Violence	Any violence HCR-20 H and C AUC =.478 HCR-20 H AUC =.398 HCR-20 C AUC = .478  Physical assault HCR-20 H and C AUC =.562 HCR-20 H AUC =.538 HCR-20 C AUC = .600  Verbal abuse HCR-20 H and C AUC =.453 HCR-20 H AUC =.277 HCR-20 C AUC = .813

						Damage to property HCR-20 H and C AUC = .408 HCR-20 H AUC = .324 HCR-20 C AUC = .65
Gunec et al. (2015)	613	3 months	Medium, low and locked units UK	Schizophrenia – 55% Disorders of adult personality and behaviour – 37% Mental retardation - 18% Mental and behavioural disorders due to psychoactive substance – 16% Disorders of psychological development – 15% Organic mental disorders – 10% Behavioural and emotional disorder -5% Neurotic disorders, stress related and somatoform disorders - 3% Behavioural syndromes associated with physiological disturbance and physical factors – 1%	Aggression	Mild verbal aggression HCR-20 total score AUC = .650 HCR-20 H1 AUC = .525 HCR-20 H2 AUC = .508 HCR-20 H3 AUC = .520 HCR-20 H4 AUC = .545 HCR-20 H5 AUC = .481 HCR-20 H6 AUC = .535 HCR-20 H8 AUC = .481 HCR-20 H9 AUC = .491 HCR-20 H10 AUC = .494

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HCR-20 H10 total  
AUC =.522  
HCR-20 C1 AUC  
=.573  
HCR-20 C2 AUC  
=.635  
HCR-20 C3 AUC  
=.557  
HCR-20 C4 AUC  
=.666  
HCR-20 C5 AUC  
=.581  
HCR-20 C total  
AUC =.683  
HCR-20 R1 AUC  
=.586  
HCR-20 R2 AUC  
=.573  
HCR-20 R3 AUC  
=.562  
HCR-20 R4 AUC  
=.615  
HCR-20 R5 AUC  
=.600  
HCR-20 R total  
AUC =.636  
SJ AUC =.588

Severe verbal  
aggression

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HCR-20 total score  
AUC =.668  
HCR-20 H1 AUC  
=.526  
HCR-20 H2 AUC  
=.534  
HCR-20 H3 AUC  
=.490  
HCR-20 H4 AUC  
=.532  
HCR-20 H5 AUC  
=.509  
HCR-20 H6 AUC  
=.521  
HCR-20 H8 AUC  
=.504  
HCR-20 H9 AUC  
=.515  
HCR-20 H10 AUC  
=.504  
HCR-20 H10 total  
AUC =.538  
HCR-20 C1 AUC  
=.572  
HCR-20 C2 AUC  
=.650  
HCR-20 C3 AUC  
=.564  
HCR-20 C4 AUC  
=.640

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HCR-20 C5 AUC  
=.579  
HCR-20 C total  
AUC =.679  
HCR-20 R1 AUC  
=.600  
HCR-20 R2 AUC  
=.599  
HCR-20 R3 AUC  
=.552  
HCR-20 R4 AUC  
=.634  
HCR-20 R5 AUC  
=.610  
HCR-20 R total  
AUC =.650  
SJ AUC =.583

Any verbal  
aggression  
HCR-20 total score  
AUC =.681  
HCR-20 H1 AUC  
=.528  
HCR-20 H2 AUC  
=.540  
HCR-20 H3 AUC  
=.499  
HCR-20 H4 AUC  
=.548

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HCR-20 H5 AUC  
=.507  
HCR-20 H6 AUC  
=.527  
HCR-20 H8 AUC  
=.511  
HCR-20 H9 AUC  
=.506  
HCR-20 H10 AUC  
=.509  
HCR-20 H10 total  
AUC =.551  
HCR-20 C1 AUC  
=.562  
HCR-20 C2 AUC  
=.658  
HCR-20 C3 AUC  
=.566  
HCR-20 C4 AUC  
=.672  
HCR-20 C5 AUC  
=.584  
HCR-20 C total  
AUC =.693  
HCR-20 R1 AUC  
=.605  
HCR-20 R2 AUC  
=.601  
HCR-20 R3 AUC  
=.556

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						HCR-20 R4 AUC =.626 HCR-20 R5 AUC =.612 HCR-20 R total AUC =.664 SJ AUC =.582
Ho et al. (2009)	96	2 years	Medium secure unit UK	Schizophrenia or schizoaffective disorder – 70.8% Bipolar affective disorder – 16.7% Delusional disorder – 6.25% Depression – 4.17	Violence	Minor violent incidents HCR-20 H AUC =.619  Serious violent incidents HCR-20 H AUC =.739  Any violent incidents HCR-20 H AUC =.605  Minor violent charges/convictions HCR-20 H AUC =.605  Serious violent charges/convictions



						HCR-20 H AUC =.538
Ho et al. (2015)	220	6 and 12 months	Discharged psychiatric patients Hong Kong	<p>Priority follow up Schizophreniform disorders - 63.6% Bipolar affective disorder - 10.9% PD - 5.4% Depressive disorders - 3.5% Substance misuse disorders - 10.9% Other - 5.4%</p> <p>Non-priority follow up Schizophreniform disorders - 63.6% Bipolar affective disorder - 10.9% PD - 5.4% Depressive disorders - 3.5% Substance misuse disorders - 10.9% Other - 5.4%</p>	Violence	<p>6 months Verbal violence HCR-20 H AUC =0.67 HCR-20 C =.68 HCR-20 R =.52 HCR-20 total score =.67 HCR-20 final risk judgement AUC =.61</p> <p>Violence against property HCR-20 H AUC =0.61 HCR-20 C =.60 HCR-20 R =.55 HCR-20 total score =.61 HCR-20 final risk judgement AUC =.69</p> <p>Violence against others</p>

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HCR-20 H AUC  
=0.70  
HCR-20 C =.68  
HCR-20 R =.57  
HCR-20 total score  
=.71  
HCR-20 final risk  
judgement AUC  
=.78

Violent conviction  
HCR-20 H AUC  
=0.80  
HCR-20 C =.72  
HCR-20 R =.66  
HCR-20 total score  
=.79  
HCR-20 final risk  
judgement AUC  
=.68

12 months  
Verbal violence  
HCR-20 H AUC  
=0.57  
HCR-20 C =.59  
HCR-20 R =.46  
HCR-20 total score  
=.57

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HCR-20 final risk  
judgement AUC  
=.59

Violence against  
property  
HCR-20 H AUC  
=0.54  
HCR-20 C =.69  
HCR-20 R =.41  
HCR-20 total score  
=.56  
HCR-20 final risk  
judgement AUC  
=.67

Violence against  
others  
HCR-20 H AUC  
=0.64  
HCR-20 C =.72  
HCR-20 R =.59  
HCR-20 total score  
=.69  
HCR-20 final risk  
judgement AUC  
=.65

Violent conviction

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						HCR-20 H AUC =0.86 HCR-20 C =.97 HCR-20 R =.98 HCR-20 total score =.96 HCR-20 final risk judgement AUC =.96
Ireland et al. (2016)	96	12 months and 4 years	High secure psychiatric hospital UK	All had a diagnosis of PD. 7.4% deemed to have major mental disorder	Violence	12 months Physical aggression against patients HCR-20 AUC =.50-.79  Physical aggression against staff HCR-20 AUC =.54-.92  Verbal aggression against patient HCR-20 AUC=.47-.79  Verbal aggression against staff HCR-20 AUC =.65

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Threatening  
patients  
HCR-20 AUC = .27-  
.78

Threatening staff  
HCR-20 AUC = .54-  
.92

Total aggression  
HCR-20 AUC = .63

4 years  
Physical aggression  
against patients  
HCR-20 AUC = .64

Physical aggression  
against staff  
HCR-20 AUC = .68

Verbal aggression  
against patient  
HCR-20 AUC = .64

Verbal aggression  
against staff  
HCR-20 AUC = .72

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						Threatening patients HCR-20 AUC = .38-.73
						Threatening staff HCR-20 AUC = .43-.77
						Total aggression HCR-20 AUC = .69
Ivgi et al. (2015)	150	6, 12 and 18 month	Acute psychiatric ward, high security ward and open ward Israel	All patients with a diagnosis of schizophrenia	Violence	Physical violence 6 month HCR-20 H AUC = .74 HCR-20 C AUC = .75 HCR-20 R AUC = .62 HCR-20 total score AUC = .76  12 month HCR-20 H AUC = .57 HCR-20 C AUC = .62

						HCR-20 R AUC =.46 HCR-20 total score AUC =.57  18 month HCR-20 H AUC =.65 HCR-20 C AUC =.70 HCR-20 R AUC =.60 HCR-20 total score AUC =.69
Langton et al., (2009)	44	12 months	Peaks High Security ward UK	All patients had diagnosis of personality disorder Alcohol and substance related disorders – 57% and 52% Post-traumatic stress disorder – 36% Major depressive disorder – 24%	Aggression	Damage to property Full period  HCR-20 SJ AUC =.73 HCR-20 H AUC =.57 HCR-20 C AUC =.66 HCR-20 R AUC =.77 HCR-20 total score AUC =.70  12 months

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HCR-20 SJ AUC  
=.67  
HCR-20 H AUC  
=.55  
HCR-20 C AUC  
=.71  
HCR-20 R AUC  
=.66  
HCR-20 total score  
AUC =.60

Interpersonal  
physical aggression

HCR-20 SJ AUC  
=.80  
HCR-20 H AUC  
=.48  
HCR-20 C AUC  
=.68  
HCR-20 R AUC  
=.70  
HCR-20 total score  
AUC =.68

12 months  
HCR-20 SJ AUC  
=.75  
HCR-20 H AUC  
=.41

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						HCR-20 C AUC =.58 HCR-20 R AUC =.73 HCR-20 total score AUC =.58
Lindsay et al. (2008)	212	1 year	High, medium and low secure services UK	All sample had diagnosis of ID. High secure – 37% also had diagnosis of mental illness Medium secure – 10% also had diagnosis of mental illness Low secure – 30.3% also had diagnosis of mental illness	Violence	AUC across all patients HCR-20 total score AUC =.72 HCR-20 H AUC =.68 HCR-20 C AUC =.67 HCR-20 R AUC =.62
Lui et al. (2011)	1225	3.31 years	Offenders released from prison UK	PD – 74% ASPD – 66.4% Schizophrenia – 10.9% Delusional disorder – 22.7%	Reoffending	HCR-20 total score AUC =.66
Martinaki et al., (2013)	295	3 years	Psychiatric patients in Greece	Schizophrenia/psychotic disorder – 46.1% PD – 11.2% Comorbidity schizophrenia and PD – 9.1%	Violence and suicide attempts	Violent behaviour HCR-20 total score AUC =.68 HCR-20 H AUC =.65 HCR-20 C AUC =.60 HCR-20 R AUC =.63

McDermott et al., (2008)	154	2.48 years (mean)	Psychiatric facility in California	Schizophrenia – 53% Schizoaffective disorder – 19% Mood disorders – 9% Substance use disorders – 4% Other disorders -15% ASPD – 71% BPD – 12% Other PD – 18%	Aggression	<p>Aggression total HCR-20 total score AUC =.65 HCR-20 H AUC =.61 HCR-20 C AUC =.61 HCR-20 R AUC =.66</p> <p>Aggression staff HCR-20 total score AUC =.65 HCR-20 H AUC =.65 HCR-20 C AUC =.59 HCR-20 R AUC =.61</p> <p>Aggression patients HCR-20 total score AUC =.71 HCR-20 H AUC =.64 HCR-20 C AUC =.66 HCR-20 R AUC =.70</p>
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McDermott et al., (2008)	238	2.52 years (mean)	Psychiatric facility in California	Schizophrenia – 45 % Schizoaffective disorder – 27% Substance use disorders – 6% Mood disorders – 13% Other disorders – 12% ASPD -52% Other PD – 46% IQ deficits – 2%	Aggression	<p>Impulsive aggression HCR-20 total score AUC = .67 HCR-20 H AUC = .59 HCR-20 C AUC = .69 HCR-20 R AUC = .66</p> <p>Predatory aggression HCR-20 total score AUC = .68 HCR-20 H AUC = .64 HCR-20 C AUC = .68 HCR-20 R AUC = .69</p> <p>Psychotic aggression HCR-20 total score AUC = .57 HCR-20 H AUC = .46 HCR-20 C AUC = .66</p>
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						HCR-20 R AUC =.58
Morrissey et al. (2007)	73	12 months	High secure forensic setting UK	All patients resident within the ID service Mental retardation – 81% PD – 54.8% Mood disorder – 8%	Aggression	Interpersonal aggression HCR-20 total AUC =.68  Verbal/property HCR-20 total AUC =.77
Nicholls et al. (2004)	268	690.26 (mean)	Involuntary civil psychiatric patients	Schizophrenia – 45.6% men, 36.8% women Affective disorders – 19% men, 16.8% women Schizoaffective disorders 10.9% men, 21.1% women Dementia disorders – 8.2% men, 7.4% women Substance abuse and dependence – 6.8% men, 3.2% women Other psychiatric disorders – 4.8% men, 6.3% women No Axis I disorder – 1.4%, 5.3% Axis II disorder – 38.7 men, 41.1% women	Inpatient violence and community violence	Any violence Men HCR-20 H AUC =.58 HCR-20 C AUC =.58 HCR-20 C and H total AUC =.59  Women HCR-20 H AUC =.69 HCR-20 C AUC =.70 HCR-20 C and H total AUC =.74  Physical violence Men

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HCR-20 H AUC  
=.56  
HCR-20 C AUC  
=.55  
HCR-20 C and H  
total AUC =.56

Women  
HCR-20 H AUC  
=.57  
HCR-20 C AUC  
=.62  
HCR-20 C and H  
total AUC =.62

Community  
violence  
Any violence  
Men  
HCR-20 H AUC  
=.66  
HCR-20 C AUC  
=.61  
HCR-20 R AUC  
=.73  
HCR-20 total AUC  
=.72

Women

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HCR-20 H AUC  
=.75  
HCR-20 C AUC  
=.65  
HCR-20 R AUC  
=.71  
HCR-20 total AUC  
=.77

Physical violence  
Men  
HCR-20 H AUC  
=.64  
HCR-20 C AUC  
=.60  
HCR-20 R AUC  
=.79  
HCR-20 total AUC  
=.73

Women  
HCR-20 H AUC  
=.76  
HCR-20 C AUC  
=.46  
HCR-20 R AUC  
=.59  
HCR-20 total AUC  
=.66

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						Violent crime Men HCR-20 H AUC =.71 HCR-20 C AUC =.62 HCR-20 R AUC =.73 HCR-20 total AUC =.75
						Women HCR-20 H AUC =.83 HCR-20 C AUC =.61 HCR-20 R AUC =.71 HCR-20 total AUC =.80
Nillson et al. (2011)	100	59 months (mean)	Offenders discharged into community Sweden	Axis I diagnosis of psychosis – 20% PD – 67% APD – 42% Substance abuse/dependence – 53%	Violent recidivism	HCR-20 AUC =.74
O’Shea et al. (2014)	505	3 months	Medium, low and locked rehabilitation UK	Schizophrenia 43.8% PD – 8.3% Developmental disorder – 6.5%	Inpatient aggression	Any aggression Schizophrenia HCR-20 total AUC =. 738

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Organic – 6.3%

HCR-20 H AUC  
=.541  
HCR-20 C AUC  
=.782  
HCR-20 R AUC  
=.681  
SJ AUC =.535

Personality  
Disorder  
HCR-20 total AUC  
=. 714  
HCR-20 H AUC  
=.522  
HCR-20 C AUC  
=.750  
HCR-20 R AUC  
=.705  
SJ AUC =.548

Schizophrenia and  
PD  
HCR-20 total AUC  
=. 690  
HCR-20 H AUC  
=.504  
HCR-20 C AUC  
=.715  
HCR-20 R AUC  
=.729

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SJ AUC =.562

Developmental  
disorder

HCR-20 total AUC  
=. 665

HCR-20 H AUC  
=.485

HCR-20 C AUC  
=.678

HCR-20 R AUC  
=.751

SJ AUC =.575

Organic

HCR-20 total AUC  
=. 639

HCR-20 H AUC  
=.466

HCR-20 C AUC  
=.640

HCR-20 R AUC  
=.773

SJ AUC =.588

Physical aggression  
Schizophrenia

HCR-20 total AUC  
=. 703

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HCR-20 H AUC  
=.520  
HCR-20 C AUC  
=.752  
HCR-20 R AUC  
=.677  
SJ AUC =.590

PD  
HCR-20 total AUC  
=. 660  
HCR-20 H AUC  
=.479  
HCR-20 C AUC  
=.716  
HCR-20 R AUC  
=.683  
SJ AUC =.583

Schizophrenia and  
PD  
HCR-20 total AUC  
=. 615  
HCR-20 H AUC  
=.439  
HCR-20 C AUC  
=.678  
HCR-20 R AUC  
=.688  
SJ AUC =.575

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Developmental  
disorder  
HCR-20 total AUC  
=. 568  
HCR-20 H AUC  
=.399  
HCR-20 C AUC  
=.638  
HCR-20 R AUC  
=.693  
SJ AUC =.568

Organic  
HCR-20 total AUC  
=. 520  
HCR-20 H AUC  
=.360  
HCR-20 C AUC  
=.596  
HCR-20 R AUC  
=.699  
SJ AUC =.561

Any aggression  
HCR-20 total AUC  
=. 721  
HCR-20 H AUC  
=.537

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						HCR-20 C AUC =.760 HCR-20 R AUC =.689 SJ AUC =.584
						Physical aggression HCR-20 total AUC =. 658 HCR-20 H AUC =.474 HCR-20 C AUC =.698 HCR-20 R AUC =.677 SJ AUC =.603
O'Shea et al. (2015)	613	3 months	Medium, low and locked rehabilitation services UK	ID group all had diagnosis of ID Schizophrenia – 19.3% PD – 28.4% Schizophrenia and PD – 5.5% Developmental – 6.4% Organic – 0.9% Other – 39.4%  Non ID group Schizophrenia – 43.7% PD – 14.3%	Aggression and self-harm	Any aggression ID HCR-20 total AUC =. 669 HCR-20 H AUC =.546 HCR-20 C AUC =.658 HCR-20 R AUC =.691 SJ AUC =.640  Non ID group

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Schizophrenia and PD –  
8.3%  
Developmental – 6.5%  
Organic – 6.5%  
Other – 20.8%

HCR-20 total AUC  
=. 674  
HCR-20 H AUC  
=.521  
HCR-20 C AUC  
=.741  
HCR-20 R AUC  
=.646  
SJ AUC =.546

Physical aggression  
ID  
HCR-20 total AUC  
=. 609  
HCR-20 H AUC  
=.481  
HCR-20 C AUC  
=.580  
HCR-20 R AUC  
=.661  
SJ AUC =.621

Non ID group  
HCR-20 total AUC  
=. 608  
HCR-20 H AUC  
=.442  
HCR-20 C AUC  
=.663

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						HCR-20 R AUC =.648 SJ AUC =.557
Schaap et al., (2009)	45	Not reported	Ex-patients of Dutch forensic psychiatric hospital	Diagnostic information not presented	Violent recidivism	HCR-20 H AUC =.68 HCR-20 C AUC =.42 HCR-20 R AUC =.47 HCR-20 total score AUC =.54
Strand et al. (1999)	40	3-12 years	Discharged forensic psychiatric patients Sweden	Recidivism group Psychosis – 27% PD – 68% Brain damage – 5%  Non-recidivism group Psychosis – 44% PD – 44% Brain damage – 12%	Violent criminality	HCR-20 AUC =.80
Verbugge et al., (2011)	59	Minimum of 2 years	Community Australia	All had ID diagnosis Psychotic disorder – 22%	Violent recidivism	HCR-20 H AUC =.75 HCR-20 C AUC =.67 HCR-20 R AUC =.75 HCR-20 total score AUC =.80 Risk category AUC =.81

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						HCR-20 with ID supplement HCR-20 H AUC =.75 HCR-20 C AUC =.68 HCR-20 R AUC =.76 HCR-20 total score AUC =.80 Risk category AUC =.82
Vjot et al., (2013)	109	24 months	High secure forensic hospital UK	Psychotic illness – 92.7% Schizophrenia – 85.1% Personality disorder – 7.3%	Violent incidents	All incidents HCR-20 H AUC =.54 HCR-20 C AUC =.55 HCR-20 R AUC =.51 HCR-20 total score AUC =.50  Minor incidents HCR-20 H AUC =.56 HCR-20 C AUC =.52

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						HCR-20 R AUC =.53 HCR-20 total score AUC =.54  Serious incident HCR-20 H AUC =.68 HCR-20 C AUC =.79 HCR-20 R AUC =.75 HCR-20 total score AUC =.86
Wilson et al. (2013)	30	12 months	Forensic psychiatric inpatients Canada	Psychotic disorder – 87% Substance related disorder – 53%	Violence	Any aggression 12 month follow up HCR-20 H AUC =.79 HCR-20 C AUC =.89 HCR-20 R AUC =.85 HCR-20 C and R AUC = .89 HCR-20 total score AUC =.88 Risk judgement AUC =.91





## Discussion

The current systematic review examined studies of the predictive efficacy of the HCR-20 risk assessment for any violence with mentally disordered offenders. The majority of the studies reviewed provided evidence for the diagnostic breakdown of sample characteristics within forensic populations examined. The results demonstrated that even though there is variability in predictive outcomes of the HCR-20, it is a good predictor of several facets of violence, whether this be following discharge into the community or within a secure service for individuals with mental disorder. The overall AUC statistic for each HCR-20 domain indicated moderate to high effect sizes, with the HCR-20 total score indicating the best overall mean AUC = .702. These results provide further evidence for the predictive validity of the HCR-20 within forensic populations. This is an important review finding as the HCR-20 is currently advocated in clinical practice within these populations (NHS England, 2014/2015), and is a KPI that is reported within the CQUIN framework. The results can provide further support for professionals working with mentally disordered offenders more generally. The lowest overall AUC was for the historical factors (AUC = .623), which represents conclusions across many studies that the historical items often reflect lower AUC values (Dolan & Doyle 2000; O'Shea et al., 2014), which has been attributed to the fact that many individuals within forensic services score highly on historical factors, leading to less variance for it to be used effectively as a predictive domain (O'Shea et al., 2014).

Within the reviewed studies, there were seven studies that explicitly examined the differences in predictive efficacy of the risk assessment across diagnoses. These typically reported results for schizophrenia, PD, ID and mood disorders. There were also four studies that focused primarily on offenders with ID, five that focused of offenders with PD and three that focused on offenders with schizophrenia.

The results reflect that the HCR-20 risk assessment generally displays moderate to large effect sizes across diagnoses, although there is variability across reported results. In terms of comparisons across diagnoses, the risk assessment demonstrated generally larger effect sizes in terms of total score, H items, R items and SJ scores, when utilised with individuals who have a diagnosis of ID in comparison to other sub diagnoses. Moderate effect sizes were largely reported for C items for this sub group. Having said this, it is also important to note that the lowest AUC statistic was reported for the H subscale of the HCR-20 when used with ID offenders (AUC =.481), which indicates a small effect size.

There were lower overall effect sizes for predictive power of the risk assessment when utilised with PD individuals, although there were large effect sizes reported across several studies for the structured judgement aspect of the tool when applied with this population. Gray et al., (2011) highlighted that the very nature of some diagnoses, and the behaviour typified with such diagnoses, may typically result in more impulsive and

less predictable behaviour, such as the behaviour observed with individuals with a diagnosis of PD. However, in direct conflict with this, O'Shea (2013) reports that there is evidence of higher predictive results for the HCR-20 with individuals with a diagnosis of PD. Indeed, as documented within the review, there is evidence within studies that populations with PD offenders have indicated excellent AUC statistics with use of the HCR-20. For example, Grann et al., (2000) presented AUC =.71 for the HCR-20 historical item for predicting violent crime within a population of PD offenders, in comparison to individuals with a diagnosis of schizophrenia (AUC =.66). Ireland et al., (2016) also presented moderate-higher levels for the HCR-20 within the population with AUC's ranging from .54 to .92 for physical aggression and threats towards staff. De Vogel and De Ruiter (2005) also presented large AUC statistics across the HCR-20 sub domains for male patients with PD diagnoses (HCR-20 total score AUC =.88, HCR-20 historical items AUC =.83, clinical items AUC =.75, risk management items AUC =.88, and SJ items AUC =.91). However, this study also presented results for female patients with PD diagnoses (HCR-20 total score AUC =.59, HCR-20 historical items AUC =.63, clinical items AUC =.61, risk management items AUC =.52, and SJ items AUC =.86), suggesting poorer predictive validity for females who have a diagnosis of PD in comparison to males with a diagnosis of PD. However, there was good predictive validity for the HCR-20 SJ items for both male and females. These findings show support for the use of the HCR-20 structured judgement element in predicting violence, particularly with individuals who have a diagnosis of

PD, although further research into this is required (De Vogel & de Ruiter, 2005). Furthermore, this study highlighted the need to consider gender as a factor within risk assessment. Indeed, due to the need for gender-sensitive risk assessment and managements for females (Judges, Egan & Broad, 2016), the FAM (De Vogel, de Vries Robbé, Kalmthout & Place, 2014) was developed to provide additional guidelines when utilising the HCR-20V3 for assessing risk with females. As highlighted by the authors of the FAM, there is not yet sufficient evidence for the predictive validity of the additional factors, although preliminary results show good inter-rater reliability and predictive validity (De Vogel & de Vries Robbé, 2013).

For individuals with a diagnosis of schizophrenia, results demonstrated predominantly moderate to large effect sizes, with large effect sizes being reported for the HCR-20 total score. Overall, these effect sizes were smaller than the overall effect sizes for individuals with a diagnosis of ID, yet higher than the overall effect sizes for individuals with a diagnosis of PD. Additionally, higher AUC statistics were reported for the total HCR-20 score specifically for individuals with a diagnosis of schizophrenia.

As previously mentioned, there were many discrepant AUC statistics reported across all studies documented within the review. There a number of reasons why this may be the case. Firstly, there is a lack of consistency across studies in relation to diagnostic criteria. For example, Gray et al., (2011) utilised the International Classification of Diseases-10 (ICD-10;

World Health Organisation, 1992) to group participants. This was based upon whether the individual had received a diagnosis at the time of admission, as opposed to on discharge when further information may have been gathered and the diagnosis may have changed. Many of the patients also had comorbid diagnoses, and therefore appeared in more than one category. Many of the studies included within the review reported comorbid diagnoses within their sample. Whilst this reflects the complexity of forensic patients, it hinders the ability to compare with any certainty the predictive ability of the HCR-20 risk assessment with specific diagnoses. This was the main aim of the review, and subsequently the conclusions made must be interpreted with this limitation in mind. Additionally, across the studies there were a wide range of outcomes used to measure the predictive validity of the HCR-20, such as interpersonal aggression within the institution, verbal aggression, damage to property, violent recidivism, and general recidivism. It may be more clinically useful for future reviews to focus on separation of results in accordance with the violence outcome measure, so that any conclusions made can aid specific service development and implementation of HCR-20, for example results focusing on violent recidivism rates may be more useful for services that are involved in completing discharges from forensic services. Furthermore, there are also limitations that have been reported for this type of outcome data. Morrissey et al., (2007) indicated that institutional aggression is often collected from computer records, which can be inappropriately filled in or have large amounts missing information. This has an impact on the

accuracy of the results. Gray et al., (2011) also indicated that recorded reconviction rates are 'only the tip of the iceberg' for all violent behaviour. This is also particularly important when examining differences across diagnosis for risk assessment tools, as Gray et al., (2011) highlights that a particular diagnosis may also have an impact on reconviction. For example, individuals who have a diagnosis of ID may be treated differently by criminal justice agencies and may not be prosecuted.

The length of follow up between studies also differed within the review. In their review, O'Shea et al., (2013), indicated that larger effect sizes were typically reported within studies with longer follow up periods, which may be due to the increased opportunity for the report of aggression. They also found a study that suggested HCR-20 clinical scale items were stronger predictors of imminent aggression (Ogloff & Daffern, 2006), although could not explore explicitly the influence of follow up period on HCR-20 C scales due to a lack of heterogeneity across their included studies. O'Shea et al., (2013) reported the importance of being able to utilise such scales like the clinical items within the HCR-20 to aid mental health professionals intervene and appropriately manage imminent aggression. This highlights that there may be differences in predictive validity of tools over different time periods, and indicates how different scales within the HCR-20 may aid clinical practice of violent behaviour detection and management. This review was not focused on exploring the impact of follow up period on

predictability, however this appears to be an area that requires further exploration in future reviews.

Although generally the quality of studies reviewed was good, there were some biases reflected within the quality assessment. Firstly, there was measurement bias within some of the studies, particularly in relation to ensuring that the rater was blind to the outcome. Over half (68%) of the studies lacked clarity as to whether the rater was blind to the outcome and two of the studies did not ensure this was achieved (3%). Additionally, some studies did not have acceptable levels of inter-rater reliability. This element of measurement bias is particularly important when evaluating SPJ tools, as these risk assessments rely on clinician judgement and interpretation (Tully et al., 2013). Furthermore, there was also variability within the outcome measures of violence and measurement of such, which subsequently limits the comparability of the results presented. Comparability was also confounded by the difference in length of follow up of the studies, with many of the studies also having less than 2 years as a follow up period (58%). Similarly, the nature of reporting within such studies proves problematic for reviews such as this one, as even though diagnostic information was provided for most of the studies, it is difficult to explore the results within the context of individual psychopathology and the implications of such in clinical practice, which was one of the key aims of the systematic review. Finally, due to time constraints of the author, 20 publications were excluded or unallocated as they could not be accessed



within these constraints. Researcher time constraints have been identified as a source of bias within systematic reviews as a research strategy (Mallett, Hagen-Zanker, Slater & Duvendack, 2012), as relevant studies may have been removed because of these constraints. This should be taken into consideration when interpreting the results of the review.

In conclusion, the HCR-20 appears to have contributed significantly to the clinical practice of risk assessment and management (O'Shea et al., 2014) within the forensic field. The results of this review further support the use of the HCR-20 within differing forensic populations, and has demonstrated particularly good results for the use of the tool with ID offenders as a subgroup of mentally disordered offenders, although it was noted that the results were not always consistent. Future research should attempt to demonstrate the validity of the tool across different diagnoses specifically to allow for a more comprehensive analysis of the impact of different disorders on the reliability of the tool, as there are still limited studies with diagnostic difference as a factor. Attention has also been paid to the biases evident within the results, primarily surrounding measurement bias and the ability to compare the results. Future research should take this into consideration to allow for more confidence in results of predictive validity of the HCR-20. As such, a retrospective cohort study will now be presented that explores the predictive abilities of the HCR-20 risk assessment between ID directorates and mental health (MH) directorates within two specific forensic services.

### **Chapter 3 – The Efficacy of Violence Risk Prediction Using the HCR-20 with Intellectually Disabled Offenders across Two Levels of Security in UK Psychiatric Services**

#### **Abstract**

The study presents results from a retrospective cohort study exploring the difference in predictive abilities of HCR-20V2 and HCR-20V3 across both ID directorates and mental health (MH) directorates within two separate forensic settings. These were high and low secure forensic services in the UK. 191 patient files were collected and examined; 40 from the high secure ID pathway, 106 from the high secure mental health pathway, 11 from the low secure ID pathway and 34 from the low secure mental health pathway. Incident records for institutional violence were gathered and re-coded to examine whether HCR-20 assessments were predictive of such within these settings. Results demonstrated that there were significant positive correlations between HCR-20 and different violent behaviours across the diagnoses. Moderate effect sizes were also reported for the HCR-20V2 and HCR-20V3 across security settings specifically. These results are discussed within the previous evidence base and limitations of the study are presented.

## Introduction

The DSM-V (American Psychiatric Association, 2013) provides the definition of ID as a disability that impairs intellectual functioning, and which has an impact on an individual's adaptive functioning across three domains: conceptual, social and practical. The DSM-V indicates that adaptive functioning is related to the specific skills required for everyday independent living, such as an individual's personal care, ability to work and home living for example. These impairments must be present from childhood. Various terms have been used within the literature to define the same cluster of criteria identified by the DSM-V (2013), such as mental retardation, intellectual disability, developmental disability and learning disability.

It has been noted by the BPS (2015), that psychologists are often required to assess whether an individual has an ID. The outcome of the assessment can subsequently be used by professionals to aid correct care planning of the assessed person within both community and mental health provisions, and determine whether they have access to a number of legal and civil rights. As such, the BPS documentation provides a set of guidelines for psychologists for assessing ID within clinical practice. The Society recommends that a diagnosis of ID requires evidence across three criteria:

1. Evidence of significant impairment of intellectual functioning.
2. Evidence of significant impairment of adaptive behaviour.
3. Evidence of onset before adulthood.

It has been generally accepted that the IQ, is an appropriate standardised measure to represent if an individual has a 'significant impairment of intellectual functioning'. The Society also indicates that 'significant impairment of adaptive behaviour' is being increasingly assessed by norm referenced measures with appropriate psychometric properties. Finally, the Society specifies that the criteria of 'onset before adulthood' is evidenced by the presence of significant impairment of intellectual functioning and adaptive behaviour prior to the age of 18. For a diagnosis of ID to be made, all three of these criteria should be met.

A significantly high number of children and adults with ID enter the CJS (NHS, 2015). It is generally accepted that between 5-10% of the offender population has ID (The Offender Health, 2015), however this figure may even be as high as 30% (Criminal Justice Joint Inspection, 2014). Offenders with ID may be diverted away from the CJS and into specialist treatment and care services (Offender Health Collaborative, 2015). Subsequently this population make up a significant proportion of patients who reside in forensic psychiatric and specialist services within the UK (Morrissey et al., 2007). Research into aggression within institutions for this population has indicated that ID offenders may display elevated levels of aggression and violence (MacMillan, Hastings & Caldwell, 2004), and are involved in a disproportionate level of aggressive incidents (O'Shea, Picchioni, McGarthy, Mason & Dickens, 2015; Fitzgerald, 2013), although the severity of these

violent acts is often lower in comparison to mental health populations (Dickens, Picchioni & Long, 2013). As a result, research has focused upon risk assessment and management of offenders within secure settings, to ensure staff and patient safety, alongside public protection (O'Shea et al., 2015). Given research findings regarding elevated levels of aggression within secure settings for ID offenders, it is imperative that clinicians have access to appropriate risk assessment tools for this population.

There has been much focus on the predictive abilities of various risk assessment tools utilised with offending populations (Lindsay et al., 2008). The ROC curve and resulting AUC statistic is the recommended method of analysing the predictive abilities of risk assessment tools (Singh et al., 2013) as the method is resistant to the effects of outcome base rates (Douglas, Otto, Desmarais, & Borum, 2012). There are also other methods of measurement, such as Cohen's  $d$  (Rice & Harris, 2005). Table 3 refers to the effect sizes in comparison to these methods.

Actuarial risk assessment tools combine a set of static variables, highlighted by the literature and construction samples, as predictive of future violence, with a mathematical formula to quantify the level of risk for each individual being assessed (MacMillan et al., 2004). The VRAG (Quinsey, Harris, Rice, & Cromnier, 1998) is one of the most widely researched actuarial risk assessments and is often used as a comparison to other risk assessments (Lindsay et al., 2008). The VRAG has demonstrated

large effect sizes when utilized for assessing and predicting institutional violence in medium secure units in the UK (Doyle, Dolan & McGovern, 2002) alongside violent offences and general offences (Gray et al., 2007).

Despite good levels of predictive accuracy, limitations of the actuarial approach have been noted, such as the focus on static variables alongside the lack of adjustments in risk (Johnston, 2002). Subsequently, other risk assessment tools have been developed that contain historic actuarial, clinical and dynamic elements that reflect treatment responsiveness (Johnston, 2002), known as SPJ. Whilst there is no gold standard of risk assessment (NICE Guidelines, 2005), the DoH (2007) indicates that the best practice of risk assessment is for clinicians to adopt tools that follow the SPJ approach. Research has subsequently focused on the development of these tools (Tully, Chou & Browne, 2013), with these tools being adopted within national and regional offender risk management protocols.

The HCR-20V2 (Webster et al., 1997) and updated HCR-20V3 (Douglas, Hart, Webster & Belfrage, 2013) is one example of a well-researched and widely used SPJ aid to risk assessment and management of violent offenders (Morrissey, Belley & Milton, 2014). The HCR-20V2 and V3 has demonstrated good predictive abilities (Gray et al., 2003; Judges, Egan & Broad, 2016). For example, Doyle et al., (2014) reported moderate to large effect sizes when examining the predictive ability of the HCR-20V3 for violence when individuals were discharged from medium secure settings in

the UK at 6 and 12 months. AUC values were reported as AUC =0.73 and AUC =0.70 for the overall assessment, with AUC =0.63 and AUC =0.63 for historical factors, AUC =0.75 and AUC =0.71 for clinical factors, AUC =0.67 and AUC =0.63 for risk management factors.

Research has also started to focus on the application of risk assessment tools with ID offenders and the predictive efficacy of such tools, to ensure that clinicians are equipped with correct risk assessments for different diagnoses and complexities of patients within forensic services (O'Shea et al., 2015). Specific risk assessment for ID offenders has also been noted to be a crucial component in aiding the planning of service provision from national strategic frameworks and individual case management (Lindsay & Beail, 2004) for these individuals.

Morrissey et al., (2007) examined the predictive abilities of the PCL-R (Hare, 2003), HCR-20V2 and EPS-BRS (Prout & Stroumer, 1991) when utilised with ID offenders in a high secure environment. The HCR-20V2 total scores and EPS-BRS externalising scale produced large effect sizes for predicting interpersonal aggression and verbal/property aggression (AUC =0.68-0.77 and AUC =0.72-0.77 respectively). The PCL-R was not significantly correlated with institutional aggression. The authors speculated that this result may be due to the function and underlying causes of aggressive behaviour with ID offenders, and that psychopathy and associated traits may be a less important construct in violence

prediction for these individuals. Such findings have been imperative in clinical practice, as previously the PCL-R has been provided with more weighting within forensic services due to the previous well established link between psychopathic traits and violence (Walsh, Swogger, & Kosson, 2009). Additionally, Lindsay et al., (2008) reported moderate effect sizes for the HCR-20V2 when applied to male ID offenders across high, medium and low secure services (AUC =0.62 for historical items, 0.67 for clinical items and 0.62 for risk management items). They also found that the HCR-20 and VRAG scores corresponded with the security of the psychiatric hospital that the individual resided in, with individuals rated as a higher risk being detained within higher security hospital. Further research by Gray et al., (2011) indicated that the HCR-20V2 was a good predictor of violent reconvictions in ID offenders, with all three domains of the risk assessment tool displaying large/moderate effect sizes, AUC =0.84 for historical items, AUC =0.68 for clinical items and AUC =0.70 for risk management items. These results indicated that the HCR-20 was a better predictor of violent reconvictions for offenders with ID in comparison to offenders who had a diagnosis of PD. It was hypothesised that for diagnoses, such as PD, clinical factors were more dynamic and likely to change, as PD is typified by impulsive and risk taking behaviour, which is more difficult to predict (Gray et al., 2011). The presentation, and subsequently the clinical and risk management factors within the HCR-20, of individuals with ID may remain relatively stable over time and could explain why the HCR-20 is being



reported as more predictive within this sub category of mentally disordered offenders.

Furthermore, Fitzgerald et al., (2013) demonstrated moderate/large effect sizes for the use of the HCR-20V2 with ID offenders. The overall judgement (AUC =0.77), historical (AUC =0.77) and risk management factors scales (AUC =0.73) were more predictive than the clinical factors (AUC =0.66). Most recently, O'Shea et al., (2015) has reported AUC values ranging from 0.481-0.691 for application of the HCR-20 with ID offenders across medium secure, low secure, locked rehabilitation and open rehabilitation wards. These results were in comparison to AUC values for individuals without ID, with AUC values 0.442-0.741. HCR-20 total and risk management scores were significant predictors of overall aggression and physical aggression towards other for both ID and non-ID sample. HCR-20 clinical items AUC values were found to be a significant predictor of any aggression for both the ID sample (AUC =0.658) and comparison group (AUC =0.741), however this was only a predictor of physical violence towards others for the comparison group (AUC =0.663), whereas this was not the case for the ID sample (AUC =0.580). Furthermore, the structured judgement provided by clinicians, scoring individuals as a low, moderate or high risk of future aggression/violence, was a significant predictor for both any aggression and physical aggression for the ID sample and not for the comparison sample. It was also reported that HCR-20 historical items were not predictive for either sample for both any aggression or physical aggression,

which is surprising given previous evidence by Gray et al., (2011), and the suggestion that more static factors are more effective for violent risk prediction, particularly among offenders with ID (Lofthouse et al., 2014).

In summary, it appears that the HCR-20 has good predictive abilities when used with ID offenders (Fitzgerald et al., 2013), and sometimes demonstrates greater predictive efficacy in comparison to other diagnoses (Gray et al., 2011). More recent studies have also found that the clinical judgement aspect of the HCR-20 is particularly predictive of institutional aggression for ID offenders (Fitzgerald et al., 2013; O'Shea et al., 2015). However, in contrast to the wide ranging evidence base for risk assessments for offenders more generally, the research in relation to ID offenders specifically, still remains relatively small (Gray, Fitzgerald, Taylor, MacCulloch & Snowdon, 2007; Lindsay et al., 2008). Additionally, there appears to be limited research focused on the predictive abilities of the most recent version of HCR-20V3, which adopts a further focus on clinical judgement (Douglas et al., 2013). This study, therefore, aims to add further evidence towards the use of HCR-20 across different forensic security levels, namely high secure and low secure, whilst also comparing the risk assessments predictive efficacy between offenders detained within ID pathways and those detained within MH pathways. The study is also unique in that it will explore the predictive abilities of both the HCR-20V2 and HCR-20V3.

## Method

### *Procedure*

The study was a retrospective cohort study across a high secure forensic hospital and low secure forensic hospital in the UK. All patients detained within the ID and MH directorates, in both the high and low secure service on a specific date identified by the author, were included in the study. Retrospective data was then collected for identified patients from time of admission up until this specific date. All previous routine violence risk assessments, the HCR-20V2 and HCR-20V3 scores, were collected for each patient from computerized records. Each patient's clinical team scored the HCR-20 risk factors utilizing numerical methods (for example a score of 0,1 or 2) for both HCR-20V2 and HCR-20V3 risk factors. In terms of the HCR-20V3 data, the presence and relevance of each risk factor, alongside case prioritization, risk of serious physical harm and imminent violence were also scored using numerical methods by the clinical team, as this was how the assessment was scored within the service. It was unclear as to whether the clinical team utilised the ID supplement for conducting HCR-20 assessments with individuals who had a diagnosis of ID. This information was not recorded on the computerized records for risk assessments.

Subsequent violent incidents from the time of the earliest HCR-20 risk assessment were recorded as the outcome measure for institutional violence. This included actual, attempted and threatened acts of violence, alongside instances of seclusions and segregation. The frequency of violent

incidents for each patient was then determined. This was calculated according to the length of time since the completed HCR-20 risk assessment. All incident data was collected from computerized records within the service, which contained information regarding the type of incident and what happened during the incident. The severity of the incident was not included in the services recording of incidents, and as such the frequency of violent incidents was computed as opposed to the severity. The predictive abilities of the HCR-20 were compared between groups (ID vs MH groups) alongside security (high vs low).

### *Participants*

Data was collected from one high secure forensic hospital and one low secure forensic hospital from both ID and MH directorates. All patients detained within these directorates on a specific date identified by the author were included in the study. From the high secure population, there were 49 patients included from the ID directorate and 120 patients from the MH directorate. From the low secure population, there were 13 patients included from the ID directorate and 45 patients from the MH directorate. Due to insufficient information (no HCR-20 risk assessment or no incident data), several patients were removed from the sample. This left the following for data analysis: 40 high secure ID patients, 106 high secure MH patients, 11 low secure ID patients and 34 low secure MH patients. A total of 191 patients were included in the sample. All patients were male.

### *Demographic and Clinical Data*

Patient age, ethnicity, admission date, primary psychiatric diagnosis, legal status and index offence demographic information were extracted from patient records, if they were available. Table 6 presents the sample characteristics across the sites.

Table 6: *Sample characteristics.*

Demographic Information	High Secure ID group (n=40)	High Secure MH group (n=106)	Low Secure ID group (n=11)	Low Secure MH group (n=34)
Mean age at consensus date (SD)	38.22 (9.98)	41.68 (10.77)	34.00 (6.36)	37.91 (11.08)
<b>Ethnicity</b>				
White-British	31 (77.50%)	72 (67.90%)	10 (90.90%)	18 (53%)
White-Irish	1 (2.50%)	1 (0.90%)	0 (0%)	0 (0%)
White-Other	1 (2.50%)	6 (5.70%)	0 (0%)	2 (5.90%)
Caribbean	1 (2.50%)	5 (4.70%)	0 (0%)	7 (20.60%)
Pakistani	2 (5%)	4 (3.80%)	1 (9.1%)	1 (2.90%)
Mixed White and Asian	0 (0%)	2 (1.90%)	0 (0%)	0 (0%)
Asian-Other	0 (0%)	1 (0.90%)	0 (0%)	0 (0%)
African	1 (2.50%)	8 (7.50%)	0 (0%)	0 (0%)
Mixed White and Black Caribbean	1 (2.50%)	1 (0.90%)	0 (0%)	0 (0%)
Mixed White and Black African	0 (0%)	1 (0.90%)	0 (0%)	0 (0%)
Indian	0 (0%)	1 (0.90%)	0 (0%)	0 (0%)
Mixed Any Other	1 (2.50%)	3 (2.80%)	0 (0%)	1 (2.90%)
Other	0 (0%)	0 (0%)	0 (0%)	3 (8.80%)
Not Stated	1 (2.50%)	1 (0.90%)	0 (0%)	2 (5.90%)
<b>Admission Source</b>				
Prison	12 (30%)	56 (52.80%)	3 (27.30%)	7 (20.60%)
Medium Secure	26 (65%)	33 (31.10%)	0 (0%)	0 (0%)
High Secure	2 (5%)	6 (5.70%)	0 (0%)	0 (0%)

Demographic Information	High Secure ID group (n=40)	High Secure MH group (n=106)	Low Secure ID group (n=11)	Low Secure MH group (n=34)
Court	0 (0%)	11 (10.40%)	0 (0%)	0 (0%)
Usual Place of Residence/Car e Home	0 (0%)	0 (0%)	0 (0%)	6 (17.65%)
Police Station	0 (0%)	0 (0%)	0 (0%)	1 (2.95%)
Other	0 (0%)	0 (0%)	5 (72.70%)	20 (58.80%)
<b>Primary Diagnosis</b>				
Schizophrenia	4 (10%)	0 (0%)	1 (9.09%)	28 (82.30%)
Personality Disorder	3 (6.90%)	0 (0%)	0 (0%)	2 (5.90%)
Intellectual Disability	31 (77.50%)	0 (0%)	2 (18.18%)	0 (0%)
Behavioural and Emotional Disorders	2 (5%)	0 (0%)	0 (0%)	0 (0%)
Other	0 (0%)	0 (0%)	0 (0%)	0 (0%)
Not Stated	0 (0%)	106 (100%)	8 (72.73%)	4 (11.80%)
<b>Legal status</b>				
Section 3	10 (25%)	7 (6.60%)	4 (36.36%)	11 (32.35%)
Section 37	2 (5%)	1 (0.90%)	1 (9.10%)	6 (17.65%)
Section 37/41	12 (30%)	51 (48.10%)	4 (36.36%)	6 (17.65%)
Section 47/49	11 (27.50%)	32 (30.20%)	2 (18.18%)	6 (17.65%)
Other	5 (12.50%)	15 (14.10%)	0 (0%)	5 (14.70%)
<b>Index Offence</b>				
Murder	1 (2.50%)	26 (24.50%)	0 (0%)	0 (0%)
Attempted Murder	1 (2.50%)	2 (1.90%)	0 (0%)	0 (0%)
Manslaughter	1 (2.50%)	17 (16%)	0 (0%)	0 (0%)
Arson	2 (5%)	4 (3.80%)	0 (0%)	0 (0%)

Demographic Information	High Secure ID group (n=40)	High Secure MH group (n=106)	Low Secure ID group (n=11)	Low Secure MH group (n=34)
Violence Against the Person	17 (42.50%)	19 (17.90%)	0 (0%)	0 (0%)
Robbery	1 (2.50%)	6 (5.70%)	0 (0%)	0 (0%)
Damage to Property	1 (2.50%)	0 (0%)	0 (0%)	0 (0%)
Sexual offences	6 (15%)	11 (10.40%)	0 (0%)	0 (0%)
Other	3 (7.50%)	11 (10.40%)	0 (0%)	0 (0%)
None	6 (15%)	9 (8.50%)	0 (0%)	0 (0%)
Not specified	1 (2.50%)	1 (0.90%)	11 (100%)	34 (100%)

## Measures

### *Risk Assessment*

Both the HCR-20V2 and HCR-20V3 contain 20 risk factors across three sub domains: Historical (H), Clinical (C) and Risk management (R) factors. Each factor is rated as to whether it is present (Y), partially or possibly present (P) or not present (N). Clinicians are also required to provide a judgement as to whether the individual presents a low, moderate or high risk of future violence (O'Shea et al., 2015). Following extensive clinical beta testing and review, the HCR-20V2 risk assessment was updated to the HCR-20V3 (Douglas, Hart, Webster, & Belfrage, 2013). Therefore, there are differences in the factors between the two risk factors. Table 1 provides further information on the risk items contained within HCR-20V2 and HCR-20V3.



The HCR-20V3 also contains additional features. The evaluator is required to rate the relevance of each factor to the risk of violence as either low, medium or high. A risk summary judgement is also determined, where the evaluator is required to rate the individual as low, moderate or high risk of future violence and determine whether there is risk for serious physical harm and risk of imminent violence. In addition to rating the factors, evaluators are guided by the tool to develop a clinical formulation that provides hypotheses into the function of violence for the individual. The evaluator is also guided to highlight potential risk scenarios for the individual, where the focus is on the likelihood, severity, duration and potential victims of future violence. The present/absent risk factors, formulation and scenario planning is then used to help the development of risk management strategies and decision making for treatment of the individual.

As the focus of the study was on institutional violence and aggression, only "in" ratings were considered. As suggested by Gray, Taylor & Snowden (2008), if a factor was not scored, the item was pro-rated by taking the average score on the HCR-20 sub scale. If too many factors were not scored (more than five in total, two for the historical scale and one for the clinical and risk management scales) then the risk assessment was omitted from further analysis.

### *Violent/Aggressive Outcomes*

Incidents of violence and aggression were collected from the earliest HCR-20 available for each patient up until the specified date, which was determined at the start of the study. Incidents were recorded electronically and categorised by the clinical staff member inputting the data. Incidents were re-coded by the researcher to ensure correct identification of codes. The HCR-20V3 definition of violence was also considered when coding incidents. The HCR-20V3 defines violence as “an actual, attempted or threatened infliction of bodily harm of another person” (Douglas et al., 2013, page 2). Table 7 presents the three codes derived from NHS Trust coding criteria in line with this definition.

Table 7: *Coding Criteria.*

Behaviour	Explanation
Physical Assault	Any physical assault on staff, other patient, visitor/others. This may be deemed as physical assault if it occurs during a restraint.
Attempted Physical Assault	The attempt to assault staff, other patient, visitor/others.
Verbal Abuse	Being verbally abusive/aggressive towards staff, other patient, visitor or others. Also includes threats of violence towards others (threat of physical and/or sexual violence). Racial abuse is also captured here.

If an incident contained several violent behaviours, then the most severe category of behaviour was coded. Furthermore, damage against property was not included within the codes, unless the property was used by the individual to threaten, attempt or use against another person. This was in line with the HCR-20V3 definition (Douglas et al., 2013).

In addition to clinical incident data, seclusion and segregation data was also collected. A period of seclusion is predominantly used within forensic and

psychiatric services as a short term management strategy for disturbed and violent behaviour (NICE, 2005), with segregation providing longer term management. It was therefore deemed appropriate that this data was collected also. Attention was paid specifically to the frequency and length of seclusion/segregation for each individual.

### *Ethics*

The study was approved by the Research and Innovation Department for the relevant Trust associated with forensic services. The study was also approved by the Clinical Audit and Service Evaluation Committee at both sites and considered as a service evaluation. Following advice from the host service, it was deemed not necessary to retrieve patient consent as only routinely collected data was utilized.

### Results

Of the risk assessments analysed, 111 were HCR-20V2 assessments and 80 were HCR-20V3 assessments. All low secure assessments were completed with HCR-20V3, as this was a relatively new forensic service.

An overview of the incidents and seclusion/segregation data is presented. The results for both versions of the HCR-20 are presented. Linear regressions were computed between all HCR-20 sub domains and total scores with frequency of total violent incidents, which were further separated into verbal abuse, attempted assault and actual assault for all

samples (high secure ID, high secure MH, low secure ID, low secure MH).

The results are presented below.

HCR-20 Version 2 analysis for incidents

Table 8: Correlations (*r*) between the frequency of incidents against all domains of HCR-20V2 across ID and MH high secure population.

High Secure	HCR-20 H	HCR-20 C	HCR-20 R	HCR-20 Total
Total Frequency of Incidents				
ID (n=34)	0.152	<b>.348*</b>	<b>0.345*</b>	<b>.372*</b>
MH (n=77)	0.073	<b>.355*</b>	0.141	<b>.270*</b>
Total Frequency of Verbal Abuse				
ID (n=34)	0.169	<b>.325*</b>	0.264	<b>.339*</b>
MH (n=77)	0.033	<b>.373*</b>	0.184	<b>.274*</b>
Total Frequency of Attempted Assault				
ID (n=34)	-0.014	0.234	<b>.370*</b>	0.242
MH (n=77)	0.084	<b>.223*</b>	0.121	<b>.203*</b>
Total Frequency of Actual Assault				
ID (n=34)	0.137	0.275	<b>.385*</b>	<b>.349*</b>
MH (n=77)	0.128	<b>.238*</b>	-0.013	0.182

\*= Significant at p<.05 level

*HCR-20 Version 3 analysis for incidents*

Table 9: Correlations (*r*) between the frequency of incidents against all domains of HCR-20V3 across ID and MH high secure population.

High Secure	HCR-20 H	HCR-20 C	HCR-20 R	HCR-20 Total	Prioritisation	Serious Physical Harm	Imminent Violence
Total Frequency of Incidents							
ID (n=6)	0.116	0.590	0.024	0.479	0.325	0.608	0.699
MH (n=29)	0.050	0.255	<b>-.434*</b>	-0.115	0.105	-0.048	-0.055
Total Frequency of Verbal Abuse							
ID (n=6)	0.207	0.411	-0.215	0.299	0.262	0.466	0.532
MH (n=29)	0.045	0.226	<b>-.433*</b>	-0.118	0.072	-0.092	-0.005
Total Frequency of Attempted Assault							
ID (n=6)	0.207	0.554	0.131	0.583	0.284	0.598	<b>.778*</b>
MH (n=29)	0.018	0.202	-0.196	-0.076	0.263	0.182	-0.270
Total Frequency of Actual Assault							
ID (n=6)	-0.228	<b>.783*</b>	0.591	0.664	0.348	0.697	<b>.750*</b>
MH (n=29)	0.065	0.189	-0.226	0.000	-0.061	-0.046	0.011

\*= Significant at  $p < .05$  level.

Table 10: Correlations (*r*) between the frequency of incidents against all domains of HCR-20V3 across ID and MH low secure population.

Low Secure	HCR-20 H	HCR-20 C	HCR-20 R	HCR-20 Total	Prioritisation	Serious Physical Harm	Imminent Violence
Total Frequency of Incidents							
ID (n=11)	0.035	0.520	0.314	0.314	0.916	-0.236	0.171
MH (n=34)	0.033	0.146	0.049	0.074	0.041	-0.024	0.250
Total Frequency of Verbal Abuse							
ID (n=11)	0.021	<b>.532*</b>	0.344	0.322	0.191	-0.251	0.242
MH (n=34)	-0.096	0.227	0.016	0.087	0.126	0.045	<b>.422*</b>
Total Frequency of Attempted Assault							
ID (n=11)	0.128	0.434	0.131	0.267	0.186	-0.169	-0.137
MH (n=34)	0.101	0.166	-0.195	0.046	-0.122	-0.127	0.270
Total Frequency of Actual Assault							
ID (n=11)	-0.037	0.414	0.298	0.234	0.212	-0.158	0.023
MH (n=34)	0.049	-0.044	0.062	0.030	0.089	0.025	-0.087

\*= Significant at  $p < .05$  level.

Additionally, seclusion data was examined to find the extent to which HCR-20 scores were correlated with seclusion and long term segregation. There were more cases with missing information with regards to seclusion and long term segregation. All data was missing with regards to the low secure

population. Table 11 and 12 indicate the results of the HCR-20 when correlated with frequency of seclusion and long term segregation incidents.

HCR-20 Version 2 analysis for seclusion/long term segregation

Table 11: *Correlations (r) between the frequency of seclusion/long term segregation against all domains of HCR-20V2 across ID and MH high secure population.*

High Secure	HCR-20 H	HCR-20 C	HCR-20 R	HCR-20 Total
Total Frequency of Seclusion				
ID (n=34)	0.023	<b>0.322</b>	<b>0.347</b>	<b>0.291</b>
MH (n=37)	0.120	0.165	-0.080	0.136
Total Frequency of Long Term Segregation				
ID (n=34)	0.205	0.150	<b>0.299</b>	<b>0.297</b>
MH (n=38)	0.047	0.010	0.122	0.093

\*= Significant at p<.05 level.



*HCR-20 Version 3 analysis for seclusion/long term segregation*

Table 12: Correlations (*r*) between the frequency of seclusion/long term segregation against all domains of HCR-20V3 across ID and MH high secure population.

High Secure	HCR-20 H	HCR-20 C	HCR-20 R	HCR-20 Total	Prioritisation	Serious Physical Harm	Imminent Violence
Total Frequency of Seclusion							
ID (n=6)	0.019	0.709	0.286	0.629	0.346	0.691	<b>0.808</b>
MH (n=12)	0.041	-0.350	-0.324	-0.160	0.148	0.081	0.475
Total Frequency of Long Term Segregation							
ID (n=6)	-0.253	0.542	<b>0.799</b>	0.606	0.200	0.400	0.548
MH (n=12)	0.072	0.365	<b>-0.571</b>	-0.116	0.000	-0.057	0.144

\*= Significant at  $p < .05$  level.

*Comparison of AUC Statistic Across Security Setting*

As suggested by previous research, the ROC curve and resulting AUC statistic is the recommended method of analysing the predictive abilities of risk assessment tools (Singh et al., 2013). This method was used to assess the HCR-20 predictive efficacy within this study. Due to the low population within the low secure ID samples across both security levels, the predictive abilities of the HCR-20 were assessed according to security level in general as opposed to diagnosis alone. HCR-20 total scores were transformed into

actuarial data for data analysis. This approach has been typically adopted by researchers in this area (Gray et al., 2011).

The HCR-20V2 demonstrated moderate effect sizes in predicting any outcome of violence within the high secure service (AUC =.642). For the HCR-20V3, the risk assessment showed a moderate effect size for the prediction of any violence (AUC =.621) when used within the high secure service. Within the low secure service, the HCR-20V3 demonstrated a moderate effect in predicting any violence (AUC =.639). However, none of the resulting AUC statistics were significant at  $p < .05$  level. Figures 2, 3 and 4 present the ROC curve for these results.

Figure 2: *The ROC curve for HCR-20V2 predicting any violence when utilised within a high secure forensic service, combining both ID and MH patients.*

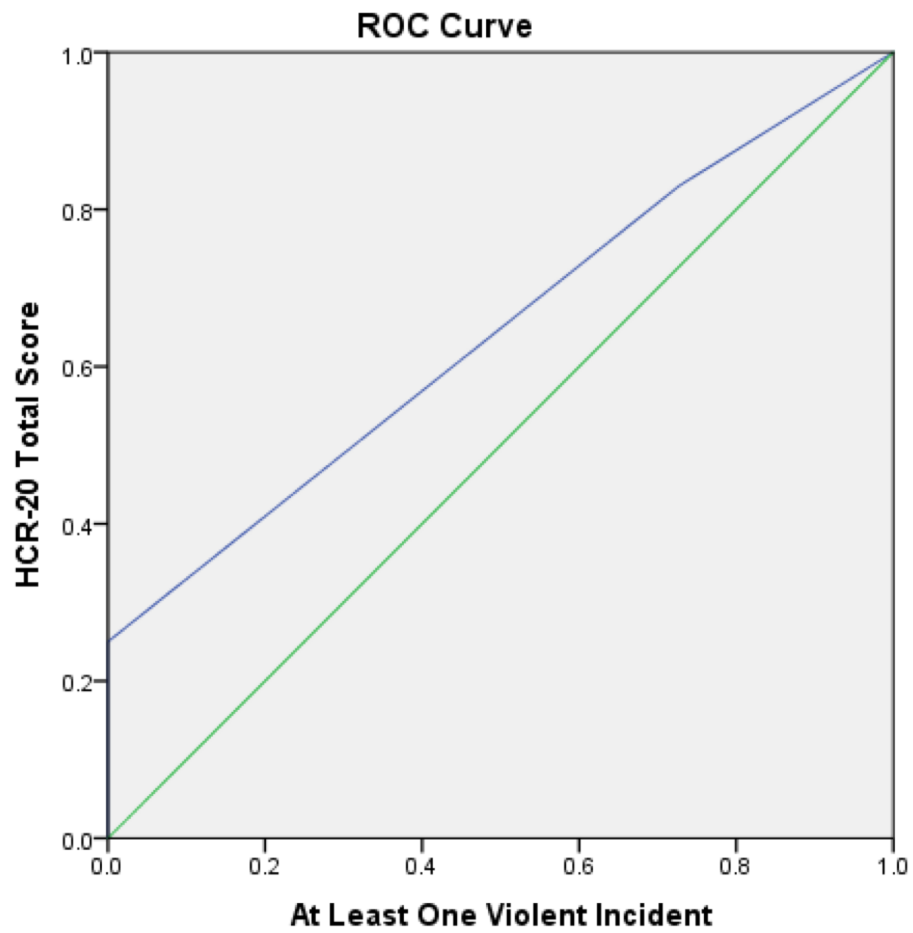


Figure 3: *The ROC curve for HCR-20V3 predicting any violence when utilised within a high secure forensic service, combining both ID and MH patients.*

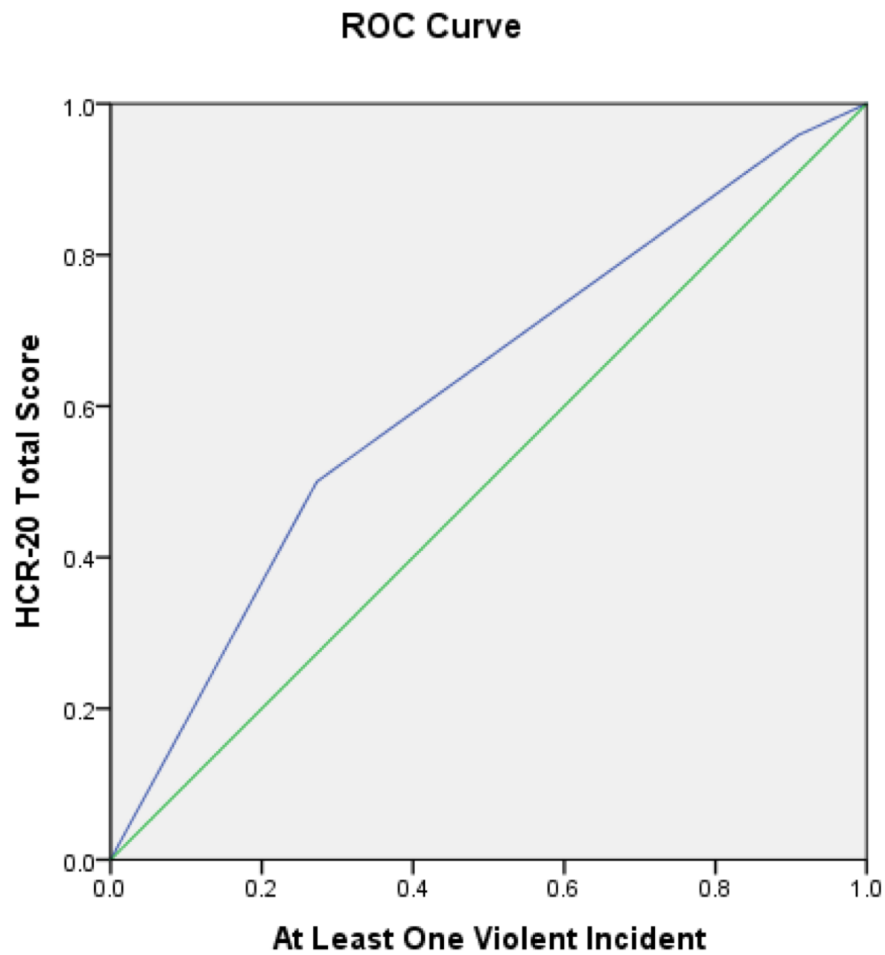
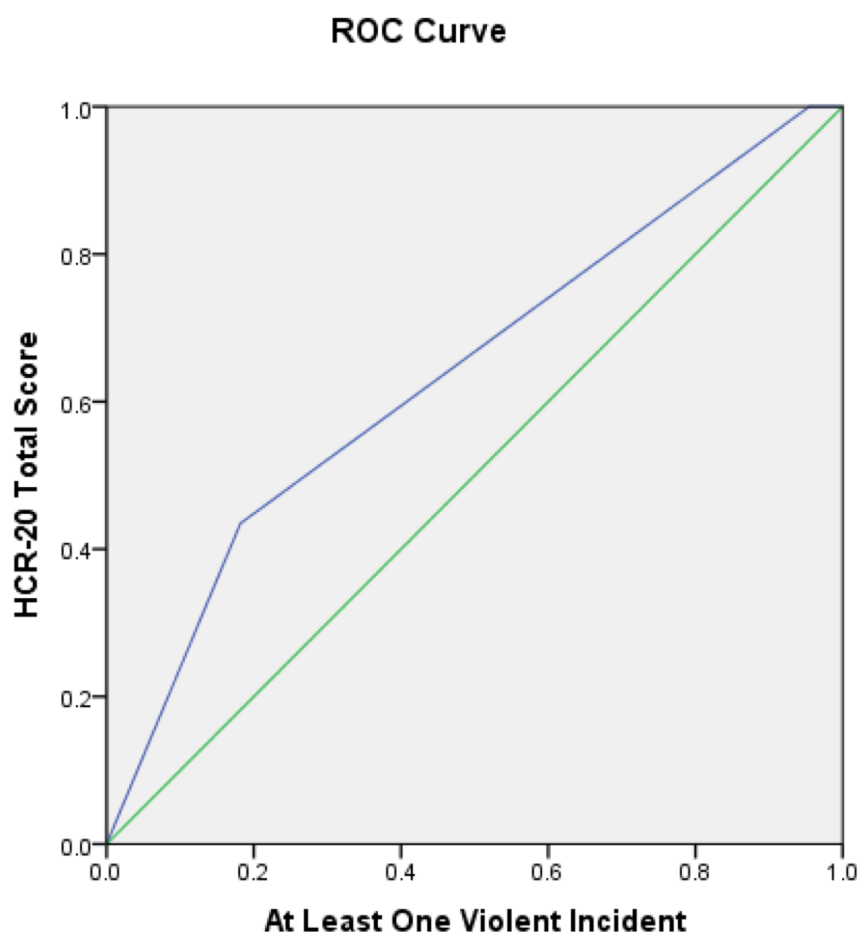


Figure 4: *The ROC curve for HCR-20V3 predicting any violence when utilised within a low secure forensic service, combining both ID and MH patients.*



The ROC analysis and resulting AUC statistics indicated that the HCR-20V2 and HCR-20V3 demonstrated good levels of predictiveness across high and low secure settings, regardless of diagnosis or directorate, for any institutional violence (verbal, attempted or actual assault), although these results were not significant at  $p < 0.05$  level.

## Discussion

This study provides further evidence for the HCR-20 risk assessment and its use across different populations and security levels in forensic services. It is also one of the first studies to explore the predictive abilities of the HCR-20V3, which also demonstrated some positive preliminary correlations and predictive capabilities when utilised with offenders with MH or ID diagnoses.

In terms of the correlation results, the HCR-20V2 clinical items ( $r=.348$ ,  $p=.022$ ), risk management items ( $r=.345$ ,  $p=.023$ ) and total score ( $r=.372$ ,  $p=.015$ ) were all significantly and positively related to frequency of violent incidents with the ID high secure sample. Results for the historical items were positively related to frequency of violent incidents within the ID sample but this result was not significant. This indicates that it can be a useful clinical tool to aid assessment and management of high risk ID offenders. In addition to this, the clinical items and HCR-20 total scores demonstrated statistically significant positive correlations for frequency of incidents within the MH population. The results demonstrated that the HCR-20 historical items, whilst positively related to the frequency of incidents, were not statistically significant for both for ID and MH offenders. This finding appears to be linked to previous research, that suggests that static aspects of risk assessment tools, such as the HCR-20 historical items are not as useful at predicting violent outcomes (Dolan & Blattner, 2010).

The HCR-20V2 also demonstrated positive correlations for incidents of seclusion, particularly within the high secure ID directorate, with clinical items ( $r=.322$ ,  $p=.032$ ), risk management items ( $r=.347$ ,  $p=.022$ ) and total score ( $r=.291$ ,  $p=.047$ ). These results were significant. Additionally, significant positive correlations, were also reported for risk management items and HCR-20 total, for incidents of long term segregation within the high secure ID population. The results for the high secure MH directorate, in comparison, were not significant, for both incidents of seclusion and long term segregation. These results suggest that the HCR-20V2 could be better at predicting violent outcomes within an ID population. These findings are also supportive of previous research (Gray et al., 2011), and may add further weight to the argument that the dynamic sub domains and total scores of the HCR-20V2 can be more effective when used with ID offenders, as the nature of behaviours presented within this population may be less impulsive and chaotic as opposed to other diagnoses, such as PD (Gray et al., 2011).

The HCR-20V3 results demonstrated that items were positively related to the frequency of incidents, although the majority of these findings were not significant. This was the case across both the high secure and low secure sample. The HCR-20V3 imminent violence judgement, however, showed positive and significant values for frequency of attempted assaults ( $r=.778$ ,  $p=.034$ ) and actual assaults ( $r=.750$ ,  $p=.043$ ) within the high secure ID population. Furthermore, this sub domain of the HCR-20 was also highly

correlated with frequency of seclusion in the high secure ID population ( $r=.808$ ,  $p=.026$ ). These results may demonstrate that this aspect of the HCR-20V3 could be useful for clinicians and staff working with ID offenders, particularly as this group often pose a high and imminent risk of violence. Whilst some of the HCR-20V3 correlations with violence within these settings were positive, it is important to note that this sample was significantly smaller than that of the HCR-20V2, and further research is required to explore the change in factors and additional clinical judgements in terms of the correlations and predictive capabilities of the HCR-20V3.

#### *Overall Predictive Abilities Shown by ROC analysis*

Finally, Figures 2-4 show for overall violence within high security services, that the HCR-20V2 (AUC =.642,  $p=.122$ ) and HCR-20V3 (AUC =.621,  $p=.256$ ), and low secure services for HCR-20V3 (AUC =.639,  $p=.477$ ) demonstrated moderate predictive abilities. These findings, whilst not significant, show similar AUC results in comparison to other studies with similar populations (O'Shea et al., 2015), suggesting that the HCR-20V2 and HCR-20V3 can be predictive within forensic populations of mentally disordered offenders. It may be beneficial that further research focuses on the HCR-20V3 with larger sample sizes to examine its predictive capabilities across differential diagnoses as opposed to security setting alone.

These results are comparable with similar research within the field in UK forensic services for mentally disordered offenders more generally. Daffern



and Howells (2007) presented similar findings across high secure PD wards for HCR-20 total scores as a predictor of institutional violence (AUC = .63). Similarly, Gunec et al., (2015) reported that the HCR-20 total score was moderately effective in predicting aggressive outcomes within medium, low and locked wards. They reported AUC statistics for mild verbal aggression (AUC =.650), severe verbal aggression (AUC =.668), and any verbal aggression (AUC =.681). Ho et al., (2009) also indicated similar findings, in that the HCR-20 total score was moderately predictive for verbal violence (AUC =.67) and violence against property (AUC =.61). Although the study showed higher effect sizes for violence against others (AUC =.70). Alongside this, there have been other studies that have provided evidence for high predictive efficacy across similar populations ranging from AUC =.715 (Dolan & Fullam, 2007). Gray et al., (2003) also indicated that the HCR-20 total score had high levels of predictive ability across similar violence measurements as this study; verbal aggression (AUC =.79), violence to property (AUC =.83) and physical aggression (AUC =.81), indicating that whilst the current study highlights moderate levels, there are studies which suggest that these results are slightly lower than previous findings. It is important to note that due to the low population within the low secure ID samples across both security levels, that the AUC results were assessed by combining results from both MH patients and ID patients within each security level. Therefore, these results do not meet the study aims, which was to compare predictive abilities of the HCR-20 across the identified diagnostic groups.

The findings of this study provide further evidence for the use of HCR-20 within ID offenders. This may be surprising, given that the tool was developed in populations without ID (Douglas et al., 1997). O'Shea (2015) indicated that this may not be the case as many of the core characteristics of violence prediction, are observed across both ID populations and non-ID populations, such as antisocial attitudes, a prior history of violence, major mental illness and PD.

### *Limitations*

There were several reasons and limitations that may have impacted upon the data and subsequent smaller AUC statistics. One limitation involves the complexity of individuals with ID who have offended. This relates to the concern that there are also additional diagnoses in the areas of MH, PD, autism spectrum disorder and attention-deficit/hyperactivity disorder (Lovell, 2017) and whilst diagnostic information was collected, this did not encompass secondary diagnoses. Therefore, it is extremely difficult to tease apart the true predictive abilities of risk assessment tools for certain diagnoses, particularly with such complex forensic cases.

A second point, which has been found within many similar studies (Lindsay et al., 2008), is that the data collected is based up case notes within the field, which can vary upon quality and accuracy. Case notes, such as demographic information, HCR-20 risk scores and incident data, are all

inputted by varying members in the clinical and administrative team. It is therefore difficult to control and counteract biases therein. Additionally, a large proportion of the clinical data requested was missing, such as incident reports, comprehensive HCR-20 risk assessments and seclusion/segregation data, leading to reduction in sample sizes.

The sample size itself proved challenging, particularly with respect to low secure wards. These were particularly small, and caution should be applied when interpreting such results. Furthermore, the small sample size also had a detrimental impact on the ability to analyse and compare AUC statistics across diagnostic groups. Data from both MH and ID directorates had to be combined to allow for ROC analysis to be computed, and subsequently the results of this analysis were not in line with the research aims. It would be beneficial for future research to focus on larger samples, to explore the predictive abilities of the HCR-20V3 in particular for offenders with a diagnosis of ID, so as to provide more conclusive findings in this respect.

As previously identified, there has been limited research in respect to the HCR-20V3 being utilized with ID offenders specifically. The thesis will now present a case study focused on a risk reduction intervention for an older adult with an ID diagnosis. The HCR-20V3 was incorporated within this case study to highlight its use within a clinical setting.

## **Chapter 4 - Psychological Assessment and CBT Informed Treatment of an Older Adult Male Offender with a Diagnosis of 'Mild Mental Retardation'**

### Abstract

This case study focuses upon a male older adult detained under Section 37 of the Mental Health Act (MHA; 1983/2007) in a locked older adult challenging behaviour ward. According to his medical records within the service, he had a diagnosis of 'mild mental retardation'. Following an updated cognitive assessment being completed, alongside an assessment of his executive functioning, risk assessment, and collaborative team formulation, psychological treatment was developed to meet Mr B's identified needs. An adapted Cognitive Behavioural Therapy informed approach was undertaken with Mr B targeting his inappropriate sexual behaviour.

Mr B was chosen as a case study to explore the application of the HCR-20V3 risk assessment within a clinical environment, as opposed to within a research one, alongside presenting the adaptations and considerations required for psychological assessment, treatment and risk management for an individual with an ID diagnosis.

## Case History

### *Family History*

Mr B was raised by both his parents and was an only child. His mother reported that he had an "emotional childhood" after having surgery on a cleft palate at the age of two, which she described as having a profound effect upon him. Mr B described a happy childhood and said that he felt loved by his parents. Having said this, he also described being hit often by his parents. Mr B reported that as he got older, he would be physically aggressive towards his parents if they hit him.

### *Educational History*

Mr B attended a 'special needs' school from the age of ten and reported that he struggled with the change in school and was bullied by his peers. He subsequently preferred to be on his own. He left school at the age of 17 and it is unclear as to the qualifications he received from his education.

### *Personal History*

Mr B began making obscene and threatening phone calls around the age of 15. He would phone people from school that had bullied him and would make threats to kill them. At age 16 he began making hoax phone calls to the fire brigade. He tended to do this when feeling angry in response to being bullied at school, and would send the fire brigade to the homes of those who had bullied him. He reported feeling happy and excited when he

saw the fire engines coming quickly with sirens going. He reflected that he wanted to take revenge on the bullies and wanted them to be upset.

At age 17 he was admitted to hospital for “destructive behaviours” for three months. He felt angry at his detention at this time and started writing threatening letters to those that had detained him. He was charged in relation to writing threatening letters and given a two-year probation order. Upon returning to his parents’ house following this admission, Mr B began to write threatening letters to the professionals that had been involved in his admission and subsequent care in hospital. He was charged with making false fire alarms, sending obscene packages, making obscene phone calls, and breach of the peace. He was sentenced to 12 months in prison, of which he served six months. He described imprisonment as “terrible” as he was bullied and beaten because people believed that he was a paedophile.

Upon release from prison, he continued to send threatening letters and was charged with threats to kill within a year of release. He was subsequently detained in a high secure forensic hospital from court as a result. Here he continued to call the police to report that staff were hitting him and would send threatening letters to members of staff at the hospital. Following on from this admission, Mr B has remained largely in hospital care and transferred to several hospitals.

He was transferred to a locked older adult challenging behaviour ward in Hospital X, in 2013. There has been an overall reduction in threatening letters, however Mr B now sends numerous letters to local and national competitions to win money, and local newspapers regarding his detention in hospital with his view that he should be released. Furthermore, Mr B has disclosed long standing sexual fantasies surrounding male children. He has denied physical and sexual contact with children. There is no evidence to corroborate or refute this statement. Mr B has also disclosed that whilst on unescorted Section 17 leave at a previous hospital, that he would frequent public restrooms and engage in sexual acts with other males, including strangers. It was also reported that he was observed masturbating at a bus stop during this time period.

There have been ongoing concerns from the clinical team regarding his sexual fantasies around male children and his masturbation in communal areas. There have also been incidents of physical and verbal aggression towards both staff and patients.

### *Forensic History*

Mr B served a six-month prison sentence for making false fire alarm calls, sending obscene packages, making obscene phone calls and breach of the peace. Following his release from prison he began writing obscene letters to the police and social services.

He was charged with threats to kill and was subsequently detained in a high secure forensic hospital. Since this time, Mr B has remained largely in hospital care. He is now detained under Section 37 MHA within a locked older adult challenging behaviour ward following further threats to kill.

### *Psychiatric Diagnosis*

According to his medical records within the service, he has a diagnosis of 'mild mental retardation with significant impairment of behaviour, characterised by ongoing aggressive and irresponsible conduct'.

### Referral

Mr B was referred by his Multi-Disciplinary Team (MDT) to provide a recent assessment of his cognitive ability. Furthermore, it was also identified that it would be beneficial for Mr B's frontal lobe function to also be assessed, as some of Mr B's difficulties were congruent with deficits in frontal lobe functioning, such as difficulties in abstract reasoning, poor decision making, judgement, maintaining attention, and inappropriate behaviour (Chan, Shum, Touloupoulou & Chen, 2008). Following the assessment, the MDT referred Mr B for psychological treatment focused on his inappropriate sexual behaviours, namely masturbating in communal areas, alongside exploring his sexual fantasies and behaviours towards male children. Mr B subsequently consented to undergo assessment and engaged in treatment sessions.



## Assessment Measures

Mr B's intellectual ability was assessed using the following (see appendix 7 for further assessment details and appendix 8 for raw assessment scores):

1. Wechsler Adult Intelligence Scale-Fourth UK Edition (WAIS-IV; Wechsler, 2008).

Mr B's frontal lobe functioning was assessed using the following:

1. Behavioural Assessment of Dysexecutive Function (BADS; Wilson, Emslie, Evans, Alderman & Burgess, 1996) and DEX questionnaire.
2. Frontal Assessment Battery (FAB; Dubois & Litvan, 2000).

During the assessment, it was subjectively observed that Mr B would look at the assessor for several seconds before responding to the questions asked. He would reply in short sentences, would stutter most of the time and would intermittently rock his upper body and head. He demonstrated concrete thinking and rigidity throughout the assessment. He informed the assessor if he did not understand the questions and would say if the task was too difficult for him.

## Assessment results

### *WAIS-IV*

Mr B's FSIQ, which is a representation of his overall intellectual ability, fell within the 'extremely low' range. His VCI score, which measured verbal conceptualisation, knowledge and expression, fell within the 'extremely low'

range. This score suggests Mr B is likely to experience significant difficulties understanding questions and information, unless they are put to him in simple terms and do not contain jargon or other unfamiliar words. Mr B may also find it difficult to understand complex instructions or concepts. Mr B's PRI score, which measures non-verbal thinking and visual motor coordination, fell within the 'extremely low' range. This level of score suggests that Mr B will find non-verbal thinking and reasoning difficult, and will require support if he is to perform non-verbal tasks or exercises. Mr B's score fell within the 'extremely low' range on the WMI, which measures active short-term memory and sequential processing. This level of score suggests that Mr B will find it difficult to hold on to and manipulate information effectively. In terms of PSI, which measures response, motor and thinking speed, his score fell within the 'extremely low' range. This score suggests that Mr B will have a significantly slower reaction and motor speed than most people and it will therefore take him longer to process information or questions. He may find it difficult to answer several questions at once.

### *BADS*

Overall, Mr B's scores were extremely low and placed him within the 'impaired' range. This was indicative of severe deficits in his executive functioning. This suggests that he has deficits in his overall ability to plan and organise his behaviour, and formulate strategies. Mr B appeared to find it difficult to understand the tasks within the BADS assessment, making it

difficult to ascertain whether the assessment was a true representation of his executive functioning. Consequently, the FAB was completed with him, as it was felt that the tasks within the assessment may have been easier for him to understand. The results on this were also indicative of impaired frontal lobe functioning.

As part of the BADS assessment, Mr B completed the self-report DEX questionnaire. This questionnaire samples the range of behavioural problems often associated with Dysexecutive Syndrome. Mr B scored himself as experiencing several behavioural problems. He scored himself as experiencing abstract thinking problems, impulsivity, confabulation, planning problems, temporal sequencing problems, apathy and lack of drive, disinhibition, disturbed impulse control, shallowing of affective responses, lack of concern, perseveration, inability to inhibit responses, knowledge-response dissociation, distractibility, loss of decision making ability and an unconcern for social rules as 'very often'. He also scored himself as experiencing euphoria, lack of insight and social awareness, aggression and restlessness/hyperkinesia as 'fairly often'. His overall score was 76 out of 80.

In addition to this, an independent rater who knew Mr B well also scored the DEX questionnaire. Mr B was scored as presenting 'very often' with shallowing of effective responses, perseveration and restlessness/hyperkinesia. He was also rated as presenting 'fairly often'

with abstract thinking problems, lack of insight and social awareness, apathy and lack of drive, inability to inhibit responses and an unconcern for social rules. The independent rater highlighted that Mr B 'sometimes' presented as impulsive, had planning problems, was disinhibited, had disturbed impulsive control and had a lack of concern. He was also scored as presenting 'occasionally' with aggression, knowledge-response dissociation and distractibility. He was scored as 'never' presenting with confabulation, euphoria and a loss of decision making ability. The independent rater acknowledged that they were 'unsure' as to whether Mr B experienced temporal sequencing problems and did not score this item. Without this item being included in the score, the independent rater score was 40 out of 76.

Given the difference in these results it was hypothesised that Mr B may not have fully understood the DEX questions and/or may have not been able to discriminate between the Likert scales contained within it.

### *HCR-20V3*

Additionally, the HCR-20V3 (Douglas, Hart, Webster & Belfrage, 2013) was consulted to present an overview of Mr B's risks. The HCR-20 is one of the most commonly used SPJ violence risk assessment tools (Singh, Fazel, Gueorguiva & Buchanan, 2014) and can be used within forensic, correctional, psychiatric and general settings (Douglas et al., 2013). It has also been demonstrated to have good predictive abilities amongst

individuals with ID (Fitzgerald et al., 2013; Gray et al., 2011) and was therefore deemed appropriate to complete as a risk assessment of Mr B. Table 13 presents the results of the HCR-20V3 assessment for Mr B.

Table 13: *Overview of HCR-20V3 risk assessment scores for Mr B.*

HCR-20 Risk Factor	Presence	Relevance
H1. Violence	Y	Y
H2. Other antisocial behaviour	Y	Y
H3. Relationships	Y	Y
H4. Employment	Y	N
H5. Substance use	N	N
H6. Major mental disorder	Y	Y
H7. Personality disorder	N	N
H8. Traumatic experiences	P	Y
H9. Violent attitudes	Y	Y
H10. Treatment or supervision response	Y	Y
H11. Other considerations: sexual risk towards children	Y	Y
C1. Insight	P	Y
C2. Violent ideation or intent	N	N
C3. Symptoms of major mental illness	Y	Y

C4. Instability	P	Y
C5. Treatment or supervision response	P	Y
C6. Other considerations: sexual risk towards children	Y	Y
R1. Professional services and plans	N	N
R2. Living situation	P	P
R3. Personal support	P	P
R4. Treatment or supervision response	P	Y
R5. Stress or coping	P	Y
R6. Other considerations: sexual risk towards children	Y	Y
Future violence/case prioritisation	Low/Moderate	
Serious physical harm	Moderate	
Imminent violence	Low	

The HCR-20 indicated ongoing risks in relation to Mr B's behaviour towards children, which was the focus of the psychological intervention.

### Formulation

It appears that Mr B's home life may have been turbulent and unstable. He may not have been raised in an environment that met his emotional and

physical needs and it seems that he did not learn how to manage his emotions and behaviour in an appropriate way from his parents. There was violence between Mr B and his parents, and he may have learnt that aggression towards others was an acceptable way of resolving conflict and expressing emotions.

In addition to this, it is likely that the move to a 'special school', where he was subsequently bullied, had a significant impact on him. He may have perceived others as untrustworthy and threatening, and regarded himself as worthless, stupid and insignificant. Feeling unable to cope with his angry feelings towards the bullies, Mr B appeared to seek revenge on people he believed had wronged him. He perhaps felt excited, powerful and in control when making hoax calls, writing threatening letters, and phoning the fire brigade. Therefore, Mr B achieved a positive outcome and a personal internal reward for his behaviours, thus reinforcing them. These behaviours were subsequently repeated and became a way of Mr B coping, particularly in expressing his anger and seeking revenge on those who he perceived had wronged him.

Mr B's cognitive deficit's mean that he has poor problem solving and coping skills, which has an impact on his ability to generate alternative solutions to situations he finds difficult. Mr B demonstrates concrete thinking and rigidity in his behavioural responses. This appears to have maintained his repetitive behaviour historically and may have been a contributory factor

in his structured routines and repetitive behaviour, such as sending letters and engaging in weekly competitions. It is possible that these repetitive rituals provide him with structure that is safe and familiar for him. These also allow him to retain some form of control and power, whilst also allowing him to maintain some hope in the possibility of being discharged from hospital.

The combination of Mr B's upbringing and his cognitive deficits also seem to have impacted on his ability to regulate and manage his emotions and behaviour effectively. He seems to have a restricted range of emotions, but in the past he has displayed extreme outbursts of emotions, such as anger. He also seems to have difficulty in understanding the emotions of others and the impact his behaviours have on them. He can present as egocentric and finds consequential thinking difficult.

Mr B has verbalised long standing sexual fantasies about male children. It seems that Mr B's attraction to a school friend in childhood who wore shorts and wellington boots, was significant for him and this has been the focus of his sexual preferences throughout adulthood. It may be the case that Mr B feels he can relate to young male children on an emotional level and staff report that he can present as 'childlike' himself. Additionally, Mr B has previously engaged in sexual activity with adult males in public places. Mr B has explained that he is comfortable with his homosexuality and enjoyed the sexual outlet of visiting public restrooms when he had unescorted leave



at a previous hospital. Mr B is extremely vulnerable in these situations and does not appear to understand the severity of this. It appears that he wants to relate to others and develop relationships to meet his sexual and emotional needs, but places himself in vulnerable situations when he does so, suggesting that he has a limited understanding of interpersonal and sexual relationships.

### *Team Formulation*

A case formulation consultancy session was completed with staff members working with Mr B. Team formulation refers to the process of facilitating discussion and developing a shared understanding of an individual's difficulties (Cole, Wood & Spindel, 2015). Engaging team members in collaborative formulation consultancy sessions has been suggested to be very valuable for members and helps to develop an explorative and inquisitive team culture (Johnstone, 2013). Team formulation can also be effective in developing a more person-centered approach, aid the working alliance, optimise risk assessment, and provide more effective treatment interventions (Cole et al., 2015).

The assessment results were also used as part of treatment recommendations for ward staff working with Mr B. The following recommendations were captured as part of the team formulation:

1. Staff should ensure that they give instructions to Mr B in a simple and straightforward manner, avoiding jargon and other uncommon words or expressions. For staff to observe his response or ask him directly to check that he has understood.
2. Staff to ensure that he is given enough time to process information and questions. Questions must be asked one at a time and he should be given extra time to respond.
3. For extra support to be given to Mr B when he is planning activities.
4. To provide Mr B with praise for any tasks that he performs well as a means of increasing his self-esteem and confidence.
5. For staff to focus on consequences for Mr B in relation to his inappropriate and aggressive behaviour.

Staff were also appraised of the skills developed within treatment sessions and support was provided by the therapist in implementing and reinforcing these skills, as suggested by NICE guidelines (2014).

### Treatment Sessions

#### *Treatment Overview*

Treatment sessions and the therapeutic style were adapted to meet Mr B's strengths and weaknesses across his cognitive profile, such as being explicit, using a more didactic and concrete approach to concepts, having access to visual aids, repetition and a slower paced intervention (BPS, 2016). This was to ensure the sessions also met the RNR (Andrews, Bonta

& Hoge, 1990) principle to ensure that the intervention matched Mr B's learning style and cognitive abilities specifically. Interventions that adhere to the RNR principle have been shown to be more effective in reducing recidivism and treatment effectiveness within the offender population (Andrews & Bonta, 2010).

A Cognitive Behavioural Therapy (CBT) informed approach was adopted for treatment sessions with Mr B. CBT has been shown to be an effective treatment option for individuals with an ID (DoH, 2015), and that skills involved in such treatment, such as the ability to link situations to emotions, and to differentiate between thoughts/feelings and behaviours, can be understood by individuals who have a diagnosis of an ID (DoH, 2015), although individual differences should be considered prior to treatment.

Furthermore, there is evidence to suggest that adapted CBT is an effective treatment option for individuals with an ID who have committed sexual offences, (Cohen & Harvey, 2015). Most Sex Offender Treatment Programmes (SOTP) and adapted SOTP programmes are developed within a CBT framework based on sexual offending theories, such as Finkelhor (1984) and relapse prevention models (Marshall & Laws, 2003).

Finkelhor's four preconditions model to sexual offending highlights that sexual offending against children is multifaceted. That is, that such

behaviour is related to a man's individual needs, alongside situational and contextual variables. Furthermore, Finkelhor (1984) argued that there were four underlying factors that can explain the occurrence of sexual abuse.

These are:

1. Emotional congruence: An individual's emotional needs may fit with that of a child. This may be due to arrested development of that individual.
2. Sexual arousal: An individual is sexually aroused by a child.
3. Blockage: An individual cannot meet their sexual needs in other socially appropriate ways.
4. Disinhibition: Individuals become disinhibited and behave in ways that they normally would not.

The key idea within this theory is that these four factors can be grouped into four preconditions that must be satisfied before an individual offends. These preconditions are that the individual overcomes internal inhibitions, overcomes external inhibitions and deals with possible child resistance. This theoretical approach may explain why Mr B, to the clinical team's knowledge, has not offended against children. It may also be that the constraints of hospitalisation have served as a protective function for Mr B, so he has not had the opportunity to engage in such behaviour, although the factors of motivation depicted by Finkelhor are present.

Treatment typically includes challenging cognitive distortions, enhancing victim empathy and relapse preventions (Mann & Marshall, 2009). Whilst most of the research in this field is focused on group interventions, these components were also included in the one-to-one treatment sessions with Mr B. Enhancement of Mr B's protective factors were also incorporated within the treatment sessions, in line with Finkelhor's theory, particularly with regards to Mr B's internal and external inhibitions. Additionally, as suggested in the method of CBT, application of skills to the individual's wider life, is typically achieved through the use of homework. This can be difficult for individuals with an ID as they may lack the sufficient independence and confidence in following through with homework tasks and additional support can be beneficial (Hassiotis et al., 2012). In Mr B's case, this was adopted through clinical observation and reflection whilst Mr B was accessing community leave, an environment that had been identified as a particular risk for him by the MDT following his previous behaviour.

### *Engagement in Treatment*

During sessions, Mr B acknowledged that masturbating in communal areas was inappropriate and was able to explore the potential negative consequences that may occur should he engage in such behaviour; for example, how this may make him vulnerable to retaliation from peers. More recently, Mr B reported that he no longer masturbates in communal areas or in his bedroom, although recognises that it is "OK" to masturbate in his bedroom with the door closed.

Mr B was also willing to discuss his feelings towards male children. He reported that seeing male children makes him "happy" and that this is a "nice" feeling for him. He reported that the happy feeling was not a sexual feeling and he denied masturbating after seeing male children. This contradicted previous information that Mr B gave to a prior psychologist, where he reported masturbating after observing male children in the community (whilst on leave for example). Mr B admitted to "staring" at male children and explained that he liked to visit the local town as there were male children there that he could observe. These reflections were utilised in sessions to develop Mr B's awareness of sexually appropriate behaviour and boundaries.

Mr B was able to recognise that his behaviour could lead to police involvement, would upset parents and the public, and that this could lead to retaliation towards him. Mr B found it extremely difficult to understand and recall the impact of his behaviour on a potential victim, possibly displaying a lack of empathy and deficits of "Theory of Mind" (ToM; Premark & Woodruff, 1978). ToM suggests that individuals make sense and predict others response through the ability to mentalize and attribute the mental states of others and themselves (Baron-Cohen, Wheelwright, Hill, Raste & Plum, 2001). ToM can also be related to executive functioning (Carlson, Moses & Breton, 2002), which had been assessed for Mr B as being a significant area of deficits for him. A lack of empathy towards the distress

of their victims has been identified as common characteristic within individuals who sexually offend (Elsegood & Duff, 2010). In addition, Keenan & Ward (2000), highlight that those who sexually offend may have deficits in ToM and find it difficult to take the perspective of others, and therefore their victim.

One important area of the CBT model is for clients to be able to apply learnt skills within their wider lives (BPS, 2016). Discussions were focused on the consequences of Mr B engaging in inappropriate behaviour with male children in the community, such as staring at or approaching them whilst on Section 17 leave, and involved observation of Mr B in a community setting by the therapist. These sessions were focused around supporting Mr B in recognising risk situations and implementing coping strategies to manage inappropriate behaviours whilst in a community setting. Mr B was supported in developing coping strategies for situations where he may be in the vicinity of a male child, such as that he would look away, walk away or speak to the member of staff escorting him to ensure that he did not observe and "stare". Focus was also placed upon the application of skills learnt within session, into the wider environment to explore and reflect upon Mr B's understanding of the concepts and ability to link these to specific risk situations that had been identified by his clinical team. For example, there were occasions where Mr B was observed by the therapist to be staring at young children. This behavioural example was then used with Mr B to reflect upon this behaviour and discuss the timings to

implement coping strategies to ensure effectiveness. Mr B was able to accept his behaviour at these times, therefore displaying some level of insight into his behaviour. However, this behaviour continued throughout the sessions, which highlighted to some extent that Mr B was currently unable to manage his behaviour appropriately.

### Results

Psychometric assessment for individuals who have an ID and who sexual offend can be separated into four facets; deviant sexual interests, pro-offending attitudes, socio-affective functioning and self-management problems (Keeling, Beech & Rose, 2007a). Whilst there are adapted reliable and valid measures of assessment particularly for pro-offending attitudes (Questionnaire on Attitudes Consistent with Sexual Offending; QACSO, Broxholme & Lindsay, 2003), social-affective functioning (Miller Social Intimacy Scale; MSIS, Miller & Lefcourt, 1982) and self-management problems (Adapted Relapse Prevention Interview; ARPI), which is an adapted measure of Beckett, Fisher, Mann & Thornton (1996) Relapse Prevention Interview, it was felt that psychometric pre- and post-assessments for Mr B would not be appropriate given his inability to self-report upon his behaviour and difficulties (as hypothesised after completing the DEX questionnaire). As such other methods of assessment were used, such as clinical risk assessments and behavioural observations.



### *Risk Assessment*

The Short Term Assessment of Risk and Treatability (START; Webster, Martin, Brink, Nicholls & Middleton, 2004) is a SPJ assessment for risks, strength and treatability. It can be utilised as a measure of dynamic risk to predict short-term behaviour and can assess change over the assessment time period (Webster et al., 2009). Within the treatment time period there was a documented reduction in Mr B's specific risk of masturbation in communal areas, however his risk towards children remained static throughout.

### *Behavioural Observations*

Behavioural observations were undertaken by staff members working with Mr B on a daily basis and by the therapist as part of the community clinical assessment and observation. It was noted that there was a reduction in masturbation incidents reported on the ward and in the community as treatment progressed. At the time of treatment completion, there had been nil reported incidents for three months.

In addition to this, it was reported by staff and by observations during community sessions that there were ongoing concerns regarding Mr B staring at male children. This may indicate that there was little clinical change in terms of this behaviour directly.

## Discussion

Mr B completed a cognitive assessment and frontal lobe functioning assessment, which identified that he had an extremely low FSIQ and impaired executive functioning. A collaborative formulation was developed within the clinical team working with Mr B, as this has been shown to have a positive impact upon person-centered care and more effective treatment interventions (Cole, Wood & Spindel, 2015). Furthermore, outcome results from the cognitive assessment were incorporated in the team formulation forum to develop effective ways to manage Mr B's behaviour and engage with him more effectively. The HCR-20V3 assessment was consulted and completed to assess Mr B's risk of violence. Additional factors were considered relating to his risk of sexual violence towards male children.

The use of the HCR-20V3 aided the clinician in providing evidence for presence and relevance of risk factors for the Mr B, his risk scenarios and a risk formulation. The clinician was guided by the HCR-20V3 manual to develop risk scenarios that included the nature of the Mr B's possible future violence, the severity, imminence, frequency and duration, and likelihood of occurrence. Risk scenario planning is useful within clinical practice as it directly leads to individualized risk management strategies that in turn guide treatment interventions and recommendations (Logan, 2014). In terms of Mr B, one particular future risk scenario was focused upon the potential of him committing sexual violence within the community whilst on

leave, and this was therefore a focus of the treatment and risk management (for example, having escorted leave only and one-to-one escort within a group escorted leave). Furthermore, formulation of risk was developed to aid understanding of Mr B's violence and potential sexual violence, with a focus of 'weaving' together information to aid an overall explanation of violent behaviour, and how this may be prevented in future (Logan, 2014). This explanation was also then used to identify intervention aims. For example, within the formulation it was hypothesized that Mr B did not understand the severity of his behaviour and the boundaries surrounding appropriate sexual behaviour. Part of the intervention was therefore focused on the negative consequences of his behaviour and discussion surrounding concrete rules of appropriate sexual behaviour.

Logan (2014) identifies that whilst the process of formulation can aid understanding of individuals, there are a number of limitations to this approach when incorporated within a risk assessment framework. Firstly, it is unclear to clinicians what the core features are of formulation and how a formulation is developed, which can lead to the formulation being skipped or being completely briefly or superficially. Additionally, Logan (2014) highlights that there is no evidential link between having a risk formulation and an effective risk management plan. Research into this area is currently developing. Hart et al., (2011) proposed a method to analyse the quality of risk formulations, which may help differentiate between acceptable and poor formulations. This tool may consequently aid further research studies

into the links between acceptable formulations and effective risk management strategies developed as a result. This shows that whilst the HCR-20V3 tool has improved the risk assessment and management strategies of violence within clinical practice, further clinical research is required. Finally, it is also important to note that the processes undertaken by clinicians to conduct a HCR-20V3 risk assessment in clinical practice can vary from the data often collected by researchers, where HCR-20V3 items and subsequent considerations are collected or changed to actuarial data, an approach often adopted by researchers in the field (Gray et al., 2011). This adds further weight to the need of future studies to focus on analysing the structured clinical judgement approaches, including formulation and risk scenario planning of the risk assessment tool.

Following on from the assessment and formulation, Mr B engaged in an adapted CBT informed treatment focused specifically on his inappropriate sexual behaviour, namely masturbating in communal areas and his sexual interest in male children. From behavioural observations and the SPJ risk assessments completed, Mr B's recorded incidents of masturbation reduced following the treatment. However, his risk towards male children remained static, and he was observed to continue to stare at male children when observed in the community, suggesting there was limited behavioural change or risk reduction. Subsequently, as a result of this, the clinical team decided that unescorted leave for Mr B should not be granted at this time. This was an aim that was identified following successful psychological

intervention completion. As identified within the Transforming Care (NHS England, 2017) initiative, it is important that services work towards reducing length of stay within inpatient services for individuals with ID. As such it was recommended that further psychological treatment and ongoing risk management were important to help support Mr B in gaining access to unescorted leave, which would be a positive factor in aiding a future transition to a lower security environment.

It was hypothesised that in this particular case, the psychological treatment and restrictions of detention within hospital were not necessarily enough to reduce his level of risk and insight into his own behaviour. Having said this, it was positive that Mr B's behaviour did not escalate (although given his restrictions, he may have not had the opportunity to do so) and that he was willing to engage in psychological treatment for the duration. The HCR-20V3 risk assessment was completed for Mr B and identified ongoing areas of concern in relation to risk reduction, such as a continued lack of insight into some areas of his behaviour, a limited access to his cognitive and behavioural coping strategies to manage stressful and risk related situations alongside chronic and enduring instability, which was noted as an unresponsive element of his psychiatric disorder. This demonstrated the application of the HCR-20V3 within a clinical environment and how it could be utilized to both assess risk of violence and promote treatment recommendations in line with RNR principles (Andrews & Bonta, 2003).

Clinical strengths were also noted in his risk assessments and were protective factors for Mr B. Following the results from the HCR-20 and START, it was recommended that further treatment was required with Mr B to continue to build upon his cognitive and behavioural skills, so as to manage risk situations in relation to his sexual preferences. This was also to aid Mr B in gaining access to unescorted leave within the community, and ultimately a transition to a lower security environment.

Given that there was little clinical change following the intervention with Mr B, it may be beneficial to consider different treatment models for future interventions. The Good Lives Model (GLM; Ward & Gannon, 2006; Ward & Stewart, 2003) has been indicated as a particular favourite of treatment approaches, as opposed to or alongside, the RNR principle, particularly for working with individuals who sexually offend (Andrews, Bonta & Wormith, 2011). The GLM approach advocates that individual motivation and agency in criminal behaviour is an attempt to source a fulfilling life through primary human goods, such as friendship, work, intimate relationships (Andrews et al., 2011). The GLM is a strength based approach focused on two aspects. These are that the model takes into account individual preferences, values, and goals, and draws upon these to help motivate an individual to lead a better life, and also equips an individual with the resources to access primary goods, in more socially appropriate ways (Barnao, 2013). It is highlighted within the model that individuals may offend as an attempt to obtain these primary goods due to individual limitations (for example a lack

of knowledge) or environmental factors (for example lack of resources) (Barnao, 2013). Based on these assumptions, Lindsay, Ward, Morgan and Wilson (2007) identified that individuals who sexually offend do so as a maladaptive strategy to obtain primary goods, and treatment should aid individuals in developing adaptive strategies and coping skills. Although research into the GLM, in comparison to other treatment models, is still in its infancy, preliminary research suggests that sexual offender treatment programs could be more effective with inclusion of the GLM (Willis, Ward & Levenson, 2013).

Most of published research regarding the GLM focuses on offenders without mental health diagnoses (including those with ID) and those who have sexually offended. However, recent research has begun to explore this approach with mentally disordered offenders. A case study paper by Barnao, Ward & Robertson (2015) highlights that adopting the GLM approach with individuals with a mental disorder can provide a holistic framework that can facilitate understanding of an individual and their personal goals, whilst also aiming to alleviate symptoms and reduce risk. This can also aid an individual who is detained within a forensic environment by supporting and promoting their own personal goals, which is not always deemed most important within more traditional approaches within forensic services (Barnao et al., 2015). Furthermore, the case study discussion highlights that there is preliminary evidence that the GLM

approach may be more effective than other approaches in motivating mentally disordered offenders to engage in their own treatment program. More specifically, the GLM may also have relevance for ID offenders, and ID offenders who have sexually offended (Craig, Lindsay & Browne, 2010). Research has suggested that ID offenders may need assistance in achieving primary goods, as they may have difficulties in developing social relationships for example (Steptoe, Lindsay, Forrest & Power, 2006). Aust (2010) also advocated the potential use of the GLM model with sexual offenders who have a diagnosis of ID as it is a person centered approach, could aid risk reduction and helps individuals achieve a 'Good Life'. This in particular, may be relevant for further psychological treatment options in the case of Mr B. However, further research is required into the effectiveness of the GLM approach with this subgroup of offenders. Further research is also required to develop any specific adaptations to the GLM for ID offenders (Craig et al., 2010).

Due to the preliminary evidence for the support of GLM approach with treatment of offenders, particularly those who have sexually offended, it may be beneficial for future interventions completed with Mr B to incorporate this approach. Whilst there are currently some positive preliminary results that suggest the GLM is relevant for use with ID offenders, the limited current evidence base for the use of GLM with ID offenders must also be considered by the clinical team.



## Conclusion

This case study presents the psychological assessment process, and subsequent formulation and treatment of Mr B, a male older adult with a diagnosis of a 'mild mental retardation'. Mr B's behaviour has been explored within the context of the literature surrounding offenders who have a diagnosis of an ID and individuals with this diagnosis that have sexually offended against children. The HCR-20V3 risk assessment was completed and utilized to guide treatment options and risk management strategies. Treatment sessions were developed using an adapted CBT informed approach in line with recommendations within the evidence base and took into consideration Mr B's identified cognitive deficits.

Mr B's subsequent behaviour was observed within the hospital and community. There was limited reduction in his behaviour towards male children in the community and this risk remained unchanged within the risk assessments highlighting that ongoing treatment was required. The HCR-20V3 was utilized to aid identification of ongoing risks and to provide recommendations for further treatment, following the identification of risk factors, highlighting how the tool could be used in clinical practice.

## **Chapter 5 – A Psychometric Critique of the Historical Clinical and Risk Management Assessment with Intellectually Disabled Offenders**

### Introduction

Violence risk assessment is a crucial component for professionals working within forensic and clinical services (Howe, Rosenfeld, Foellmi, Stern & Rotter, 2015). Bonta (2002) proposed two general goals of offender risk assessment: Firstly, to ensure individual and public safety and secondly, to maximise the benefits of treatment and management to reduce risk. This process has also been known as the “risk needs assessment” (Judges, Egan & Broad, 2016). Both goals require professionals involved to form opinions about the future behaviour of an individual to inform decisions regarding their risk management. Consequently, research has focused on developing risk assessment tools that aid professionals in evaluating and identifying high-risk individuals.

Initially, risk assessment was guided by unstructured clinical judgement, where professionals used their own knowledge and clinical impression (Harris & Lurigio, 2007). However, further research found that unstructured clinical judgements of risk were no more valid than chance (Hurducas, Singh, de Ruiter & Petrila, 2014). Actuarial tools for risk assessment were introduced to replace unstructured clinical judgement, for example the VRAG (Harris, Rice & Quinsey, 1993; Quinsey et al., 1998). These tools

combine a set of static risk variables (that are highlighted by the literature or construction sample) that are predictive of future violence with a mathematical formula to quantify the level of risk (MacMillan et al., 2004). Despite this approach improving consistency of risk assessment (Dolan & Doyle, 2000) the actuarial approach to risk prediction is entirely focused on static variables and consequently does not allow for adjustments to reflect effective interventions (Johnston, 2002) and is therefore not sensitive to changes in risk over time. Subsequently, the approach to risk assessment has developed with an increasing use of the SPJ model of violence risk assessment, which combines actuarial and clinical data (Heilbrun, Yasuhara & Shah, 2009) with emphasis on the dynamic nature of risk and situational triggers (Turner, 2000). The SPJ approach is developing in the literature on risk assessment of offenders (Tully, Chou & Browne, 2013). A well-researched and widely used SPJ aid to risk assessment and management with violent offenders is the HCR-20 and HCR-20V2 (Webster, Eavers, Douglas & Wintrup, 1995 and Webster et al., 1997). The HCR-20V2 has been translated into 20 languages and has been adopted or evaluated in more than 35 countries (Fazel, Singh & Bjørkly, 2016). Following extensive clinical beta testing and review, the risk assessment was updated to the HCR-20V3 (Douglas, Hart, Webster & Belfrage, 2013).

The HCR-20V2 and HCR-20V3 have been found to be one the most widely adopted violence risk assessment tools (Singh, Fazel, Gueorguiva & Buchanan, 2014) used within correctional, forensic, general or civil

psychiatric settings (both inpatient and community). To date, the HCR-20V3 has been translated into 6 different languages. The aim of this review is to examine the HCR-20's scientific properties alongside its application within clinical settings and research, specifically when used with ID offenders.

### *Overview of HCR-20 Risk Assessment*

The HCR-20V3 is a standardised tool used for the assessment of risk of future violence (Douglas et al., 2013). It provides a set of guidelines for professionals to assess and subsequently provide risk management recommendations for violence. The authors define violence within the manual as "actual, attempted, or threatened infliction of bodily harm of another person" (Douglas et al., 2013, page 2).

It comprises of 20 risk factors that are shown to be associated with a risk of future violence in adult males and females (Douglas et al., 2013). It is designed to be utilised by professionals who have an expertise in violence risk and knowledge surrounding the underlying aetiology and management of violent behaviour. In addition, the authors of the HCR-20 state that assessors should have prior training in conducting individual assessments and prior experience of assessment and diagnosis of mental, personality and substance related disorders and in using SPJ tools (Douglas et al., 2013).

### *Development of the HCR-20*

As previously mentioned, the HCR-20 was first published by Webster et al. (1995) and subsequently updated by Webster et al., (1997). The HCR-20V3 built upon previous versions of the risk assessment tool. The authors stated that their goal was to produce an updated Version 3 that would be comparable with Version 2 so as to provide a “continuity of concept” (Douglas et al., 2013). They highlighted that this would infer that decisions such as risk level and the number of risk factors identified by a professional or clinical team would be largely the same. In a HCR-20 review and annotated bibliography by Douglas et al., (2014), the authors explain that HCR-20V2 data was collected (i.e. 5000+ cases) and evaluated to determine the risk assessment tools performance to guide the development of the HCR-20V3. Clinicians were consulted as to what was useful in practice and in depth beta-testing and feedback was completed in the development of the HCR-20V3. Consequently, changes were made to the HCR-20V2, which included the addition of sub items for risk factors, rating of presence and relevance of each factor and more explicit focus and links to risk formulation and management and the HCR-20V3 was published in 2013.

### *Items and Scoring*

The HCR-20V3 contains 20 risk factors across three sub domains: Historical (H) factors, Clinical (C) factors and Risk management (R) factors. Each factor is rated as to whether it is present (Y), partially or possibly present

(P) or not present (N). In addition to this, the evaluator is required to rate the relevance of each factor, provide a risk summary judgement, and determine the level of risk for serious harm and risk of imminent violence. A risk formulation and risk scenarios for the individual is then completed. A list of violence risk factors is provided in Table 1 alongside further explanation of items and scoring.

### *Risk Assessment with ID Populations*

Research has shown that there is an overrepresentation of individuals within the CJS that have a diagnosis of ID (Verbrugge, Goodman-Delahunty & Frize, 2011). Offenders with ID are more likely to be at a disadvantage within the CJS, due to vulnerability and victimisation alongside the lack of specialist services currently available for them (Verbrugge et al., 2011). This consequently increases the risk of reoffending within this sub group of offenders; which is a concern at both an individual, public and organisational level (New South Wales Council for ID, 2007).

Within forensic and clinical practice, risk assessments such as the HCR-20 are utilised routinely by clinicians to also assess the risk with ID offenders (Wilcox et al., 2009). However, when utilising HCR-20 with ID offenders, it has been highlighted that professionals may not have adequate training in applying risk assessment items and may require further support (Verbrugge et al., 2011). Consequently, additional supplements for risk assessment have been produced specifically to aid interpretation of factors

within the context of ID, for example Morrissey (2006, in Verbrugge et al., 2011) provided supplementary guidelines for application of the PCL-R (Hare, 2003) and Psychopathy Checklist-Screening Version (PCL-SV; Hart, Cox & Hare, 1995). Following this, a similar supplement was proposed for the application of the HCR-20V2 for use with ID offenders (Boer et al., 2010). The supplement is designed to be an additional resource alongside the HCR-20 and provides the assessor with further guidance of each factor in relation to the context of ID. Although the addition of ID supplement with the HCR-20 has been shown to have equal, if not better, predictive validity when used for risk assessment of ID offenders (Verbrugge et al., 2011). There does not appear to have been a further supplement proposed for the more recent HCR-20V3, which is now adopted within clinical practice and has overtaken the HCR-20V2.

### Characteristics of a good test

A psychometric test will be identified as a good test if it has an interval scale, is internally and externally reliable and valid (Kline, 2015). These criteria will be used throughout this review to critically examine the HCR-20V2 and HCR-20V3, specifically for use with ID offenders.

### *Reliability*

#### *Inter-rater reliability*

Inter-rater reliability relates to variation between assessors that utilise the tool (McHugh, 2012). It has been specifically identified as one of the most

important components of reliability for the HCR-20 risk assessment tool (Douglas & Reeves, 2010), as good inter-rater reliability indicates that two professionals would code the presence (and relevance in the HCR-20V3) similarly. There are several methods of measuring the construct of inter-rater reliability, such as Intraclass Correlation Co-efficient (ICC) and Pearson’s correlation ( $r$ ). ICC can be reported with either the single measure  $ICC_1$ , which measures the reliability of a single rater in comparison to other raters, or the average measure  $ICC_2$ , which measures the reliability of a group of average (Douglas & Belfrage, 2014). There are several recommendations within the literature regarding the interpretation of ICCs, for example Fleiss (1981) recommended that ICC values of:  $\geq .75$  = excellent,  $.60$  to  $< .75$  = good,  $.40$  to  $.60$  = moderate and under  $.40$  = poor. In terms of Pearson’s  $r$  correlation,  $> .80$  is a strong correlation co-efficient and a weak correlation is  $< .50$  (Chow et al., 2016). See Table 14 for synthesis of results on inter-rater reliability.

Table 14: *Inter-rater reliability results.*

Reference	Country	Setting	Sample	Inter-rater reliability
Gray et al. (2007)	UK	Independent sector medium secure services	1,312 in total, 1,141 patients that could be included in study, 145	ICC measure: HCR-20V2 total = .80-.88.



			patients in ID sample	
Gray et al. (2011)	UK	Independent sector medium secure services	996 patients in total, 890 patients that could have HCR-20 scored, 115 patients in ID sample	Pearson's correlation: HCR-20V2 total = .80 HCR-20-H = .92 HCR-20-C = .90 HCR-20-R = .85
Lindsay et al. (2008)	UK	High secure, medium secure and community services	212 patients in total, all with ID	Percentage: HCR-20-H = 89.4% HCR-20-C = 93.1% HCR-20-R = 92.1%
Holzinger et al. (2013)	Germany	Inpatient	Patients illustrated in vignettes (10 with personality disorder, 10 with psychosis and 10 with ID)	ICC measure: HCR-20V3 draft version overall score = .86 H1, H5, H6, H7, H8, H9, C1, C3, C5, R1, R2 and R4 = >.70 H2, H3, H4, H10, C2 and C4 = <.50

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Verbrugg e et al. (2011)	Australi a	Community	89 individuals in total sample, 59 individuals deemed appropriate for research, all with diagnosis of ID	ICC measure: HCR-20 total = .67 HCR-20 with ID supplement = .65
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Gray et al., (2007) presented ICC's of between .80 - .88 for the HCR-20V2 total scores. The results indicated high inter-rater reliability for total HCR-20V2 scores and is consistent with previous research by Douglas et al., (1999). However, one limitation is that this result cannot be generalised to support high inter-rater reliability with the ID sample specifically.

Furthermore, Gray, Taylor and Snowden (2011) examined the applicability and validity of the HCR-20V2 with different psychiatric diagnoses, one of which was 'mental retardation'. Pearson's correlation's (*r*) were computed, which highlighted that inter-rater reliability was high for all sub scales on the HCR-20 and total HCR-20 score. Again, the authors did not specify inter-rater reliability for the sub sample of ID offenders, so it is difficult to hypothesise the extent to which the agreement between raters differs across diagnoses.

Lindsay et al., (2008) presented inter-rater reliability of the HCR-20V2 as a percentage. For the historical scale, agreement was 89.4%, for the clinical scale agreement was 93.1% and for the risk management scale agreement was 82.7%, indicating good agreement across HCR-20 domains. One limitation of reporting inter-rater reliability using this method is that it does not take into account the expected agreement that would occur by chance, which leads to inflation of the level of percent agreement (Hallgren, 2012). Therefore, these results should be interpreted carefully.

In a German project by Holzinger, Eucker, Kotter and Müller-Isberner (2013), they asked five raters to score case vignettes with the draft version of the HCR-20V3. These case vignettes depicted 10 patients with PD, 10 with psychosis and 10 with ID. The ICC for the final overall rating was .86 showing excellent inter-rater reliability. Items that had ICC values  $>.70$  and therefore good inter-rater reliability were H1, H5, H6, H7, H8, H9, C1, C3, C5, R1, R2 and R4. Items that had ICC values  $<.50$  and therefore moderate inter-rater reliability were H2, H3, H4, H10, C2 and C4.

Verbrugge et al., (2011) also reported good levels of inter-rater reliability when applying both the HCR-20 and the HCR-20 with ID supplement with individuals who had a diagnosis of ID and were accessing community services following release from custody (ICC = .67 and .64 respectively).

It is promising that there has been evidence in some publications that the HCR-20V2 and V3 draft version has good inter-rater reliability across total scales, subscales and specific risk factors when the tool is applied with ID offenders. However, caution should be applied when interpreting this conclusion. There has not been an abundance of research specifically reporting inter-rater reliability for application of the HCR-20V2 or V3 with ID offenders in comparison to studies that have reported inter-rater reliability for the application for mentally disorder offenders. Additionally, studies tend to report inter-rater reliability scores for the total sample rather than for sub diagnoses, which makes it more difficult to draw specific conclusions of inter-rater reliability for ID populations.

#### *Internal reliability*

Internal reliability relates to the degree in which the assessment variables measure the same construct (the consistency within the tool) (Tavakol & Dennick, 2011). Cronbach's alpha is a common coefficient that is utilised to measure internal reliability (Kline, 1998), with .80 and above representing good internal reliability. ICC's are also reported as measures of internal reliability.

Research into the internal reliability of the HCR-20V2 has shown good internal reliability (Judges, Egan & Broad, 2016). Following the introduction of the HCR-20V3, Eidhammer, Selmer & Bjørkly (2013) compared the HCR-20V2 and V3's internal consistency by assessing 20 male forensic patients

in a medium secure facility in Norway. They reported moderate estimates for internal consistency for C-items (ICC = .57) on the tool and good estimate values for H (ICC = .85), R items (ICC = .81) and HCR-20 total (ICC = .84). The authors concluded even though the two versions are quite similar and results reflect common underlying constructs, the lower scores on the C items indicate that there are differences between V2 and V3, with V3 being a more detailed violence risk assessment. Although it is argued that internal reliability is not as important as inter-rater reliability for the HCR-20 as a tool, as it does not technically measure a psychological construct and as such, risk factors within the assessment are not expected to “sit” together as well as other psychometric measures (Otto & Douglas, 2010). It may still be beneficial for future research to examine sub groups of psychiatric diagnoses that the HCR-20 is currently used with in services, such as with ID offenders, to examine internal reliability further.

## *Validity*

### *Concurrent Validity*

Kline (2015) explains that concurrent validity refers to how well the test correlates with another validated tool that assesses the same construct. As such, the HCR-20 could be compared to the VRAG. The VRAG is an actuarial risk assessment tool whereas the HCR-20 is a SPJ tool. It also contains a different definition for the construct of violence. Therefore, examining the concurrent validity of the HCR-20 against other risk assessments tools,

alongside the added challenge of differentiating the validity of each tool with sub populations such as ID offenders, proves to be quite difficult.

Consequently, researchers have compared the HCR-20V2 with V3 to examine concurrent validity. The authors of the HCR-20V3 presented results of concurrent validity within the risk assessment manual for comparisons of the HCR-20V2 and HCR-20V3 within forensic populations. Eidhammer et al., (2013) found that in a sample of 20 Norwegian forensic patients that the correlation between the V2 and V3 for total numerical ratings was high ( $r = .84$ ), historical items was high ( $r = .85$ ), clinical items was moderate ( $r = .59$ ) and risk management for "out" ratings was high ( $r = .81$ ). The studies identified within the manual focus on more general forensic samples and do not specify sub categories of offenders, such as those with ID. Additionally, it is not surprising that there was good concurrent validity between the V2 and V3, as they are characteristically a very similar risk assessment tool (Douglas et al., 2013).

### *Face Validity*

Face validity refers to whether the HCR-20 subjectively measures what it claims to measure, the risk of future violence (Thatcher, 2010). The authors of the HCR-20V3 refer to the vast literature reviews of violence, beta-testing and clinician feedback alongside the addition of relevance items to aid clinicians evaluate the nature of violence risk more precisely (Douglas et al., 2014). It could be argued that due to the extensive review and

feedback gathered from clinicians that the HCR-20V3 does to some extent subjectively measure violence risk, however there has been no specific empirical research that is supportive of this conclusion. Furthermore, there has also been no empirical research related to specific sub groups of offenders and the application of the tool with ID offenders. Consequently, no conclusion can be reached regarding the face validity of the HCR-20 with ID offenders.

### *Predictive Validity*

Predictive validity refers to how well a risk assessment tool correctly predicts the likelihood of violence or recidivism (Geraghty & Woodhams, 2015). This is clearly an imperative measure, because an individual's identified risk level is often used within medical and legal settings to aid decisions surrounding individual liberty, treatment and management alongside public protection (Singh, Desmarais & Van Dorn 2013). Consequently, there is a larger focus on assessing predictive abilities of risk assessment tools, such as the HCR-20, within the research literature.

The ROC curve and resulting AUC statistic is the recommended method of analysing the predictive abilities of risk assessment tools (Singh et al., 2013) as the method is resistant to the effects of outcome base rates (Douglas, Otto, Desmarais, & Borum, 2012). There are also other methods of measurement, such as Cohen's *d* (Rice & Harris, 2005). Therefore, it is important to consider how these different statistics compare to one another

(see Table 3). See Table 15 for synthesis of results for predictive validity of the HCR-20 specifically for application with ID offenders.

Table 15: *Predictive validity results* (\* indicates HCR-20 plus ID supplement).

Reference	Country	Setting	Sample	Predictive Validity
Gray et al. (2007)	UK	4 independent hospitals where patients were subsequently discharged	1,141 patients in total. ID subgroup consisted of 118 males and 27 females	<p>AUC statistic: For violence reconviction at 5 year follow up: HCR-20 total = .79 HCR-20-H = .81 HCR-20-C = .71 HCR-20-R = .64</p> <p>For general reconviction at 5 year follow up: HCR-20 total = .81 HCR-20-H = .80 HCR-20-C = .69 HCR-20-R = .73</p>
Morrissey et al. (2007)	UK	High security forensic ID service	73 patients	<p>AUC statistic: For interpersonal physical aggression HCR-20 total = .68</p> <p>For verbal/property aggression HCR-20 = .77</p>



Lindsay et al. (2008)	UK	High security, medium/low security and community ID services	212 adult males	AUC statistic: For violent incidents HCR-20 total = .72 HCR-20-H = .68 HCR-20-C = .67 HCR-20-R = .62
Gray et al. (2011)	UK	Patients discharged from 4 independent medium secure psychiatric units	996 male patients identified, of which 890 could be included. 115 patients with diagnosis of "mental retardation"	AUC statistic: For violent of reconvictions HCR-20 total = .80 HCR-20-H = .84 HCR-20-C = .68 HCR-20-R = .70 For general reconvictions HCR-20 total = .80 HCR-20-H = .79 HCR-20-C = .64 HCR-20-R = .76

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Verbrugg e et al. (2011)	Australia a Community Justice Program (CJP)	Clients from 72 in total identified, 59 clients could be included	AUC statistic: For violent recidivism HCR-20 total = .80 HCR-20-H = .75 HCR-20-C = .67 HCR-20-R = .75 Risk category = .81 *HCR-20 total = .80 *HCR-20-H = .75 *HCR-20-C = .68 *HCR-20-R = .76 *Risk category = .82  For general recidivism HCR-20 total = .94 HCR-20-H = .85 HCR-20-C = .76 HCR-20-R = .99 Risk category = .88 *HCR-20 total = .97 *HCR-20-H = .90 *HCR-20-C = .80 *HCR-20-R = .99 *Risk category = .92
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Fitzgerald UK et al. (2013)	4 medium secure units in ID subgroup	70 patients. 25 patient in ID subgroup	<p>AUC statistic: For any physical aggression HCR-20 total = .77 HCR-20-H = .77 HCR-20-C = .66 HCR-20-R = .73 HCR-20 clinical judgement = .88</p> <p>For severe physical aggression HCR-20 total = .79 HCR-20-H = .70 HCR-20-C = .64 HCR-20-R = .81 HCR-20 clinical judgement = .90</p>
O'Shea et UK al. (2015)	4 inpatient psychiatric hospitals, including medium secure, low secure, locked rehabilitation and open rehabilitation units.	613 patients in total, 109 in ID subgroup	<p>AUC statistic: For any aggression HCR-20 total = .669 HCR-20-H = .546 HCR-20-C = .658 HCR-20-R = .691 HCR-20 summary judgement = .640</p> <p>For physical aggression HCR-20 total = .609 HCR-20-H = .481 HCR-20-C = .580 HCR-20-R = .661 HCR-20 summary judgement = .621</p>

Lindsay et al., (2008) reported AUC statistics for HCR-20 total score (AUC = .72), HCR-20-H (AUC = .68), HCR-20-C (AUC = .62) and HCR-20-R (AUC = .62)

= .62), which were all significant values and showed moderate or large effect sizes, highlighting that the HCR-20 demonstrated good predictive validity when applied with ID offenders across different settings. One identified limitation of the research was that the length of data collection was relatively short in comparison to other studies (one year in comparison to two-three years in other studies). However, the sample size was four times larger than other studies and the authors indicated that the results were consistent with these previous studies.

Gray, Taylor and Snowden (2011) highlighted that the HCR-20 was a good predictor of violent reconnections (AUC's between .68 and .84) and any reconvictions (AUC's between .64 and .80) within the subgroup of 'mental retardation'. This study also highlighted that the HCR-20 appeared to be more effective with this subgroup of the sample as opposed to other diagnoses, such as PD and substance abuse disorders. The authors hypothesised that this may be that the latter disorders are associated with impulsive behaviours that are more difficult to predict, in comparison to ID offenders where clinical presentation may be more consistent and stable.

Furthermore, Verbrugge et al., (2011) highlighted that within a community setting, the HCR-20 had good predictive abilities for both violent and general recidivism and this was the case when utilising the tool independently and with the ID supplement. This provides positive support

for application of the HCR-20 with ID populations as similar AUC statistics were reported with and without the use of the supplement.

Fitzgerald et al., (2013) indicated that the HCR-20 had good predictive validity in relation to any/severe physical aggression, with medium to large effect sizes, and had greater predictive efficacy within the ID sample in comparison to the control group. O'Shea, Picchioni, McCarthy, Mason and Dickens (2015) reported AUC statistics that were substantially smaller than those found in previous studies, such as Fitzgerald et al., (2013). The authors report that this is still suggestive of good predictive validity of the HCR-20 with ID populations and highlighted variations in their research methodology, such as how the HCR-20 was initially scored, sample size and sample characteristics, which could have affected the results. Indeed, it has been reported within the research that many of the studies in the field of risk assessment utilise clinical and forensic records and retrospective scoring (Verbrugge et al., 2011). Even though this is an accepted research method within the field (Gray et al., 2007), it can lead to bias within the results (due to missing data, unreliable scoring and reporting) and this must be taken into consideration as a methodological limitation of the research.

Although the research base is significantly smaller for application and predictive abilities of the HCR-20 with ID offenders, the evidence so far suggests that the HCR-20 is predictive of future violent behaviour within

this subgroup, although due to the complexities of co-morbidity within research samples caution should be applied to this conclusion. There now needs to be further research within ID populations to enhance the research base for the HCR-20, particularly with the updated V3 and within community settings.

### Conclusion

Assessment of violence risk is a crucial element within forensic mental health settings. The HCR-20V2, recently updated to HCR-20V3, is the most widely adopted risk assessment tool within forensics settings (Singh et al., 2014). Subsequently, researchers have focused on measuring its applicability, reliability and validity within these settings and with different offending populations.

Douglas et al., (2014) provided an extensive overview of research studies specifically for the reliability and validity of the HCR-20 with more general offending populations, however less attention has been paid to sub groups of offenders, such as those with ID. Subsequently, this critique provides an overview of the research to date for use of the HCR-20 with ID offenders.

The research highlights that when utilised with ID offenders, the HCR-20 displays good levels of inter-rater reliability and also predictive validity. The evidence also highlights that the HCR-20 has good levels of internal reliability, concurrent validity and face validity, however this is not specific

to use with ID offenders as it is naturally more challenging to provide evidence for sub groups due to the nature of these reliability and validity measures. Additionally, the research is not without limitations, such as smaller sample sizes, length of data collection, biases in risk assessment completion, differing outcome measures and limited evidence for the HCR-20V3 and subsequent comparisons based on suggestions that the HCR-20V2 and V3 are similar. Specifically, for application with ID offenders, it is crucial that further research focuses on risk assessment with this sub group so that firmer conclusions can be made for both the HCR-20V2 and HCR-20V3.

## **Chapter 6 – Discussion**

Assessment of violence risk is a crucial element within forensic mental health settings. The HCR-20V2, recently updated to HCR-20V3, is the most widely adopted risk assessment tool within forensics settings (Singh et al., 2014). Subsequently, researchers have focused on measuring its applicability, predictability, reliability and validity within forensic settings and with different offending populations. The thesis has presented findings specifically for the use of the HCR-20 risk assessment tool with a sub category of ID offenders. The thesis has highlighted that to date, the research for this sub group of offenders, is still in its infancy.

Violence risk assessment is a crucial component for professionals working within forensic and clinical services (Howe, Rosenfeld, Foellmi, Stern & Rotter, 2015). The HCR-20 risk assessment tool is a well-researched and widely used SPJ aid to risk assessment and management of violent offenders (Singh, Fazel, Gueorguiva & Buchanan, 2014) used within correctional, forensic, general or civil psychiatric settings (both inpatient and community). The main aim of the thesis was to present a detailed perspective of the use and predictive abilities of the HCR-20 risk assessment tool within a specific sub group of offenders, ID offenders.

Firstly, a systematic review was undertaken regarding the current literature of the HCR-20 risk assessment specifically for mentally disordered offenders. Following stringent review of the initial search (n=1085), 59



studies were included for review. Mean AUC statistics were computed to highlight that for any violent outcome, the HCR-20 sub domains demonstrated moderate to high effect sizes (HCR-20 total score AUC =.702, HCR-20 historical factors AUC =.623, HCR-20 clinical factors AUC =.677, HCR-20 risk management factors AUC =.676 and overall judgement AUC =.68). These results were comparable to previous conclusions that indicated that historical risk factors often result in lower predictive ability on risk assessment tools as many individuals score highly on these leading to less variance between the population (O'Shea et al., 2014). Whilst the majority of the studies reported in depth diagnostic information for the samples, only seven studies distinguished diagnoses and compared HCR-20 results across diagnoses. A further four studies focused primarily on ID offenders, five studies focused on offenders with a diagnosis of PD and three focused on offenders with a diagnosis of schizophrenia. Overall, the results from this small sample indicated that the HCR-20 was a good predictor of violence, particularly for individuals with a diagnosis of ID. In terms of comparisons across diagnoses, the HCR-20 demonstrated generally larger effect sizes in terms of the total score, H items, R items and SJ scores for the ID population. Moderate effect sizes were reported for C items within this population. Furthermore, lower overall effect sizes were reported for the use of the HCR-20 with offenders who had a diagnosis of PD, although large effect sizes were reported within several studies for the structured judgement aspect of the risk assessment. For offenders who had a diagnosis of schizophrenia, studies generally reported moderate to

large effect sizes, with large effect sizes being reported for the HCR-20 total score. The authors of such studies hypothesised that differences in results across diagnoses may be due to the characteristics of individual diagnoses, with some such as PD, involving more impulsive and less predictable behaviour (Gray et al., 2011). However, it has also been noted that forensic patients often present with comorbidity (Lovell, 2017), and as such it is particularly difficult to tease apart the true predictive abilities of risk assessments with specific sub groups of offenders. Furthermore, it was hypothesised that there were several reasons across the research examined within the review that may have had an impact upon variability of reported AUC statistics, such as differences in diagnosis protocols and criteria, presence of comorbidity across samples, difference in violent outcomes and difference in the length of follow up.

Due to the discrepant results, and smaller evidence base particularly for sub groups of offenders, further research is required, with a focus on individual subgroups as opposed to aggregating individuals into one category (O'Shea et al., 2014). This would allow for more confidence in the results of predictive validity of the HCR-20 within categories of offenders, such as offenders with ID. Furthermore, a convergence across the methodology of studies would also be beneficial as this would allow for a meta-analysis to be undertaken (Russo, 2007).

A retrospective cohort study was conducted to explore the predictive abilities of the HCR-20 risk assessment across two offender pathways within two separate forensic services: an ID pathway and MH pathway. In total, 191 patients were included, this involved 40 high secure ID patients, 106 high secure MH patients, 11 low secure ID patients and 34 low secure MH patients. Retrospective violent incidents and HCR-20 risk assessments were analysed for each patient.

The HCR-20V2 clinical items, risk management items and total score were all significantly and positively related to frequency of violent incidents with the ID high secure sample. Results for the historical items were positively related to frequency of violent incidents within the ID sample but this result was not significant. In addition to this, the clinical items and HCR-20 total scores demonstrated statistically significant correlations for frequency of incidents within the MH population. The results demonstrated that the HCR-20 historical items, whilst positively related to the frequency of incidents, were not statistically significant for both for ID and MH offenders. This finding appears to be linked to previous research, that suggests that static aspects of risk assessment tools, such as the HCR-20 historical items are not as useful at predicting violent outcomes (Dolan & Blattner, 2010). The HCR-20V2 also demonstrated positive correlations for incidents of seclusion, particularly within the high secure ID directorate for clinical items, risk management items and the total score. These results were significant. Additionally, significant positive correlations, were also reported

for risk management items and HCR-20 total, for incidents of long term segregation within the high secure ID population. The results for the high secure MH directorate, in comparison, were not significant, for both incidents of seclusion and long term segregation. These results suggest that the HCR-20V2 could be better at predicting violent outcomes within an ID population. These findings are also supportive of previous research (Gray et al., 2011), and may add further weight to the argument that the dynamic sub domains and total scores of the HCR-20V2 can be more effective when used with ID offenders, as the nature of behaviours presented within this population may be less impulsive and chaotic as opposed to other diagnoses, such as PD (Gray et al., 2011).

One unique element of the study was that results were also collected for HCR-20V3. These results demonstrated that items were positively related to frequency of incidents, although these were not significant. One positive finding was that the HCR-20V3 imminent violence judgement showed positive and significant values for frequency of attempted assaults and actual assaults within the high secure ID population. Whilst there were limitations with the sample size for this analysis, this provides a positive initial result that could be utilised effectively within secure forensic services to manage violence and aggression. In addition to these results, comparable AUC statistics were reported for use of the HCR-20V2 and V3 across the level of security in terms of overall institutional violence. Results showed moderate predictive effect sizes (AUC = .621 - .642), which were

comparable to other research with similar populations (O'Shea et al., 2015). However, it is important to note that AUC statistics were reported for combined results across MH and ID directorates, due to the low sample size, and therefore these results did not meet the research aim of exploring predictive abilities of the HCR-20 tool across diagnoses. Whilst these results were promising, there were several limitations to the study and the results.

In particular, whilst the sample was taken specifically from specialist services for ID and MH health offenders, it was unclear from the demographic information as to any secondary diagnoses of the individuals. Lovell (2017) indicates that there are sometimes secondary diagnoses for these individuals, such as MH, PD, autism spectrum disorder, and whilst it is beneficial to examine individuals based on diagnoses, it is incredibly difficult to untangle diagnostic criteria to determine the true predictive validity of risk assessments with sub populations. As identified within the systematic review and empirical research study, further research is required into predictive abilities of risk assessment tools across specific diagnoses within forensic patients as the evidence base is still relatively small and discrepant results have been reported. Future research should focus on larger sample sizes, given the limitations of the current study presented, and also focus on HCR-20V3.

Following on from these results, a case study was presented focused on the cognitive assessment, risk assessment and the resulting risk reduction

psychological treatment of an older adult offender with a diagnosis of 'mild mental retardation'. Whilst treatment was focused on reduction of inappropriate sexual behaviours as opposed to violence risk reduction, the HCR-20V3 was utilized within the case study to explore Mr B's violence risk factors. A risk formulation and risk scenarios were also completed as part of the HCR-20V3 and the risk assessment was subsequently used to inform treatment recommendations. Given the previous research, which indicates moderate/large effect sizes in terms of the predictive validity of the HCR-20 with ID offenders (Fitzgerald et al., 2013) alongside recommendations that the HCR-20 should be used within clinical practice (NHS England 2014/2015; NHS England, 2017), the HCR-20V3 was deemed appropriate for use with Mr B. The HCR-20 aided identification of areas of concern related to his risk, such as a continued lack of insight into some areas of his behaviour, a limited access to his cognitive and behavioural coping strategies to manage stressful and risk related situations alongside chronic and enduring instability, which was noted as an unresponsive element of his psychiatric disorder. Furthermore, limitations of the HCR-20V3 within clinical practice were discussed, such as the lack of core features of formulation for clinicians and the lack of evidential support for the link between a risk formulation and an effective risk management plan. This identified that research and clinical case studies should now focus on further exploration of the HCR-20V3 risk assessment, including measurement of risk formulations and risk scenarios and the impact upon effective risk management plans across diagnoses within forensic

populations, as this would be beneficial in offender risk assessment and management.

Finally, the thesis presented a psychometric critique of the HCR-20 specifically for use with ID offenders. Results demonstrated that the HCR-20 displays good levels of inter-rater reliability and predictive validity when applied to ID offenders, although there were discrepant results reported across studies. The evidence also highlighted that the HCR-20 had good levels of internal reliability, concurrent validity and face validity, however this was not specific for use with ID offenders. It was noted that it is naturally more challenging to provide evidence for sub groups due to the nature of these reliability and validity measures. One pertinent limitation of the review was that there was limited evidence for psychometric properties of the HCR-20 when applied with ID offenders specifically. Further limitations of the studies were reported, such as small sizes, length of follow up, biases in risk assessment completion, differing outcome measures for violence and limited evidence for the HCR-20V3. These findings and limitations were in line with those found in the systematic review and empirical study, which supports the overall conclusion that further research is required, that focuses on HCR-20V3 risk assessment with ID offenders and indeed other diagnoses, and limitations of previous studies should be considered and adapted to aid a more consistent methodological approach.

Overall, the thesis has examined the application of the HCR-20 with ID offenders, and demonstrated some positive results thus far. There were, however discrepant results reported across studies, which highlights the need for further research in the area to ensure the correct recommendation and utility of risk assessment with individuals with ID. Further research is now required that focuses on the HCR-20V3 risk assessment with different diagnoses, including ID offenders, to ensure clarity of approach and confidence in the risk assessment tool. Additionally, research should also focus on exploring the impact of risk formulation and risk scenarios upon the effectiveness of risk management within clinical settings. It is recommended that further research takes into consideration the limitations of previous studies and attempts to create a more consistent methodological approach to aid comparisons across studies, which will allow for a future meta-analysis to be conducted. Specifically, research should include larger sample sizes, consider comparisons across diagnoses and report diagnostic information thoroughly, and replicate violent outcomes and time frames.



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## **Appendices**

### Appendix 1: Full search syntax for each database

#### *OVID: Psychinfo*

1. mental\* ill\*.mp.
2. exp Mental Health/ or exp Mental Disease/
3. mental\* disorder\*.mp.
4. (mental\* adj4 (ill\* or disorder\* or health)).mp. [mp=title, abstract, heading word, table of contents, key concepts, original title, tests & measures]
5. exp Personality Disorders/ or personality disorder\*.mp.
6. exp Intellectual impairment/ or exp Learning Disorder/ or Learning Disab\*.mp.
7. Intellectual\* disab\*.mp.
8. Mental\* retard\*.mp.
9. exp Violence/ or exp Aggression/ or Violence\*. mp
10. offen\*.mp.
11. recidivism.mp. or exp Recidivism/
12. convict\*.mp. or Crime/
13. reoffen\*.mp.
14. "HCR-20".mp.
15. "historical clinical risk management-20".mp.
16. "HCR-20v3".mp.
17. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8
18. 9 or 10 or 11 or 12 or 13
19. 14 or 15 or 17
20. limit 19 to yr= "1995-Current"
21. 19 and 20



*OVID: Medline*

1. mental\* ill\*.mp.
2. exp Mental Disorders/ or exp Mental Health/
3. mental\* disorder\*.mp.
4. (mental\* adj4 (ill\* or disorder\* or health)).mp. [mp=title, abstract, original title, name of substance word, subject heading word, keyword heading word, protocol supplementary concept word, rare disease supplementary concept word, unique identifier]
5. Personality Disorders/ or personality disorder\*.mp.
6. learning disab\*.mp.
7. exp Developmental Disabilities/ or exp Intellectual Disability/ or intellectual disab\*.mp.
8. intellectual impairment.mp.
9. mental\* retard\*.mp.
10. violen\*.mp.
11. offen\*.mp.
12. recidivism.mp.
13. convict\*.mp.
14. Crime/ or reoffend\*.mp.
15. exp Aggression/ or aggress\*.mp.
16. reoffend\*.mp.
17. "HCR-20".mp.
18. "historical clinical risk management-20".mp.
19. "HCR-20v3".mp.
20. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8 or 9
21. 10 or 11 or 12 or 13 or 14 or 15 or 16
22. 17 or 18 or 19
23. 20 and 21 and 22
24. limit to 23 to yr= "1995-Current"

*OVID: Embase*

1. mental\* ill\*.mp.
2. exp mental health/ or exp mental disease/
3. mental\* disorder\*.mp.
4. (mental\* adj4 (ill\* or health or disease or disorder\*)).mp. [mp=title, abstract, heading word, drug trade name, original title, device manufacturer, drug manufacturer, device trade name, keyword]
5. exp personality disorder/ or personality disorder\*.mp.
6. exp intellectual impairment/ or exp learning disorder/ or learning disab\*.mp.
7. intellectual\* disab\*.mp.
8. mental\* retard\*.mp.
9. exp violence/ or exp aggression/ or violen\*.mp.
10. offen\*.mp.
11. recidivism.mp. or exp recidivism/
12. convict\*.mp. or crime/
13. reoffen\*.mp.
14. "HCR-20".mp.
15. "historical clinical risk management-20".mp.
16. "HCR-20v3".mp.
17. 1 or 2 or 3 or 4 or 5 or 6 or 7 or 8
18. 9 or 10 or 11 or 12 or 13
19. 14 or 15 or 16
20. 17 and 18 and 19
21. limit to 20 to yr= "1995-Current"

*Web of Science and Social Sciences Citation Index*

TS = ("mental\* ill\*" OR "mental health" OR "mental\* disorder\*" OR "personality disorder\*" OR "learning disab\*" OR "intellect\* disab\*" OR "intellectual impairment" OR "mental\* retard\*")

TS = (risk OR "risk assess\*" OR "risk manage\*" OR violen\* OR aggress\* OR "structured professional judg\*ment" OR recidivism OR reoffen\* OR offend\* OR convict\*)

TS = (HCR-20 OR "historical clinical risk management-20" OR HCR-20v3) #3 AND #2 AND #1

*Applied Social Sciences Index and Abstracts (ASSIA)*

All ("mental\* ill\*" OR "mental health" OR "mental\* disorder\*" OR "personality disorder\*" OR "learning disab\*" OR "intellect\* disab\*" OR "intellectual impairment" OR "mental\* retard\*")

AND

All (risk OR "risk assess\*" OR "risk manage\*" OR violen\* OR aggress\* OR "structured professional judg\*ment" OR recidivism OR reoffen\* OR offend\* or convict\*)

AND

All (HCR-20 OR "historical clinical risk management-20" OR HCR-20v3)

*Cochrane Central*

"mental\* ill\*" OR "mental health" OR "mental\* disorder\*" OR "personality disorder\*" OR "learning disab\*" OR "intellect\* disab\*" OR "intellectual impair\*" OR "mental\* retard\*" in Title, Abstract or Keywords AND risk OR "risk assessment" OR predict\* OR "structured professional judg\*ment" in Title, Abstract or Keywords AND "HCR-20" OR "historical clinical risk management-20" OR "HCR-20v3" in Title, Abstract or Keywords

## Appendix 2: Inclusion and exclusion forms

Author(s):

Year:

Title:

Database:

Author(s):

Year:

Title:

Database:

Inclusion Criteria	Is the criteria met?	Additional Comments
Population:		
- Adult male/female offender?	Yes/No	
- AND		
- Mental disorder?	Yes/No	Which diagnosis?
Exclusion:		
- HCR-20 risk assessment tool applied?	Yes/No	
Outcome:		
- Any violent behaviour?	Yes/No	
- OR		
- Institutional violence?	Yes/No	
- OR		
- Violent offending?	Yes/No	Which outcome measure?
Study type:		
- Cohort?	Yes/No	
- Case control?	Yes/No	
- Other?	Yes/No	Which study type?
Exclusion:		
- Not opinion paper, letter, editorial or review?	Yes/No	
Conclusion:		
- Included or excluded?	Yes/No	

### Appendix 3: Excluded studies and reasoning

Excluded Studies	Reasoning
Abou-Sinna & Luebbbers (2012)	Outcome
Allnutt et al. (2013)	Study type
Arbach-Lucioni (2015)	Outcome
Barber Rioja, Kopelovich & Kucharski (2012)	Outcome
Belfage & Douglas (2002)	Outcome
Brown & Rakow (2016)	Population
Castelletti, Rivellin & Stratico (2014)	Study type
Cawood (2017)	Population
Claix (2004)	Population
Cote, Crocker & Nicholls (2012)	Outcome
Cullen et al. (2011)	Outcome
Dahle (2006)	Population
Daffern (2007)	Study type
Davoren et al. (2012)	Outcome
Davoren et al. (2013)	Outcome
Davoren et al. (2015)	Outcome
De Borbia Telles et al. (2009)	Outcome
De Ruiten (2007)	Study type
Dolan & Blattner (2010)	Outcome
Dolan & Doyle (2000)	Study type

Douglas (2014)	Study type
Douglas, Yeomans & Boer (2005)	Population
Folino et al. (2004)	Outcome
Geraghty & Woodhams (2015)	Study type
Green et al. (2014)	Outcome
Guy et al. (2015)	Outcome
Jewell et al. (2017)	Outcome
Johnston (2002)	Study type
Jovanovic et al. (2009)	Population
Judges, Egan & Broad (2016)	Study type
Kroner & Mills (2001)	Population
Macall et al. (2004)	Outcome
Morrissey, Beeley & Milton (2014)	Outcome
Morrissey et al. (2007)	Outcome
Neves, Gonclaves & Palma-Oliveira (2011)	Population
O'Shea (2016)	Outcome
O'Shea & Dickens (2015)	Outcome
Pham, Claix & Remy (2000)	Outcome
Smith, White & Macall (2004)	Outcome
Stone (2002)	Study type
Strand & Belfrage (2001)	Outcome
Sturup et al. (2016)	Population
Teo (2012)	Outcome

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Van den berg (2011)	Study type
Vitacco et al., (2016)	Outcome
Warren et al. (2005)	Outcome
Zhu, Li & Wang (2016)	Outcome

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Appendix 4: Quality assessment form for cohort studies

Author(s):

Year:

Title:

Database:

**Quality Criteria**                      **Y(2) P(1) N(0) U**      **Additional Comments**

Threshold Questions:

Did the study address a clearly focused issue?

- *The population identified*
- *The risk factors studied*
- *The outcomes considered*

Sampling/Selection Bias:

Was the cohort recruited in an acceptable way?

Was the cohort representative?

Were the criteria for inclusion explicit?

Measurement Bias:

Was the risk assessment tool described clearly?

Was the method of outcome assessment clearly stated?



Were the outcome assessors blind?

Was the outcome measured in the same way across the participants?

Did trained individuals conduct the risk assessment?

Was the inter-rater reliability above the .8 threshold?

Was the follow up period sufficient? (2 years minimum)

Attrition Bias:

Was drop out rate recorded and was this considered acceptable?

Results:

What are the results? Was the ROC statistic/ sensitivity/specificity reported?

Was predictive validity of the risk assessment tool stated?

Was concurrent validity discussed and addressed?

Are the results reliable?

Do the results fit with other available evidence?

Are the results generalisable?

Were confounding factors taken into consideration or discussed?

Overall quality score:

Number of unclear:

Appendix 5: Quality assessment form for case control studies

Author(s):

Year:

Title:

Database:

<b>Quality Criteria</b>	<b>Y(2)</b>	<b>P(1)</b>	<b>N(0)</b>	<b>U</b>	<b>Additional Comments</b>
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Threshold questions:

Did the study address a clearly focused issue?

- *The population identified*
- *The risk factors studied*
- *The outcomes considered*

***Sampling and selection bias***

Sampling/Selection Bias:

Were the cases representative of the target population?

Were cases and controls randomly selected from population?

Were cases reliably assessed?

Were controls reliably assessed?

Were cases clearly defined?

Were controls clearly defined?

Were demographics cited and clear?

Were case and controls comparable in terms of demographic/confounding variables?

Measurement Bias:

Was the risk assessment tool described clearly?

Was the method of outcome assessment clearly stated?

Were the outcome assessors blind across cases and controls?

Was the outcome measured in the same way across the participants?

Did trained individuals conduct the risk assessment?

Was the inter-rater reliability above the .8 threshold?

Was the follow up period sufficient? (2 years minimum)

Attrition Bias:

Was drop out rate recorded and was this considered acceptable?

Results:

What are the results? Was the ROC statistic/ sensitivity/specificity reported?

Was predictive validity of the risk assessment tool stated?

Was concurrent validity discussed and addressed?

Are the results reliable?

Do the results fit with other available evidence?

Are the results generalisable?

Were confounding factors taken into consideration or discussed?

Overall quality score:

Number of unclear:

## Appendix 6: Data extraction form

Author(s):

Year:

Title:

Database:

### **Data extraction items    Comments**

Study type?

Study location?

Sample size?

Diagnosis/Diagnoses?

Control group?  
(Any specific diagnosis or  
no diagnosis?)

Setting?  
(E.g. hospital security)

Risk category if  
applicable?  
(E.g. low, medium, high)

Violent behaviour?  
- % Violent  
- % Not violent

Length of follow up  
period?

Results?  
- ROC analysis  
- Sensitivity  
- Specificity  
- Likelihood ratio

Inter-rater reliability?

Quality assessment?

- Overall score
- Clarity score

## Appendix 7: Overview of assessments used with case study

### 1. Wechsler Adult Intelligence Scale - Fourth UK Edition (WAIS-IV; Wechsler, 2008)

The WAIS-IV is an individually administered test of a person's intellectual ability and cognitive strengths and weaknesses. It is comprised of 10 core subtests and measures both verbal skills and specific non-verbal abilities. The WAIS-IV is the most widely used measure of assessment of adult intelligence in the UK (British Psychological Society, 2015).

Furthermore, it was also identified that it would be beneficial for Mr B's frontal lobe function to also be assessed, as some of Mr B's difficulties were congruent with deficits in frontal lobe functioning, such as difficulties in abstract reasoning, poor decision making, judgement, maintaining attention, and inappropriate behaviour (Wilson, 2003).

### 2. Behavioural Assessment of Dysexecutive Function (BADS; Wilson, Emslie, Evans, Alderman & Burgess, 1996)

The BADS measures a range of higher level cognitive functions including the ability to plan and organise behaviour, problem solving, impulsivity and initiation, allocation of resources between competing tasks, the ability to change from one topic to another and to think flexibly.



The DEX questionnaire is also completed as part of the BADS assessment process. The DEX questionnaire is a 20 item self-report questionnaire designed to sample emotional, motivational, behavioural and cognitive changes in an individual with potential deficits in frontal lobe functioning.

### 3. Frontal Assessment Battery (FAB; Dubois & Litvan, 2000)

This is a brief battery of six neurological tasks that are specifically designed to assess frontal lobe function.

Appendix 8: Raw data of assessments from case study

*WAIS-IV results*

Factor	Index	Confidence Interval 95%	Percentile Rank	Descriptive Category
Full Scale IQ	51	46-56	0.1	Extremely Low
Verbal Comprehension	58	53-63	0.3	Extremely Low
Perceptual Reasoning	56	51-61	0.2	Extremely Low
Working Memory	63	58-68	1	Extremely Low
Processing Speed	50	45-55	<0.1	Extremely Low

Subtest	Scaled Score	Percentile Rank	Corresponding IQ score	Descriptive Category
Block Design	2	0.4	60	Extremely Low
Similarities	4	2	70	Extremely Low
Digit Span	5	5	75	Borderline
Matrix Reasoning	2	0.4	60	Extremely Low
Vocabulary	2	0.4	60	Extremely Low
Arithmetic	2	0.4	60	Extremely Low
Symbol Search	1	0.1	55	Extremely Low
Visual Puzzles	4	2	70	Extremely Low
Information	3	1	65	Extremely Low

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Subtest	Scaled Score	Percentile Rank	Corresponding IQ score	Descriptive Category
Coding	1	0.1	55	Extremely Low

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*BADS results*

Subtest	Scaled Score
Rule Shift Cards	0
Action Programme	0
Key Search	0
Temporal Judgement	0
Zoo Map	0
Modified Six Elements	Declined*
Total Profile Score	0

Mr B declined to complete the 'modified six elements' task. As a result, to obtain an 'overall classification' the following process was followed:

Add the total profile scores of the five completed tasks  $(0+0+0+0+0) = 0$

Divide total profile scores by number of tasks completed  $(0/5) = 0$

Add this result to the total profile scores  $(0+0) = 0$

New profile score = 0

Standardised score = 12

Age standardised score = 8

