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Process evaluation of the High Intensity Program Units (HIPUs): Within-treatment change

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Aims

To examine whether participation in the HIPUs was associated with measurable change in a range of dynamic risk factors that were the targets of intervention.

Methods

The sample included offenders who had commenced or completed participation in the HIPUs and were administered a series of psychometric measures before (N=833) and after completion of the program (N=448). Within-treatment change was calculated at the group level using average simple differences and at the individual level using clinically significant change analyses.

Results

At the time of entering the HIPUs, the most prevalent assessed domains of dynamic risk among participants were related to substance use, anger and impulsiveness. On average, participants showed significant within-treatment change in the expected direction of improvement on almost all measures. Clinically significant change analysis showed that an average of one in five participants who met statistical definitions for having 'dysfunctional' scores on a measure at pre-treatment were classified as 'recovered' at post-treatment. An average of 15% of participants showed statistically significant improvement irrespective of their pre-treatment functioning. Participants most commonly reported improvement in anger-related domains of risk.

Conclusion

Within-treatment change analyses provide preliminary evidence that participation in the HIPUs is associated with improvement in a number of dynamic risk factors. This study also contributes to our understanding of the dynamic risk profiles of short-sentenced offenders such as those entering the HIPUs.

INTRODUCTION

New South Wales (NSW) accounted for 31% of the total Australian adult prison population in the financial year 2018-2019 (Australian Bureau of Statistics, 2019). Approximately 35% of offenders sentenced to custody in NSW receive an aggregate sentence of less than two years (Corben & Tang, 2019), and time spent in custody is often considerably lower after taking into account release onto parole. On average offenders spend seven months in custody, which extends to an average of 14 months when remand period is considered (NSW Bureau of Crime Statistics and Research, 2018).

Although a significant proportion of adult prisoners serve less than two years in custody, they historically have had few opportunities to engage in offence-focused interventions before their release. Offenders who receive short prison sentences are also less likely to receive supervision in the community after release, further limiting their prospects of rehabilitation (Wang & Poynton, 2017). Consistent with this, shorter sentences and limited community supervision have been associated with increased risk of reoffending. Offenders with sentences of less than 12 months reoffend at higher rates than those with longer sentences and are more likely to receive further custodial sentences (Holland, Pointon & Ross, 2007; Jonson, 2010; Ministry of Justice UK, 2013; Wermink et al., 2010; Xie et al., 2018).

A cycle of conviction-release-reoffence, limited rehabilitative options and a substantial population of short-sentenced offenders in prisons necessitate the development of suitable interventions targeting this inmate cohort. To address these concerns, Corrective Services NSW has established 10 High Intensity Program Units (HIPUs) in seven correctional centres across NSW. The HIPUs deliver rehabilitative interventions and reintegration services to offenders with shorter sentences[1], following an intensive schedule of around 4 hours a day over 3-4 days per week on average. The units themselves comprise purpose-built group rooms and other standalone facilities within the correctional centres that are dedicated to delivery of interventions to HIPU participants.

Behaviour change interventions are primarily delivered in the HIPUs through a suite of programs known as EQUIPS (Explore-Question-Understand-Investigate-Practice & Plan-Succeed). EQUIPS consists of four structured interventions which address needs relating to inmate partner violence (EQUIPS Domestic Abuse) and other violent behaviour (EQUIPS Aggression), as well as substance use (EQUIPS Addiction). The fourth program is EQUIPS Foundation, which is a non-offence specific program that addresses general dynamic risk factors associated with antisocial attitudes, risk-taking behaviour, and emotion regulation (for additional information about EQUIPS see Zhang, Wei, Howard, & Galouzis, 2019).

Other interventions delivered in HIPUs include the Real Understanding of Self-Help (RUSH) program that supports emotional adjustment and regulation over a series of up to 22 sessions; cultural strengthening programs and other support resources for vulnerable groups such as women and Indigenous offenders; and programs for participants with driving offences. Delivery of reintegration services by internal and external facilitators is also a key feature of the HIPU model, and support needs relating to homelessness, unemployment, substance use, health issues, social communication and relationships, and others.

Core principles underlying the HIPUs include intensive assessment and delivery of intervention dosage to offenders within the constraints of their

[1] HIPU policy and procedure defines shorter sentenced inmates who are eligible for intervention as those with an aggregate custodial sentence of less than two years.

sentencing timeframe. At the time of entry, HIPU participants undergo an assessment phase that identifies the nature and severity of their dynamic risk factors and other needs. Dynamic risk factors are individual features that have a causal relationship with their likelihood of reoffending and are amenable to change through intervention (Andrews & Bonta, 2010; Boorman & Hopkins, 2012; Light, Grant, & Hopkins, 2013). The most prominent dynamic risk factors, often described as the 'central eight' include a history of antisocial behaviour; antisocial personality pattern (poor self-control, hostility, weak problem-solving skills); antisocial cognitions (crime supportive attitude, anger, resentment, & defiance); antisocial peer networks; family/marital circumstances; education and employment; substance abuse; and lack of prosocial activities (Andrews & Bonta, 2010; Andrews, Bonta, & Wormith, 2006).

The assessment phase of the HIPUs results in development of a treatment and reintegration plan that informs delivery of interventions over the course of participation. In accordance with the need principle of the risk need responsivity (RNR) model of correctional treatment (e.g. Andrews & Bonta, 2010), core interventions delivered in the HIPUs aim to reduce the severity of or otherwise achieve positive change in identified dynamic risk factors.

The Current Study

It is consistent with the RNR principles that measurement of within-treatment change in dynamic risk factors is considered a viable method of assessing the effectiveness of offender treatment (Beggs, 2010; Hanson, 1997; Klepfisz, O'Brien, & Daffern, 2014; Scalora & Garbin, 2003). A key mechanism of change for offender programs, or part of the logic model by which programs reduce offenders' likelihood of recidivism, is that they address dynamic risk factors (Daffern, Simpson, Ainslie, & Chu, 2018; Howard & van Doorn, 2018; Kroner & Yessine, 2013; Serin & Lloyd, 2009). In this regard, offenders who show improvement in dynamic risk factors are expected to be less likely to reoffend than those who show less or no improvement (Hanson, 1998; Andrews & Bonta, 2010). Measurement of within-treatment change can also be valuable for understanding how interventions work to achieve positive outcomes for offenders with greater detail and precision than more distal reoffending outcomes.

Since its inception the HIPUs have assessed dynamic risk factors and change in those factors through administration of a psychometric test battery during the assessment phase and again after completion of the program. The tests assess multiple common risk factors such as antisocial attitudes, criminal associations, anger, substance dependence and impulsiveness. There is considerable research showing significant relationships between these dynamic risk factors and reoffending. Antisocial, offence supportive attitudes and relationships with criminal peers have been found to show strong associations with criminal behaviour and risk of reoffending (Andrews & Bonta, 2010; Gendreau, Little, & Goggin, 1996; Helmus, Hanson, Babchishin, & Mann, 2013). Anger-related risk factors are a valid predictor of violence, aggressive behaviour and reoffending (Baker, Van Hasselt, & Sellers, 2008; Moeller, Novaco, Heinola-Nielsen, & Hougaard, 2016; Novaco, 2011). Substance abuse, impulsiveness and lack of self-control are also common factors in offender populations (Dolan & Anderson, 2002; Haden & Shiva, 2008; Kunic, 2008).

The primary aim of this study is to examine whether participation in the HIPUs is associated with within-treatment change in identified dynamic risk factors. To achieve this, we compared pre-treatment and post-treatment scores on four self-report psychometric measures that assess a range of constructs of risk. Change in dynamic risk factors was assessed in terms of average magnitude of within-treatment change across HIPU participants at the group level, as well as by exploring individual-level differences in

psychometric scores using best practice statistical techniques such as clinically significant change.

A secondary aim of the study was to use available data from the psychometric test battery at pre-treatment to explore the risk profile of offenders entering the HIPUs. There is a lack of research characterising dynamic risk factors among short-sentenced offenders. One study by Bourgon and Armstrong (2005) examined risk factors among offenders who had received custodial sentences of less than two years and participated in the Rideau Correctional and Treatment Centre in Canada. They identified substance abuse, anger/aggression, criminal attitudes and criminal 'at-risk' lifestyle as the most prominent criminogenic factors. Another study of an intensive treatment program for community-based, short-sentenced offenders also identified criminal lifestyle and associates, drug misuse and criminal thinking and behaviour as the most prevalent risk factors (Wong, O'Keeffe, Ellingworth, & Senior, 2012). It is intended that analysis of the risk profile of offenders entering the HIPUs may assist in developing an understanding of the common needs and treatment targets of the program cohort and short-sentenced offenders in general.

METHODS

Participants

The total sample comprised 833 HIPU participants who had either completed treatment, exited before completion or were actively engaged in treatment between December 2017 and August 2019. To be eligible for inclusion in this study, all participants were required to validly complete at least one assessment from the battery of psychometric measures delivered to participants before and after treatment (see Measures). Given the variability in administration and availability of records, the number of participants who completed these assessments varied. Table 1 shows the final sample sizes for each of the measures.

Table 1 also shows the distribution of participants in the sample by gender and Indigenous status. Of the total sample, 26% were females, and 37% had an Indigenous cultural background. The age of participants across the measures ranged between 20 and 66 years, with a mean of 36.2 years (SD = 8.6 years).

Table 1. Samples available for the various psychometric measures and analyses.

Analysis	Measure	Total (n)	Female (n)	Indigenous (n)
Distribution Analysis	MCAA	737	200	265
	NAS-PI	790	194	292
	BIS-11	746	186	271
	SDS	833	215	309
Within-treatment Change	MCAA	448	92	140
	NAS-PI	415	69	140
	BIS-11	399	66	125
	SDS	401	68	138

Measures

A battery of self-report psychometric measures is routinely administered to all HIPU participants. All tests are administered before treatment and immediately after the completion of treatment. The following sections provide an overview of each of the psychometric measures that were used in the current study.

Measures of Criminal Attitudes and Associates (MCAA)

The MCAA (Mills & Kroner, 2001) is a self-report questionnaire that was developed to provide measures of risk factors relating to antisocial attitudes and associates. It is a two-part instrument comprising Part A and Part B. Part A quantifies the number of criminal associates the respondent identifies having in the community. Part A produces a count of criminal friends as well as the Criminal Friend Index, which accounts for time spent in the company of criminal associates. Maximum scores range from 0 to 4 for Number of Criminal Friends and 0 to 16 for the Criminal Friend Index.

Part B is a 46-item measure consisting of four scales that assess antisocial attitudes towards Violence, Entitlement, Antisocial Intent, and Associates. The Violence and Entitlement factors of Part B of MCAA contain 12 items each and provide information about endorsement of attitudes supportive of violence, and beliefs about what they deserve or are owed to them, respectively. Antisocial Intent and Associates factors each comprise ten items, and measure beliefs about committing potential antisocial actions in the future, and endorsement of association with others involved in criminal activities, respectively. Items from each of the factors are summed to provide a total score of general antisocial attitudes, where higher scores indicate more antisocial attitudes. The Part B total score ranges from 0 to 46. The MCAA has established reliability with internal consistency at $\alpha = .89$ reported for an offender sample (Mills, Kroner, & Forth, 2002) and $\alpha = .82$ reported for a student sample (Mills & Kroner, 2001).

Novaco Anger Scale and Provocation Inventory (NAS-PI)

The Novaco Anger Scale was first developed by Novaco (1975) as a measure of anger reactions to various provocations. The NAS-PI is a two-part measure designed to assess anger as a problem of psychological functioning and physical health. It is intended to be used as a tool for research, therapeutic change and outcome evaluation. The NAS-PI provides an overview of aggression and violence-related dynamic risk factors and criminogenic needs centred on anger.

Part A of the NAS-PI is the Novaco Anger Scale (NAS), which contains 60 items that focus on how an individual experiences anger and measures anger disposition (Moeller et al., 2016). The NAS is composed of Cognitive, Arousal, Behavioural, and Anger Regulation subscales. These four subscales are indicative of various domains of anger disposition and regulation, including justification, hostile attitudes, irritability, impulsive reactions, verbal aggression, and management of anger-engendering thought. Scores from the subscales can be combined to yield a NAS-Total score, with a range of 48 to 148[2]. Higher scores on the NAS-Total indicate more severe difficulties with manifestation of anger.

Part B of the NAS-PI comprises the Provocation Inventory (PI), which is a 25-item questionnaire centred on anger intensity in the range of provocative situations. The PI total score ranges from 25 to 100, with higher scores indicating greater anger and sensitivity to provocation. The NAS-PI has high reliability and stability with excellent internal consistency at $\alpha = .94$ for NAS-Total and $\alpha = .95$ for PI total.

[2] The 12 items on the Anger Regulation (REG) subscale do not contribute to the NAS-Total score.

Barratt Impulsiveness Scale (BIS-11)

Currently in its 11th revision (Patton, Stanford, & Barratt, 1995), the BIS-11 is a 30 item self-report instrument designed to assess the behavioural construct of impulsiveness in both research and clinical settings. Items on the BIS-11 are rated on a 4-point scale and load onto three subscales, namely BIS-Attentional Impulsivity, BIS-Motor Impulsivity, and BIS-Non-planning. These three subscales are indicative of quick decision making, acting without thinking and lack of forethought (Barratt, 1985). High BIS-11 scores indicate elevated impulsiveness across attentional, motor and planning domains of impulsivity.

Validation studies have shown high internal consistency of the BIS at $\alpha = 0.83$ for student populations (Stanford et al., 2009), and $\alpha = 0.79$ to 0.83 across subscales have been reported in clinical populations (Patton et al., 1995).

Severity of Dependence Scale (SDS)

The SDS is a brief five-item scale that measures an individual's self-reported level of psychological dependence for a nominated substance (Gossop, Griffiths, Powis, & Strang, 1992; Gossop et al., 1995). The SDS was developed initially for measuring the dependence of opioids; however, over time it has been validated to measure dependence on other substances including amphetamines, cannabis, cocaine, alcohol, and benzodiazepines (Cuevas, Sanz, Fuente, Padilla, & Berenguer, 2000; Gossop et al., 1995; Lawrinson, Copeland, Gerber, & Gilmour, 2007; Swift, Hall, & Copeland, 1998; Topp & Mattick, 1997). Higher scores on the SDS indicate greater severity of multiple psychological symptoms of substance dependence, including frequency of use as well as impaired control, preoccupation and anxiety about ongoing use. Gossop et al. (1992) reported excellent internal consistency of the SDS at $\alpha = 0.87$ for opioid users, $\alpha = 0.89$ for cocaine users and $\alpha = 0.93$ for amphetamine users.

Data Analysis

Within-treatment change among offenders in the study sample was analysed using group-level and individual-level approaches. The group-level approach examines the magnitude and statistical significance of differences in scores between pre-treatment and post-treatment on average, across all offenders in the sample (Beggs & Grace, 2011; Nunes, Babchishin, & Cortoni, 2011). This method of group-level analysis has several shortcomings, however. For example, it does not allow for calculation of whether average change also reflects shifts from severe or clinically relevant elevations on a factor to more functional levels, or the proportion of individuals in the sample who achieve such change. In addition, analysis of change at the group level does not provide an indication of how many individuals achieve statistically significant change.

To account for these limitations, we also applied methods of calculating change at the individual level. These methods centred on clinically significant change analysis, which determines whether individual participants have scored in clinically functional ranges on psychometric constructs of interest following treatment and if the change was statistically reliable (Jacobson, Follette, & Revenstorf, 1986). These two approaches have been used concurrently to provide complementary information regarding within-treatment change analysis in offender treatment programs (Nunes et al., 2011).

Group-level analysis

We conducted paired sample t-tests on the differences between pre-treatment and post-treatment scores to determine average within-treatment change in the sample. This analysis provides a simple index of whether the average difference between scores was significant as a function of the whole sample. For the SDS, the average within-treatment change was computed separately for each of the six reported substances

of interest, before being merged to give a single measure of change at the group level. While higher scores on most tests indicated more severe needs, interpretation of the NAS-Regulation subscale was reversed because higher scores indicated better anger regulation abilities.

Individual-level analysis

Clinically significant change. Primary analyses of change at the individual level followed principles of clinically significant change. Clinically significant change is change between pre-treatment and post-treatment scores that is both statistically significant and reflects a shift between 'dysfunctional' and 'functional' thresholds[3]. Clinically significant change analysis primarily involves three steps.

First, a cut-off score is selected to determine the threshold at which scores can be statistically defined as functional or dysfunctional (Jacobson, Follette, & Ravenstorf, 1984; Nunes et al., 2011). We used data from non-offender samples to represent functional norms for the NAS-PI, BIS-11, and MCAA (Part B) measures to define the functional threshold. In these cases, the cut-off was defined as the functional sample mean plus 1 SD if higher scores represent more severe needs, or minus 1 SD if lower scores indicate more severe needs (Nunes et al., 2014). Since only data for the SDS were available from samples that would be considered dysfunctional according to clinically significant change definitions (substance dependent individuals), we defined the cut-off for this measure as the dysfunctional mean minus 1 SD. Normative data and other statistics used for calculating clinically significant change are given in Appendix 1.

Secondly, to assess the extent to which each participant's change on a measure was statistically significant, we calculated the reliable change index (RCI; Jacobson et al., 1984; Jacobson & Truax, 1991). Statistically, reliable change is calculated as the difference between each offender's pre-treatment and post-treatment score, divided by the standard error of the difference between the two scores.

In the final step, we derived categories of clinically significant change from the RCI and placement of post-treatment scores in dysfunctional or functional ranges. It is noted that clinically significant change is only assumed to occur for offenders with dysfunctional scores at pre-treatment (Jacobson et al., 1984); for the purposes of these analyses, HIPU participants who returned functional scores at pre-treatment were classed as already functional (see Figure 1). Among those with dysfunctional scores at pre-treatment, participants were classified as recovered if their post-treatment scores were below the functional threshold, and the RCI was significant (RCI > 1.96 or < -1.96). They were classified as improved if their RCI was significant, but their post-treatment score remained above the functional threshold. The participants were clinically classified as unchanged if their RCI was non-significant (RCI > -1.96 or < 1.96) and as deteriorated if they had a significant RCI, but the direction of change indicated greater dysfunction (RCI > 1.96).

Reliable change analysis. A potential limitation of clinically significant change analysis is that it only assesses the extent of change for individuals who record dysfunctional scores prior to treatment. However, offenders such as those entering the HIPUs are a heterogeneous population who are not expected to have uniformly severe needs across multiple risk factors. As a result, clinically significant change analyses may be insensitive to dynamics of change among offenders with more

[3] According to models of clinically significant change, an individual is 'dysfunctional' on a given construct if the assessed severity of their need resembles norms for individuals who receive intervention for that need. Conversely, they are 'functional' if the assessed severity of their need resembles norms for individuals who do not receive intervention for that need. These terms are used to represent statistical relationships between individual and group scores on a specific measured construct, and are not intended to suggest that the individual or group exhibits any other qualitative or quantitative indicators of deficits.

moderate patterns of need and exclude large proportions of the sample who do not record dysfunctional scores pre-treatment. To address this, we also used RCI statistics to report on whether participants made statistically significant within-treatment change regardless of their functional status pre- or post-treatment. Participants were classified into three categories based on their RCIs. They were classified as improved if their RCI was significant (< -1.96). They were classified as unchanged if their RCI was non-significant (RCI > -1.96 or < 1.96) and as deteriorated if they had significant RCI, but the direction of change indicated greater dysfunction (RCI > 1.96).

RESULTS

Pre-treatment risk profiles of HIPU participants

Distributions of scores on the psychometric measures pre-treatment, in addition to proportions of participants classified as having dysfunctional scores pre-treatment, are shown in Table 2. A large percentage of participants (85.1%) assessed with the SDS showed dependence on a variety of substances including alcohol, amphetamines, opioids, and benzodiazepines. The highest proportions of participants scored in dysfunctional ranges for opioids (97.8%) and methamphetamine dependence (96.8%). Similarly, many reported dependence on other drugs including cocaine and benzodiazepines and alcohol (Range: 80.6% - 88.5%).

At pre-treatment, around three in five participants (57.3%) returned dysfunctional scores relating to their disposition towards anger, as assessed by the NAS-PI Total. More than half had elevated behavioural manifestations of anger, tendency to react impulsively, verbal aggression and physical confrontation tendencies (NAS-Behavioural = 58.9%). Approximately half reported problems regulating anger (NAS-Regulation = 48.5%), reported justifying anger and suspicions and held hostile attitudes (NAS-Cognitive = 48.5%). Around 40% of participants reported that they had problems containing the duration of their anger and reported somatic tensions and irritability (NAS-Arousal = 41.9%).

A substantial proportion of participants reported elevated impulsiveness, as assessed by the BIS-Total score (52.4%). Approximately half reported high non-planning impulsivity (BIS- Non-planning = 49.3%), reflecting a lack of forethought before engaging in offending or other behaviours. Almost half also reported elevated motor impulsiveness (BIS-Motor = 46.5%). Fewer participants (BIS-Attention = 28.7%) reported issues with impulsivity related to attention and related cognitive difficulties.

A third of participants identified having friends and close associates with histories of criminal involvement, and more than half (MCAA-Criminal Friends Index = 57.1%) reported frequently spending time with antisocial associates. Total MCAA Part B scores indicated that less than half (43.7%) had antisocial attitudes in dysfunctional ranges before participating in the HIPUs. The most prevalent risk factor found on the MCAA was endorsement of association with individuals involved in criminal activities (MCAA-Associates), with 72.9% of participants showing dysfunction. Around two in five participants also reported high scores on Entitlement (41.7%) and Antisocial Intent factors (37.4%) of the MCAA. Only a quarter of participants reported elevated endorsement of violence (MCAA-Violence = 25.1%) pre-treatment.

Table 2. Distributions of pre-treatment scores and proportions of participants with dysfunctional scores on each of the psychometric measures

Measure	Factor / Group	N	Description	Proportion dysfunctional (%)	Mean (SD)
MCAA Part A	*Friends*	687	Number of criminal friends	32.3	2.6 (1.2)
	Criminal Friend Index	687	Time spent with criminal associates	57.1	13.5 (11.2)
MCAA Part B	*Total*	737	Antisocial attitudes	43.7	23.6 (9.0)
	Violence	737	Endorsement of violence	25.1	4.9 (3.5)
	Entitlement	737	Endorsement of entitlement	41.7	6.0 (2.7)
	Antisocial Intent	737	Endorsement of antisocial intentions	37.4	5.3 (3.0)
	Associates	737	Endorsement of criminal associates	72.9	7.4 (2.3)
NAS	*Total*	790	Anger disposition	57.3	88.4 (17.8)
	Cognitive	790	Anger Justification, Suspicion, Hostile attitude	48.5	30.0 (5.7)
	Arousal	790	Anger duration, Somatic tension, Irritability	41.9	29.1 (6.4)
	Behavioural	790	Impulsive reactions, verbal aggression, physical confrontation	58.9	29.1 (7.0)
	Regulation	790	Anger regulation	48.5	25.3 (4.0)
PI	*Provocation*	780	Anger Intensity, Sensitivity to provocation	38.6	59.3 (16.6)
BIS-11	*Total*	746	General Impulsiveness	52.4	72.8 (12.1)
	Attention	746	Attentional impulsivity	28.7	18.3 (4.2)
	Motor	746	Motor Impulsivity, Acting without thinking	46.5	26.4 (5.0)
	Non-Planning	746	Lack of forethought, Planning impulsivity	49.3	28.0 (5.5)
SDS	*(Total)*	833	Dependence on substances, Impaired control and anxiety	85.1	7.3 (4.0)
	Alcohol	162	Alcohol dependence	84.6	5.8 (4.2)
	Methamphetamine	314	Methamphetamine dependence	96.8	7.7 (3.6)
	Opioids	139	Opioids dependence	97.8	9.0 (3.7)
	Cannabis	161	Cannabis dependence	52.2	6.6 (3.9)
	Cocaine	26	Cocaine dependence	88.5	6.8 (4.2)
	Benzodiazepine	31	Benzodiazepine dependence	80.6	7.7 (4.4)

Note. For the MCAA, NAS-PI and BIS-11 the Factor / Group column represents factors assessed by the measure when completed for any given offender. For the SDS, the column represents subsamples of offenders who completed the measure in reference to a specific substance, in addition to the total sample who completed the measure in reference to any substance.

Within-treatment change

Average change

Table 3 provides available sample sizes, descriptive statistics and average change between pre-treatment and post-treatment for each of the psychometric measures using a series of paired sample t-tests. As expected, average post-treatment scores tended to indicate improvement among HIPU participants relative to average pre-treatment scores. This was shown by lower post-treatment scores than pre-treatment scores on most measures except for NAS-Regulation, where higher scores indicated improvement.

As can be seen from Table 3, the average within-treatment change across the total sample was

statistically significant for all measures except for the NAS-Regulation scale. Cohen's d represents the effect sizes or magnitude of average within-treatment change, which can be interpreted so that effect sizes of up to .2 are considered small, between .2 and .5 are moderate, and between .5 and .8 are large (Cohen, 1992). Across the sample on average, the effect sizes were found to be in the small to moderate range.

Table 3. Descriptive statistics for each of the measures at pre-treatment and post-treatment, and analyses for average within-treatment change between the tests.

Measure	Pre-treatment		Post-treatment		Simple Differences	
	n	*M (SD)*	*n*	*M (SD)*	*t*	*d*
MCAA-Total	447	23.37 (9.2)	447	21.39 (9.7)	6.47***	-.31
MCAA-Violence	447	4.82 (3.4)	447	4.16 (3.4)	5.43***	-.25
MCAA-Entitlement	447	5.86 (2.8)	447	5.61 (2.7)	2.39*	-.11
MCAA-Antisocial Intent	447	5.37 (3.1)	447	4.69 (3.5)	5.51***	-.27
MCAA-Associates	447	7.32 (6.9)	447	6.93 (2.6)	4.70***	-.08
NAS-Total	415	87.87 (17.8)	415	82.16 (17.2)	8.12***	-.38
NAS-Cognitive	415	29.90 (5.8)	415	27.87 (5.6)	7.97***	-.32
NAS-Arousal	415	29.07 (6.5)	415	26.97 (6.4)	7.60***	-.37
NAS-Behavioural	415	28.89 (7.0)	415	27.13 (6.8)	6.52***	-.31
NAS-Regulation	415	25.29 (3.9)	415	25.66 (4.7)	-1.73^{ns}	.09
Provocation Inventory	411	59.13 (16.3)	411	54.57 (16.2)	6.61***	-.32
BIS-Total	399	72.61 (11.9)	399	69.11 (12.3)	7.02***	-.35
BIS-Attention	399	18.32 (4.1)	399	17.39 (4.1)	4.85***	-.24
BIS-Motor	399	26.28 (5.1)	399	25.10 (5.0)	5.01***	-.24
BIS-Non-planning	399	28.01 (5.4)	399	26.62 (5.5)	5.76***	-.28
SDS	401	6.94 (4.0)	401	6.45 (4.0)	2.51*	-.12

Note. *p < .05 **p < .01 ***p < .001; ns = not significant; d = effect size

Clinically significant change

Figure 1 illustrates the percentage of participants classified as functional at the pre-treatment stage (in blue) as well as percentages of participants who scored in dysfunctional ranges at pre-treatment, classified into post-treatment categories of clinically significant change (recovered, improved, unchanged and deteriorated). Across all measures, the average proportion of participants who were classified as dysfunctional pre-treatment ranged between 23.5% and 85.1% with a mean of 56.4%.

Among those participants who were dysfunctional at pre-treatment, 19% were classified as recovered on average across the measures after treatment (range 6.3% - 36.5%). The highest rates of recovery were reported for NAS-PI domains, including the

Provocation Inventory (36.5%), NAS-Arousal (36.5%), NAS-Total (25.1%), and NAS-Behavioural (23.5%). The lowest rates of recovery were recorded for NAS-Regulation (6.3%), MCAA-Associates (6.7%) and the SDS (8%).

For most of the measures, the majority of participants who had dysfunctional scores at pre-treatment did not show clinically significant change. Classification into the unchanged category ranged between 53.1% and 93.3% across the measures with a mean of 70.2%. The highest proportions of offenders classified into the unchanged category were observed for MCAA-Associates (93.3%), BIS-Non-planning (84.6%), NAS-Cognitive (78.9%), BIS-Motor (78.1%) and MCAA-Violence (77.1%). On the other hand, the NAS-Behavioural (53.1%), Provocation Inventory (54.5%) and NAS-Arousal (54.5%) scale had the lowest rates of participants with an unchanged classification.

Relatively few participants were classified as improved post-treatment (mean = 5%). The highest proportions of participants classified as improved were observed for the NAS-Behavioural (14.8%) and NAS-Total (14.3%) measures. A marginal proportion of participants were classified as deteriorated across the measures (mean = 3.2%), with participants most likely to record significantly worse scores post-treatment on the NAS-Regulation (11.7%) scale and the SDS (10.7%).

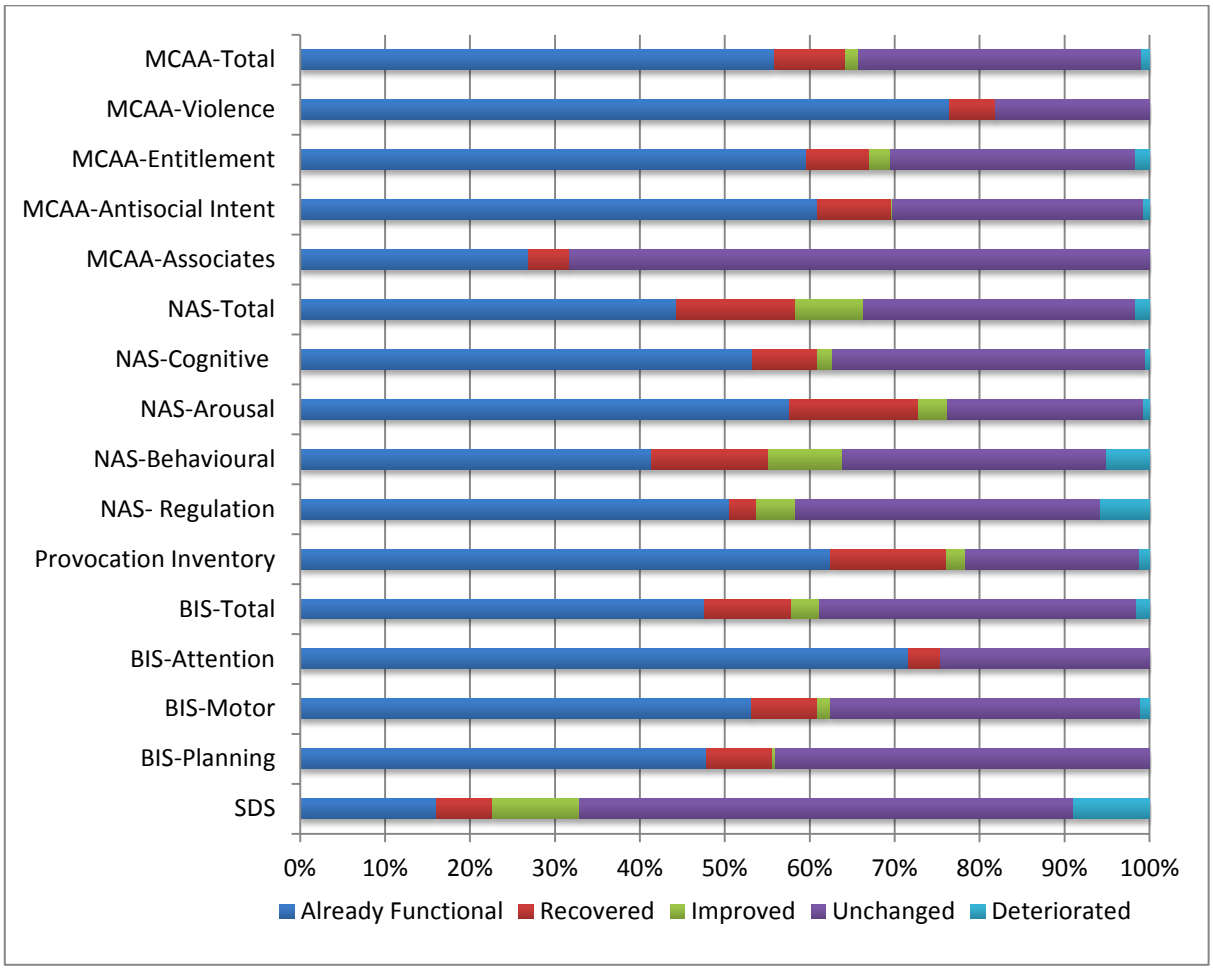

Figure 1. Distribution of clinically significant change categories for the total sample. The blue bars represent participants who were functional at pre-treatment, and the remainder of categories represent clinically significant change outcomes for participants who were classified as dysfunctional at pre-treatment.

Reliable change

As previously discussed, clinically significant change analyses may give an incomplete picture of dynamics of within-treatment change across the sample because a large proportion of HIPU participants returned pre-treatment scores that were within functional ranges, and therefore were excluded from the analyses. To address this, we also report rates of reliable change among participants irrespective of their pre-treatment functional status. Table 4 shows the percentage of participants who were classified into the three categories of reliable change for each of the psychometric measures.

Across measures, the majority of participants remained unchanged, or did not show statistically significant change between their pre-treatment and post-treatment scores (range = 63.1 – 93.5%; mean = 78.6%). The BIS-Attention (93.5%), MCAA-Associates (92.4%), and MCAA-Violence (89%) scales accounted for the highest proportions of participants classified as unchanged.

Proportions of participants classified as improved, or who showed statistically significant change towards less severe risk, ranged between 5% and 26% with a mean of 15% across the measures. A number of NAS-PI scales showed the highest rates of improvement among participants, with around a quarter of participants showing reliable change on the NAS-Total (26%), NAS-Behavioural (25.5%) and Provocation Inventory (25.1%) scales. On the other hand, participants were least likely to show reliable change in the direction of improvement on the BIS-Attention (5%) and MCAA-Associates (6%) scales.

Importantly, HIPU participants were least likely to be classified as showing reliable change in the direction of deterioration, or statistically significant elevations in risk. Rates of deterioration across the measures ranged between 1.5% and 13.5% with a mean of 6.3%. The highest proportions of participants were classified as deteriorated on the NAS-Regulation (13.5%) and SDS (11.7%).

Table 4. Proportions of treatment change categories in HIPU participants as a function of total sample based on their RCIs (in %).

Measure	Improved	Unchanged	Deteriorated
MCAA-Total	11.9	83.2	4.9
MCAA-Violence	8.3	89.0	2.7
MCAA-Entitlement	13.9	77.4	8.7
MCAA-Antisocial Intent	14.1	80.8	5.1
MCAA-Associates	6.0	92.4	1.6
NAS-Total	26.0	66.3	7.7
NAS-Cognitive	11.6	85.5	2.9
NAS-Arousal	24.3	67.5	8.2
NAS-Behavioural	25.5	63.1	11.3
NAS-Regulation	8.7	77.8	13.5
Provocation Inventory	25.1	65.5	8.4
BIS-Total	19.8	74.4	5.8
BIS-Attention	5.0	93.5	1.5
BIS-Motor	12.0	83.0	5
BIS-Non-planning	10.5	87.7	1.8
SDS	17.2	71.1	11.7

DISCUSSION

The primary aim of this study was to examine whether HIPU participants show change in a range of common dynamic risk factors before and after receiving intervention. Assessing within-treatment change is important for understanding the intermediate outcomes of HIPU participation in accordance with RNR principles, whereby intervention has an impact on dynamic risk factors which in turn have a causal relationship with reoffending (e.g. Andrews & Bonta, 2010). This study also sought to explore the profile of pre-treatment dynamic risk factors presented by cohorts of short-sentenced offenders who enter the HIPUs.

Profiles of dynamic risk among HIPU participants

The results of this study gave novel insights into the prevalence of risk factors among offenders who receive short custodial sentences. Analysis of responses on the pre-treatment psychometric battery indicated that HIPU participants most frequently presented dysfunctional elevations in risk factors associated with substance dependence, marked by impaired self-control, and preoccupation and ongoing anxiety about substance use patterns. These symptoms were particularly pronounced when indexed in relation to opioids and methamphetamines; however elevated needs across a range of substances were reported.

More than half of the sample returned pre-treatment scores that were in dysfunctional ranges in reference to their general disposition towards anger, which was most commonly associated with maladaptive, impulsive manifestations of anger. Consistent with this, around half of offenders also endorsed elevations on measures of impulsiveness including lack of forward planning and acting without thinking. Conversely, fewer offenders (25.1%) endorsed antisocial attitudes towards violence as assessed by the MCAA-Violence scale, which may indicate that violent offending among HIPU participants may be more often a function of dysregulation of impulsivity and anger as opposed to attitudinal acceptance of violence as an appropriate behavioural response. While impulsivity-related needs were high among the sample, it is noted that endorsement of difficulties with attentional impulsivity in particular was relatively infrequent.

Around half of assessed HIPU participants reported high numbers of antisocial friends, and pre-treatment attitudes supportive of antisocial associates were prevalent. There is the possibility that scores on the MCAA-Associates scale may have been aggravated by HIPU participants' custodial placement and regular exposure to peers who have histories of offending behaviour (Howard & van Doorn, 2018). Large proportions of offenders also reported elevated attitudes of entitlement, or perceptions about what they deserve or is owed to them, in addition to intentions to engage in future antisocial behaviour. The latter finding may be particularly relevant to treatment planning, given that behavioural intentions tend to be more predictive of future behaviour than general attitudes (e.g. Ajzen, 1988).

These results are consistent with previous research (Bourgon & Armstrong, 2005; Wong et al., 2012) that reported substance abuse, anger, and criminal attitudes as prevalent risk factors among short-sentenced offenders. More broadly, this and other studies suggest that presenting risk factors among offenders with shorter custodial sentences often reflect common or 'central eight' risk factors that are typical targets of RNR-based behaviour change interventions across various offender groups (Andrews & Bonta, 2010; Andrews, Bonta, & Wormith, 2006). Of course, there remains the possibility that short-sentenced offenders such as HIPU participants experience other risk factors or combinations of factors that are relatively unique to this cohort although were not assessed with available measures.

Notwithstanding these observations, the pattern of results also indicated that high proportions of HIPU participants (mean = 43.6%) reported being within functional ranges on assessed domains of risk before entering treatment. This may be attributable to the diversity of offenders entering the HIPUs. The HIPUs use several referral criteria wherein males and females of varied levels of risk, patterns of offending behaviour and cultural backgrounds are identified for intervention. While the results are consistent with the broad scope of offender eligibility for the HIPUs, they highlight the heterogeneity of intervention needs among the cohort (with the possible exception of substance dependence) and the importance of tailored

treatment planning and delivery throughout their period of participation.

Within-treatment change

Analyses of within-treatment change at the group level indicated that on average, offenders reported significant reductions in most of the assessed domains of risk after participating in the HIPUs. These results provide an indication that receiving HIPU interventions may be associated with decreased impulsiveness, reductions in antisocial attitudes, anger and sensitivity to provocative situations, and less severe psychological symptoms of substance dependence on average.

One exception to the above findings is that offenders did not report significant change in NAS-Regulation scores over the course of HIPU intervention on average. Higher NAS-Regulation scores indicate more effective anger regulation skills, reflected in self-control and personal efficacy when faced with provocation. One interpretation of these results is that HIPU interventions may benefit from additional targeting of participants' capacities to regulate anger and related anger-engendering thoughts and thinking styles. It is also noted that the NAS-Regulation scale was the only strength-based measure where higher scores indicated lower need, which may have impacted participants' responding on this scale relative to the rest of the psychometric battery.

The results of clinically significant change analyses showed a more diverse picture of within-treatment change at an individual level. Among those offenders who returned scores in dysfunctional ranges prior to treatment, around a fifth on average (19%; range = 6.3% - 36.5%) were classified as recovered after treatment, as indicated by a statistically significant shift in post-treatment scores into functional ranges.

The highest rates of recovery were observed for a number of NAS-PI measures, with participants frequently showing clinically significant change on the Provocation Inventory (36.5%), NAS-Arousal (35.8%) and NAS-Total (25.1%). These findings suggest that participation in the HIPUs may be associated with particular decreases in overall anger, and the intensity and duration of anger reactions in aversive and provocative situations. Further, high recovery rates on the BIS-Total and MCAA-Antisocial Intent scales indicate reductions in self-reported impulsiveness and future intentions to act in an antisocial manner.

On the other hand, relatively low rates of recovery were reported for anger regulation as assessed by the NAS-Regulation scale, substance dependence, and attitudes towards criminal associates and violence. In some cases (e.g. SDS; MCAA-Associates) these low rates of recovery were recorded in reference to factors that had the highest prevalence of dysfunctional scores at pre-treatment. While the pattern of results may indicate specific domains that would benefit from additional intervention in the HIPUs, psychometric factors may have also been influential. For example, the MCAA-Associates factor tends to be relatively stable over time given the focus on historical relationships with antisocial peers (Ashford, Wong & Sternbach, 2008; Kroner & Yessine, 2013). It is also noted that due to characteristics of normative data for the SDS, participants were required to effectively report no symptoms to be within functional ranges for some substances.

Results of the more inclusive reliable change analyses were similar to those of clinically significant change analyses for a number of psychometric measures. In general, however, the rates of statistically significant improvement were slightly lower (mean = 15%) and rates of non-significant change were higher (mean = 78.6%) for the total sample in reliable change analyses. After accounting for differences in sample sizes, the findings suggest that a number of participants who returned functional scores on a given risk factor at pre-treatment were nonetheless able to derive benefit from intervention and record significant

improvement on that factor. However, the high rates of non-significant change are consistent with proposals that functional individuals are less likely from both a statistical and clinical standpoint to show within-treatment change (e.g. Jacobson et al., 1986; Jacobson & Truax, 1991).

Conversely, after considering all HIPU participants in the reliable change analyses, a non-marginal proportion of the sample (mean = 6.3%) reported significant deterioration over the course of intervention. Rates of deterioration among the sample were particularly pronounced for the NAS-Regulation (13.5%) scale and the SDS (11.7%). Significant elevations in the reported severity of risk factors over treatment may be attributable to statistical artefacts such as regression to the mean; participants may also gain increased insight and sensitivity to their risk factors when completing psychometric measures after treatment compared to before treatment. However, the possibility cannot be discounted that a small proportion of HIPU participants may derive adverse impacts of intervention, which may be more likely for those who have low needs on a given risk factor or relatively low risk of reoffending in general (e.g. Makarios, Sperber, & Latessa, 2014).

Limitations

Some limitations of the study are noted. Perhaps most significantly for the purposes of this study, it was not possible to obtain psychometric scores for an equivalent comparison group who did not participate in the HIPUs. Without a non-treatment comparison group, it cannot be concluded whether the observed changes can be attributed to the effects of HIPU treatment or reflect spontaneous change over time. Comparisons with other offender cohorts on the measures may also help to clarify whether characteristics of HIPU participants, such as their relatively short custodial sentences, confer different or unique intervention needs.

In addition, use of self-reported psychometric measures to indicate within-treatment change has several potential limitations and has been subject to debate in recent years (e.g. Howard & van Doorn, 2018). Offenders may be motivated towards biased responding resulting in under-reporting or over-reporting of risk factors (Correia, 2000; Tierney & McCabe, 2001), for reasons such as securing an early release or medical transfer, or avoiding treatment programs (Edens, Hart, Johnson, Johnson, & Olver, 2000). There is evidence that under certain circumstances, offenders can give self-reports that have similar predictive validity to clinician ratings of risk (e.g. Walters, 2006). However, recent studies have suggested that response biases change and become more pronounced after treatment compared to before treatment (Juarez & Howard, 2018), which may introduce measurement error to assessments of within-treatment change in particular.

A related limitation is that this study did not examine the relationship between within-treatment change and reoffending outcomes. Establishing an association between reported change and reoffending is important for identifying mechanisms of change in interventions (e.g. Banse, Koppehele-Gossel, Kistemaker, Werner & Schmidt, 2013; Kroner & Yessine, 2013), and can serve as a validation method to test whether reported change on a psychometric measure reflects real cognitive and behavioural change. Analyses of reoffending outcomes were omitted from this study due to the recency of HIPU implementation and insufficient time for offenders to be exposed to risk of reoffending in the community. We aim to examine the relationship between within-treatment change and reoffending when relevant outcomes data becomes available.

Lastly, we acknowledge that the utility of clinically significant change analyses can be impacted by the quality of normative data and other reliability statistics for the psychometric measures used in this study. Normative data were obtained from a range of studies with diverse sample sizes and characteristics, which is likely to affect their

statistical robustness and generalisability to local populations. Future research would benefit from development of norms for a range of measures using the same samples and consistent definitions of functional or dysfunctional status (Jacobson & Truax, 1991).

Conclusions

The results of this study provide preliminary indications that delivery of interventions in the HIPUs is achieving the intended intermediate outcome of addressing critical dynamic risk factors for reoffending among participants. This study also gives insights into the nature and prevalence of risk factors among the target offender cohort, with potential applications for improving intervention content and availability at the system level. Limitations of the available data cannot be discounted, and from the current findings it may not be concluded that observed change in scores over treatment convey valid information about the impacts of HIPUs on participants' risk of reoffending. However, the study contributes to an incremental understanding of the logic model, operations and outcomes of the HIPUs that will be supported by additional evaluations in the future.

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Appendix 1. Summary of normative data and reliability statistics used in clinically significant change analyses

Measure	Source	Functional mean (SD)	Reliability statistic	Functional threshold
MCAA	Mills & Kroner (2001)			
Part A				
Criminal Friends		1.5 (1.6)		
Criminal Friend Index		4.2 (5.4)		
Part B				
MCAA Total		17.4 (6.9)	0.82	24.3
Violence		4.6 (3.0)	0.74	7.6
Entitlement		4.6 (2.2)	0.77	6.8
Antisocial Intent		4.0 (2.9)	0.79	6.9
Associates		4.2 (2.4)	0.66	6.6
NAS-PI	Moeller et al. (2016); Novaco & Taylor (2003)			
NAS-Total		75.8 (10.0)	0.76	85.8
Cognitive		26.6 (3.6)	0.47	30.2
Arousal		25.9 (4.2)	0.78	30.1
Behavioural		23.3 (3.8)	0.81	27.1
Regulation		27.9 (3.0)	0.72	24.9
Provocation Inventory		53.5 (10.3)	0.82	63.8
BIS-11	Stanford et al. (2009)			
BIS-Total		62.3 (10.3)	0.83	72.6
Attention		16.7 (4.1)	0.74	20.8
Motor		22.0 (4.0)	0.59	26.0
Non-planning		23.6 (4.9)	0.72	28.5
SDS	Gossop et al. (1992); Lawrinson et al., (2007); Cuevas et al. (2000);	Dysfunctional mean (SD)*		
Alcohol		3.6 (4.4)	0.92	0.0
Methamphetamine		4.0 (3.6)	0.93	0.0
Opioids		5.2 (5.0)	0.87	0.2
Cannabis		9.4 (2.9)	0.85	6.5
Cocaine		4.2 (3.2)	0.89	1.0
Benzodiazepines		6.4 (3.8)	0.81	2.6

*Since functional norms were not available for SDS, dysfunctional norms were used for clinically significant change analysis.

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