

Social cognition in intellectually disabled male criminal offenders

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Abstract

Purpose: Although intellectual disability (ID) and criminal offending have long been associated, the nature of this link is obfuscated by reliance on weak, historical means of assessing ID and fractionating social cognitive skills. This paper addresses current and future research in social perception, social inference and social problem-solving in ID violent offenders. **Methodology:** Literature is reviewed on comorbidity of criminal offending and ID, and on social problem-solving impairment and offending. In an exploratory case-control series comprising six violent offenders with ID and five similarly able controls, emotion recognition and social inference are assessed by the Awareness of Social Inference Test (TASIT) and social problem-solving ability and style by an adapted Social Problem-Solving Inventory (SPSI-R). **Findings:** Violent offenders recognised all emotions except 'anxious', which they tended to misidentify as 'surprise'. While offenders could interpret and integrate wider contextual cues, absent such cues offenders were less able to use paralinguistic cues (*e.g.* emotional tone) to infer speakers' feelings. Offenders in this sample exceeded controls' social problem-solving scores. **Value:** ID offenders, like neurotypical offenders, display specific deficits in emotion recognition- particularly fear recognition. Concurrently, enhanced social problem solving (at least as measured by the SPSI-R) in offenders is a novel preliminary finding which requires follow-up in a larger sample. Findings are discussed within the social processing framework, highlighting the need for tighter service-user baseline measures and further research into the causes of ID offending.

Keywords: criminal offenders; mental retardation; emotion recognition; social problem solving; social inference; social reasoning

Type: Research paper

Introduction

Intellectual disability (ID) is characterised by significant limitations in both intellectual functioning and adaptive behaviour (Schalock, Luckasson & Shogren, 2007). Thus, individuals receiving an ID diagnosis must present with both a reduced ability to learn new skills (impaired intellectual functioning), alongside a reduced ability to function independently (impaired social functioning). Further, these deficits must be present before age 18 (Department of Health, 2001). While the disorder is heterogeneous, ID individuals typically struggle in areas including following instruction, prolonged concentration and understanding social norms (Betts, 2011).

Such communicative, cognitive/executive and social difficulties may contribute to the apparently high prevalence of ID individuals in the criminal justice system; a recent international meta-analysis estimated the prevalence of offending within the ID population at between seven and ten percent, significantly higher than that in the general population (Hellonenbach, Karatzias & Brown, 2016). This estimate is consistent with UK-based figures on the converse prevalence of ID within the prison population; in a mainstream UK prison, an estimated 7.1% of the population demonstrated IQ scores under 70, with a further 23.6% falling within the borderline range (70-79) (Hayes et al., 2007). This overrepresentation of ID individuals in the justice system corresponds with one of the most cited studies in the field, a cohort study following a population of Swedish individuals for thirty years, which suggested that ID individuals were around three times more likely than the general population to offend, with nearly half of all males and one tenth of all females being registered for a criminal offence within the past 30 years (Hodgins, 1992). This work suggests that individuals diagnosed with ID are at a greater risk of offending relative to the general population.

However, this notion remains fiercely contested: reviewing the pivotal Hodgins (1992) study, Lindsay & Dernevik (2013) note substantial methodological drawbacks which may have contributed to an overestimation of offending prevalence in ID populations. Firstly, they note that the ID classification criterion used in the study, ‘attendance of special classes’, is

methodologically weak by today's standards. This is particularly notable considering the time period; the cohort would have attended high school in the mid 1960's. As inclusion of ID individuals in Swedish schools was sparse throughout the 1960's, it is likely that these individuals would have been segregated from the school community (Ericsson, 1999); this segregation may have influenced later offending. Additionally, review of literature suggests that the individuals attending these classes likely already presented with behavioural issues (Grunewald, 2008). Therefore, it is contended that the cohort in the Hodgins (1992) study is not representative of ID individuals (Lindsay & Dernevik, 2013); the time period and the confounds posed by presumed segregation and pre-existing behavioural problems limit the study's applicability to today's offending behaviours.

Evaluating the prevalence of offending in ID individuals is further complicated by varying definitions of 'intellectual disabilities' and 'criminal offending'. For instance, borderline individuals (Individuals with IQ's of 70-79) are included sporadically, intent is often overlooked, and unreported crime is difficult to quantify (Holland, Clare & Mukhopadhyay, 2002). This resistance to complete quantification, coupled with failures to find any enhanced prevalence of ID in the justice system (Messinger & Apfelberg, 1961, MacEachron, 1979), further calls into question the thesis of enhanced prevalence of offending in ID individuals. Thus, while many studies suggest that individuals with ID offend at a higher rate than the general population the problem may be overemphasised due to the issues described above.

Perhaps of more interest than ID individuals' offending prevalence are their specific patterns of offending. Offenders with ID have been reported to exhibit higher rates of offence-against-person crimes (physical or sexual aggression) relative to non-ID offenders (Asscher, van der Prut & Stams, 2012) – a result consistent with a review suggesting heightened prevalence of sexual offences relative to other types of crime in ID samples (Simpson & Hogg, 2001). Further, aggressive individuals with ID were found to be at a significantly higher risk of reoffending (Holland & Person, 2011) and, when considering sexual offences, to be more likely to demonstrate consistent mild offences towards peers when imprisoned (Brown & Stein, 1997). Thus, it appears that offenders who have ID are more likely to commit person-centred crime, and those who do so are more likely to reoffend.

This link between ID and person-centred crime is particularly interesting when considered in line with the second criterion for ID diagnosis, impaired adaptive/social functioning (Department of Health, 2001). To receive an ID diagnosis individuals must require support with their individual needs and/or social adaption. It is only a minor step to consider that the enhanced prevalence of person-centred crime in ID offenders could, in part, stem from difficulties with social functioning.

A key component of effective social functioning is social cognition. Social cognition refers to an individual's ability to cognitively construct the social world and is necessary for smooth interaction with other individuals. The social information processing framework (SIP) (Crick & Dodge, 1994) breaks down the process of social cognition, and has been employed as a tool for understanding social cognition variances between aggressive and non-aggressive ID individuals (Larkin, Jahoda & MacMahon, 2013). The framework incorporates six stages: encoding of cues, interpretation of cues, goal clarification, response construction, response decision and behavioural enactment (Crick & Dodge, 1994). Within the first and second stages, individuals are hypothesised to generate a mental representation of the situation; cues are recognised, encoded and interpreted. At stage 3, goal clarification, individuals clarify a goal, which serves to orientate actions. After cue interpretation and goal clarification, at stage four, individuals construct multiple behavioural responses that may aid goal pursuit. At the fifth stage, all the generated responses are evaluated and the most appropriate is selected. The final stage, behavioural enactment, executes the chosen response.

Considering the encoding of cues aspect of SIP, one class of social cue proposed to influence aggressive behaviour – and by extension person-centred crime – is emotional signals. It has been suggested that individuals who are less sensitive to emotional cues may be more likely to misinterpret the intentions of others, leading to misunderstanding and making behaviours such as rape or violence more likely (Larkin et al., 2013). Evidence from a non-ID population suggests that offenders who commit person-centred crime are impaired at emotion recognition. For instance, a recent study using static photographed stimuli found both sexual and violent offenders had a decreased ability to recognise fear relative to non-offending controls (Gillespie et al., 2015). Similarly, sex offenders were found to be less accurate than control participants at recognising expressions of anger, disgust, surprise and fear, often

confusing fear with surprise (Gery et al., 2009). These results suggest that emotion recognition deficits may contribute to person-centred offending.

While this emotion recognition-aggression relationship may appear intuitive, a recent meta-analysis reviewing the broader concept of an empathy-aggression relationship offered contradictory findings. The mixed-effects meta-analysis, involving 106 effect sizes, found only a weak relationship ($r=-.11$) between empathy and aggression, calling into question the theoretically appealing empathy-aggression relationship (Vachon, Lynam & Johnson, 2014). However, the authors cite various contributing factors which may interact to dampen the strength of the actual relationship: small group differences in aggression, overuse of self-report measures, and the use of a narrow concept (empathy) to predict a broad concept (aggression). While the idea that empathy and aggression are unrelated must be considered, the analysis does not conclusively reject the existence of an important relationship between these two components. The narrowness of the concept of empathy is particularly relevant when considered within the SIP framework, which suggests that empathy (encoding of cues) is just one component of effective social cognition; some offenders may have intact cue encoding but have deficits further along the pathway.

Facial emotion recognition ability roughly relates to overall developmental level in ID individuals and is thus reduced compared to non-ID controls (Wishart, Cebula, Willis & Pitcairn, 2007). Consequently, the hypothesis that deficits here may underlie aggressive behaviour is particularly attractive in this population; perhaps ID offenders show more severe emotion recognition deficits than non-offending individuals. However, empirical studies have suggested an absence of any relationship between empathy and aggressive behaviour in this population. When subjects were tasked with labelling facial affect, or an actor's emotion in a perspective-taking task, no difference was found between aggressive ID individuals and non-aggressive controls (Jahoda, Pert & Trower, 2006). Correspondingly, self-reported anger did not correlate with facial emotion recognition in a population of ID individuals (Woodcock & Rose, 2007). However, when richer contextual cues (interaction or relevant setting) were provided, aggressive individuals performed poorly relative to controls (Matheson & Jahoda, 2005). Thus, while aggressive individuals display intact emotion recognition in controlled laboratory contexts, their performance may deteriorate when wider contextual cues require interpretation.

However, studies considering intent attribution provide mixed support. Some studies substantiate the hypothesis of an ID-related deficit in interpreting broad contextual cues; aggressive individuals were found to attribute more hostility in socially ambiguous situations (Pert, Jahoda & Squire, 1999). Correspondingly, aggressive individuals were found to attribute enhanced hostility in non-provocative social situations (Basquill et al., 2004). Others conflict with the hypothesis: one study found no significant intent attribution differences between aggressive and non-aggressive males when they were presented with vignettes of problem situations (Fuchs & Benson, 1995), whilst in another study aggressive participants were significantly more accurate in attributing hostile intent to protagonists in clearly hostile situations (Jahoda, Pert & Trower, 2006). Although there is some suggestion of impaired wider cue interpretation in violent offenders, current evidence has yet to achieve a synthetic understanding that would resolve conflicting results.

The third component of SIP is goal clarification, in which individuals generate a goal which serves to orientate actions. Goal clarification research in ID individuals is limited. One study, although not finding a significant difference between aggressive and non-aggressive individuals, found trends for aggressive individuals, relative to their non-aggressive counterparts, to view submissiveness more negatively (Pert & Jahoda, 2008). Therefore, there is a suggestion that aggressive individuals may set a goal relating to 'demonstration of dominance' within social situations.

The fourth component of the SIP framework is response construction, in which behavioural responses are constructed to achieve the chosen social goal. This area, in conjunction with the fifth aspect, response selection, can be considered to reflect an individual's social problem-solving ability. Social problem-solving is defined as the process by which an individual identifies and discovers potential adaptive solutions to stressful social problems (D'Zurilla & Nezu, 1999). If an individual is poor at generating adaptive responses to social conflict they may tend to choose excessive aggression (Dodge, 1986). Therefore, poor social problem-solving ability may contribute to an individual's propensity to commit person-centred crimes.

The Social Problem Solving Inventory (Revised) (SPSI-R) was created to measure differences in individuals' social problem-solving style and ability (D'Zurilla, Nezu, Maydeu-Olivares,

2002). High overall SPSI-R scores indicate effective problem-solving. The measure is separated into five domains: positive problem orientation (PPO), negative problem orientation (NPO), rational problem-solving (RPS), impulsivity style (ICS) and avoidance style (AS). High PPO scores denote effective problem solving, measuring an individual's propensity to appraise a problem as a challenge, believe in their problem-solving ability and commit effort to problem solving. Conversely, high NPO scores indicate lower frustration thresholds, lack of belief in problem-solving ability and viewing problems as significant threats to wellbeing. A rational problem-solving style involves gathering additional information, setting realistic goals and generating many viable solutions. The last two scales reflect maladaptive problem-solving strategies; the ICS relates to use of techniques that are narrow, hurried and incomplete, whereas the AS measures procrastination, inaction and dependency.

Social problem-solving style is a correlate of individual differences in aggression. Low SPSI-R scores correlate with increased aggression and impulsivity in a student population (McMurran, Blair & Egan, 2002), and both prisoners and personality-disordered offenders have elevated NPO, ICS and AS alongside lower RPS relative to this same student sample (McMurran et al., 2005). Adult sexual offenders frequently endorse a negative problem-solving orientation and display higher ICS and AS relative to controls (Nezu et al., 2005). Together these results suggest that poor social problem-solving may contribute to person-centred aggression and offending, at least within non-ID populations.

This relationship is further supported by the demonstrated impact of social problem-solving therapies and interventions on aggression reduction. Social problem-solving therapy concentrates on defining problems, generating solutions and developing consequential thinking (D'Zurilla & Nezu, 1999). A 16-session social problem-solving intervention led to significantly reduced anger expression in a population of personality disordered adults (Hubband et al., 2007). Correspondingly, a study using the 'Reasoning and Rehabilitation ADHD' program (covering emotional control, problem-solving and consequential thinking) to rehabilitate offenders with 'dangerous and severe personality disorders' (with significant ADHD symptom overlap) demonstrated significantly improved problem-solving ability, anger control and emotional stability relative to a 'no-intervention' control group (Young et al., 2013). Together these findings implicate poor social problem solving as an important malleable factor that contributes to person-centred offending.

Shifting focus to individuals with ID, the relationship between offending and reduced social problem-solving becomes less clear. Some studies do suggest a relationship between reduced social problem-solving skills and aggression: ID adults with frequent aggressive behaviour generate a larger number of aggressive responses in problem situations, relative to non-aggressive controls (Basquill et al., 2004). Correspondingly, in ID children, generation of many aggressive responses and poor impulse control are significant mediators of aggression (Van Nieuwenhuijzen et al., 2009). While such studies suggest that impaired social problem-solving may contribute to enhanced person-centred violence, they are not confirmatory of this conclusion. Despite this limit of the theoretical evidence, social problem-solving interventions have been regularly adapted for use in ID offenders (Lindsay et al., 2011, O'Connor, 1996). While these interventions have been successful at increasing social problem-solving skills, without confirmation of a causal role for social problem-solving in ID offending it cannot be concluded that such improvements are likely to reduce reoffending rates.

The present analysis harnesses the SIP framework to identify differences in social cognition between person centred offenders and non-offending controls. The study group consisted of both sexual and violent offenders. While notable differences exist between these groups, including early life experiences (Lindsay et al., 2001) and personality differences (Gudjonsson & Sigurdsson, 2000), important similarities exist. As noted, both crime types are person centred and involve physically harming another individual. Further, the groups display many common risk factors including social disadvantage, mental ill health and poor self-management strategies (Lindsay et al., 2008, Holland, Clare & Mukhopadhyay, 2002). The importance of such similarities is well illustrated in the study group; all participants were recruited from a single unit and were thus seemingly deemed to require similar treatment.

The Awareness of Social Inference Test (TASIT) (McDonald, Flanagan, Rollins & Kinch, 2003) is used to determine differences in the cue encoding and interpretation aspects of SIP. While TASIT was developed and validated for use in populations with traumatic brain injury (TBI), similarities between the two diagnoses warrant trial of the measure in ID individuals. Social cognitive deficits characteristic of ID present in TBI patients, e.g. disinhibited remarks and advances (Osborne-Crowley & McDonald, 2016), reduced emotion recognition (Rosenberg et al., 2014) and impaired theory-of-mind (Bivona et al., 2014).

The measure comprises three components, one measuring emotion recognition and two measuring social inference (minimal and enriched); the social inference minimal (SIM) component of the TASIT provides little external information, while the social inference enriched (SIE) component provides wider contextual cues. Therefore, the measure offers a way of evaluating both emotion recognition and wider contextual cue integration. Drawing from previous research, violent ID offenders would be expected to display intact emotion recognition, alongside similarly intact scores in the SIM domain. However, it may be expected that the offending population would show reduced scores in the SIE domain in particular – reflecting a reduced ability to integrate wider contextual cues in the service of social inference.

Alongside the TASIT, an adapted, easy-read SPSI-R (Lindsay et al., 2011) quantifies differences in social problem-solving style and ability. As discussed, the SPSI-R offers an overall problem-solving score alongside a breakdown of scores into five domains: two problem-solving orientations (Positive and Negative) and three problem-solving styles (Rational, Impulsive and Avoidant). It is hypothesised that offending individuals will display lower overall problem-solving scores, with increased NPO, ICS and AS and reduced PPO and RPS.

Method

Participants

Two groups of mild-moderately intellectually disabled males were recruited. The primary group (N=6), who had committed significant offence-against-person crimes (Sexual assault=3, Serious physical assault = 2, Murder=1), were recruited from a locked rehabilitation unit for ID offenders. Their mean age was 33.5 years (SD = 9.15 years). The control group (N=5) were recruited from the community via liaison with clinical psychologists; these individuals were intellectually disabled but had no forensic history. Their mean age was 33.2 years (SD=12.8 years). The study was approved by the NHS England Health Research Authority, and written informed consent was obtained from all participants, with the aid of graphical narratives to mitigate the obstacle posed by verbal deficits.

Measures

TASIT (McDonald, Flanagan, Rollins & Kinch, 2003): The TASIT, used to assess emotion recognition alongside contextual cue integration, comprises three sections. The first section assesses emotion recognition; participants watch 29 videos (including one practice video) of actors expressing one of seven equally represented emotional states: happy, surprised, neutral, sad, angry, anxious and revolted. After each video participants use a cue card to indicate the emotion displayed. The possible scores achievable ranged from 0 to 28.

The second component is social inference (minimal); here participants watch 16 short (20-60 second) videos (including one practice video) depicting a dialogue and are required to determine the speakers' meaning based on emotional expression and other paralinguistic cues alone; no additional external information is provided. The videos cover two broad exchange types: sincere, and sarcastic (both simple and paradoxical sarcasm). Simple sarcastic exchanges can be identified incorrectly as sincere unless paralinguistic cues are correctly interpreted. Conversely, paradoxical exchanges are nonsensical unless the dialogue

is understood as sarcasm. Each exchange type is represented equally. After each video individuals answer four questions targeting understanding of what the actor was: doing, saying, thinking and feeling. Each question can be answered: yes, no or don't know. The maximum score is 60.

The third component, social inference (Enriched) comprises 17 short (15-60 seconds) videos (including one practice video) depicting actors in everyday situations. In every scene one actor is saying something that they do not believe; in half the scenes, the actor is attempting to conceal their true feelings whilst in the other half the actor is using sarcasm to deliberately make their disbelief clear. Again, after each scene the participant must answer four questions targeting understanding of what the actor was: doing, saying, thinking and feeling. Each question can be answered: yes, no or don't know. The maximum score is 64.

The scales' psychometric properties including reliability and validity have been established in populations with TBI and neurotypical controls (McDonald, Flanagan, Rollins & Kinch, 2003).

SPSI-R (D'Zurilla, Nezu, Maydeu-Olivares, 2002) A revised version of the SPSI-R, adapted and validated for use in ID individuals (Lindsay et al., 2011) measures social problem-solving ability and style. The revised version retains the structure and themes of the original, however the language is simplified.

The scale consists of 25 items answered on a scale of 0-4 (0=Not at all like me, 1=Slightly true of me, 2=Moderately true of me, 3=Very true of me, 4=Extremely like me). Each of the five subscales is targeted by five questions. To determine the score for the NPO, ICS and AS scales, scores are subtracted from 20 and divided by five to obtain a raw score. The PPO and RPS scores are divided by five to obtain the raw scores. Summation of all the scores gives the total raw score which is then normed for age.

Wechsler Adult Intelligence Scale IV (WAIS-IV) (Wechsler, 2014): The WAIS-IV is a cognitive battery used to estimate an individual's intelligence quotient. The measure has ten core subtests, which make up four index scores; verbal comprehension (VCI), perceptual reasoning (PRI), working memory index (WMI) and the processing speed index (PSI). The VCI measures verbal reasoning, verbal concept formation and acquired knowledge. The PRI measures perceptual reasoning, spatial processing and visuo-motor integration. The WMI measures information retention, operation and manipulation. Finally, the PSI measures

mental and hand/eye coordination. An overall score of 70 or below is the cut-off point for intellectual disability diagnosis.

Procedure

Offending population – Initial meetings within a locked rehabilitation unit were arranged with each participant; here informed consent was obtained with the option of consenting to a repeat WAIS-IV if one had not been completed within five years. Participants were read the instructions from the original SPSI-R but advised that the questions would instead be read to them. A visual response aid in the form of a bar chart was used to aid response. The bar chart gradually increased to indicate an increasing amount of likeness. The bars indicating ‘like the participant’ consisted of thumbs-up symbols, those indicating ‘not like the participant’ consisted of thumbs-down.

On finishing the SPSI-R the participant was thanked and a second session was organised for TASIT administration. The TASIT was completed over three weekly sessions; in the first session, the emotion recognition component was administered, in the second the SIM and in the third the SIE. If the individual had consented to, and required, a repeat WAIS-IV then this was administered in a separate session by a consultant clinical psychologist. For all sessions individuals were assessed on the unit alone with the experimenter. On completion, the individuals were thanked for participating and told that feedback would be available once the study was complete.

Control population – The administration procedure for the control population mirrored that of the offending group, except for a few key differences. Location was not consistent between participants; three individuals were tested in a therapy centre and two in their place of residence. However, a private, quiet room was used on all occasions. For all but one participant the measures were administered in one sitting.

Results

Across all analyses, Shapiro-Wilk was used to verify normality in the relevant variables ($p>0.05$) and sphericity was confirmed where appropriate using Mauchley's test ($p>0.05$); any instances where these assumptions were not verified are reported. Two-tailed significance values are reported for all hypothesis tests.

A mixed ANOVA contrasted TASIT emotion evaluation scores between groups and across the seven emotion domains (Happy, Surprised, Neutral, Sad, Angry, Anxious and Disgusted). In this initial analysis, the variables happy, $W(11)=0.733$, $p=0.001$, and angry, $W(11)=0.830$, $p=0.023$ were distributed significantly non-normally ($p<0.05$); therefore, care should be taken when extrapolating related results outside the sample. Examining the main effect of offending, no significant difference in overall emotion recognition scores between offenders ($M=15.5$) and non-offenders ($M=16.8$) was present, $F(1,9)=0.621$, $p=0.621$. However, a trend towards interaction between offender status and emotion type was observed $F(6, 54) =$

2.077, $p=0.071$. Consequently, post-hoc independent-samples t-tests were performed to attempt to identify where differences between groups might exist. T-tests revealed no significant difference between the offending and non-offending groups for all emotions ($p>0.05$) except 'anxious', $t(9)=-3.191$, $p=0.011$; offenders ($M=1.5$) were observed to have significantly reduced anxiety recognition relative to non-offending controls ($M=3.4$) (Figure 1).

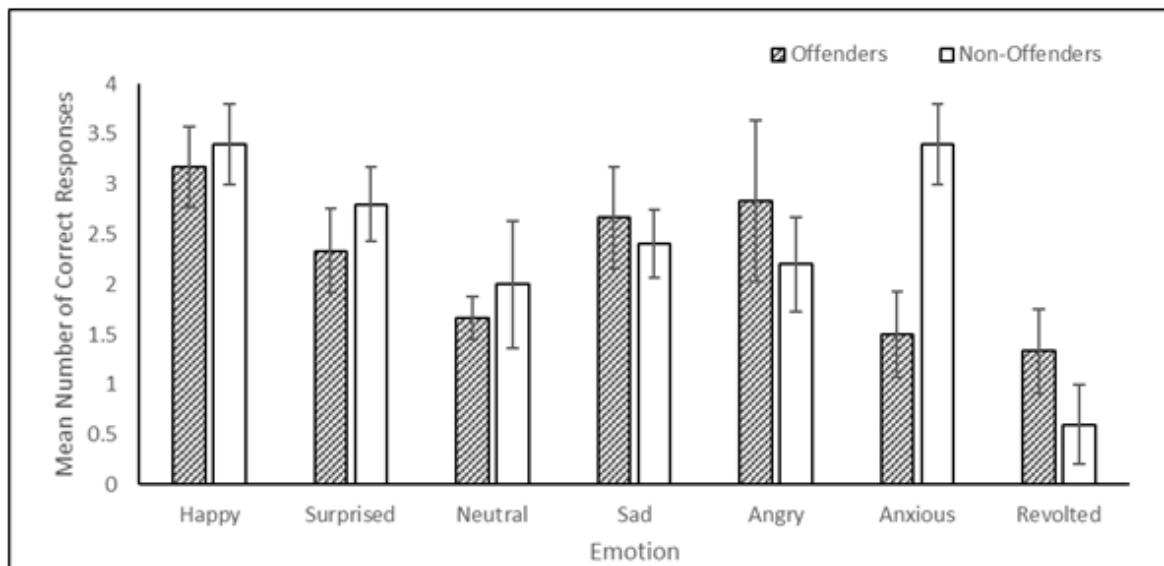


Figure 1. Comparison of Correct Responses for TASIT emotion evaluation component.

Post hoc, specific misidentifications of anxious emotions were examined. The frequency of each incorrect emotion label was distributed significantly differently from normality ($p<0.05$); consequently, Mann-Whitney U tests were used to examine differences amongst these frequencies. Bonferroni-Holm correction was applied to account for multiple comparisons; adjusted significance values are reported. There were no significant differences in the frequency of each response selection for all misperceived emotions ($p<0.05$). However, marginal significance was observed for surprise, suggesting that offenders ($M=1.5$) could be more likely to misperceive surprise in place of anxiety relative to non-offender controls ($M=0$), $U=2.5$, $p=0.085$ (Figure 2).

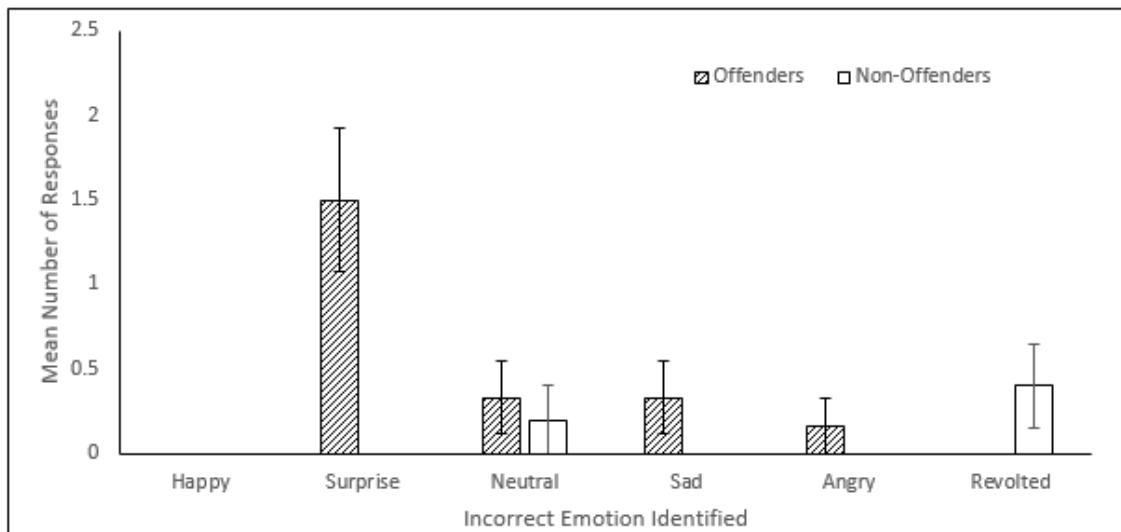


Figure 2. Anxiety misinterpretations for TASIT emotion evaluation test.

A repeated-measures ANOVA contrasted TASIT SIM scores between groups, across the four social inference domains (doing, saying, thinking and feeling). For the variable saying, Shapiro-Wilk indicated a non-normal distribution, $W(11)=0.850$, $p=0.043$; therefore extrapolation of related results beyond the sample should be done cautiously.

Examining the main effect of offending, there was no significant difference in SIM scores between offenders ($M=35.67$) and non-offenders ($M=40.4$), $F(1,9)=1.509$, $p=0.251$. However, a significant interaction between offender and social inference type was observed $F(3, 27) = 3.664$, $p=0.025$. Post-hoc independent samples t-tests revealed no significant group differences for all types of social inference ($p>0.05$) except ‘feeling’, $t(9)=-2.948$, $p=0.031$; offenders ($M=8.67$) were observed to have significantly reduced social inference ability in the feeling domain relative to non-offending controls ($M=11.6$) (Figure 3).

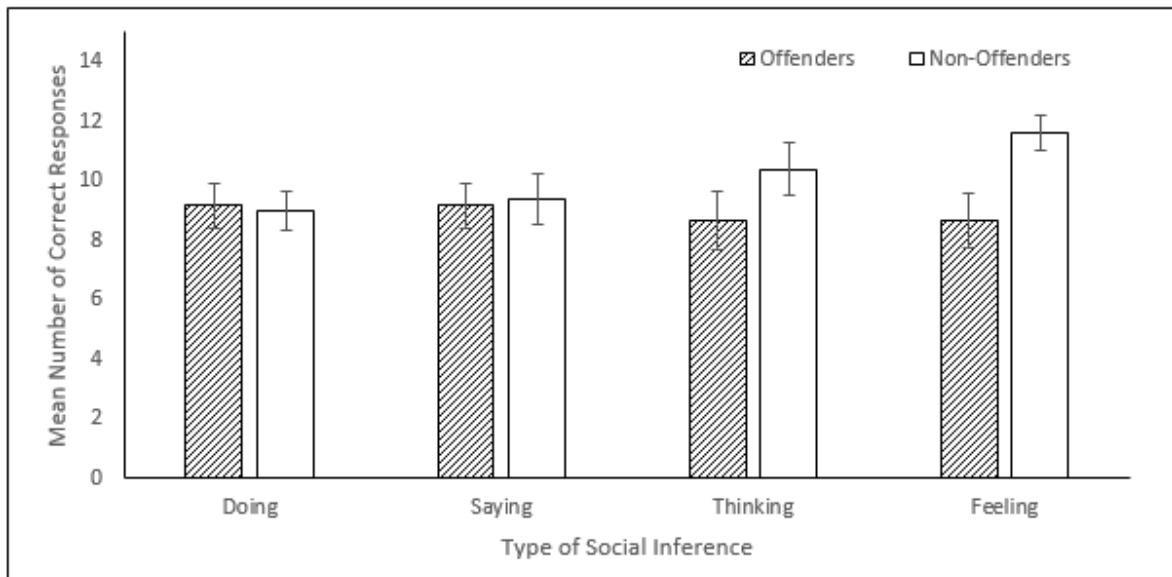


Figure 3. Comparison of social inference (minimal) scores across the four TASIT domains.

Another repeated-measures ANOVA contrasted TASIT SIE scores between groups and across the four specific types of social inference (doing, saying, thinking and feeling). Shapiro-Wilk indicated deviation from normality in the thinking domain, $W(11)=0.789$, $p=0.007$, but in any case no significant main effects or interactions were observed ($p>0.05$). To determine how strongly the results refute the hypothesis, a Bayes factor was calculated for overall SIE scores and the four specific types of social inference enriched (Dienes, 2014). Because published statistical data on TASIT scores in intellectually disabled populations are limited, statistical power was estimated using results from TASIT administration in psychotic individuals (Green et al., 2012, Bliksted et al., 2014). The Bayes factor (Table 1) indicated very strong evidence for the null hypothesis overall, $BF_{01}=0.0433$. Within specific domains, the null was supported in 'doing', $BF_{01}=0.2$, but evidence was inconclusive for 'thinking', 'saying' and 'feeling'.

Table 1

Bayes Factor Breakdown for Each Domain of the SIE.

Domain	BF_{01}	Null likelihood
Overall	0.043	23.26
Doing	0.200	5.00
Saying	1.170	0.85
Thinking	1.780	0.56
Feeling	0.410	2.44

Note. The ‘Null Likelihood’ indicates how many times more likely the observed results were to occur under the null hypothesis relative to the theory hypothesis.

For the SPSI-R data an independent-samples t-test contrasted total adjusted problem-solving scores between groups. Homogeneity of variance was confirmed using Levene’s test, $F(11)=0.496$, $p=0.499$. Offenders ($M=90$) scored significantly higher than non-offenders ($M=71.2$) on total adjusted problem-solving scores, $t(9)=2.527$, $p=0.032$ (Figure 4).

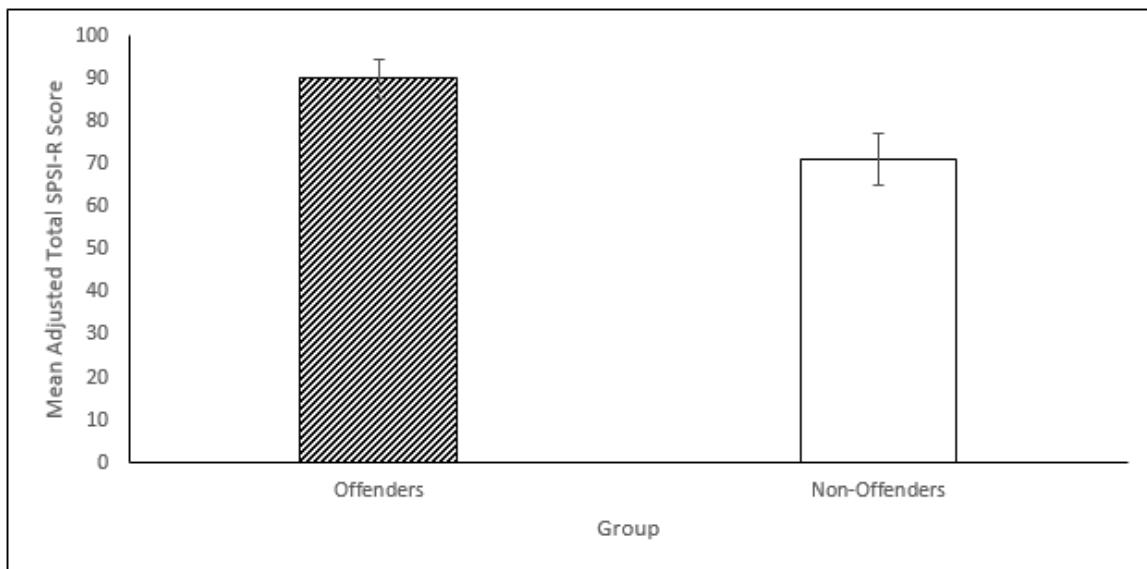


Figure 4. Comparison of Adjusted Total SPSI-R Scores.

Post hoc analysis was conducted on each of the distinct problem-solving domains (PPO, NPO, RPS, IPS and APS). Levene’s test confirmed homogeneity of variance in all domains ($p>0.05$) except IPS $F(11)=24.287$, $p=0.001$; therefore equal variances were not assumed in this domain. Bonferroni-Holm correction was applied to account for multiple comparisons; corrected probabilities are reported. No significant group differences were observed in any domain ($p>0.05$). However, there was a trend in the APS domain, offenders ($M=107.66$) tending to score lower than non-offenders ($M=131$), $t(9)=-2.762$, $p=0.11$ (Figure 5).

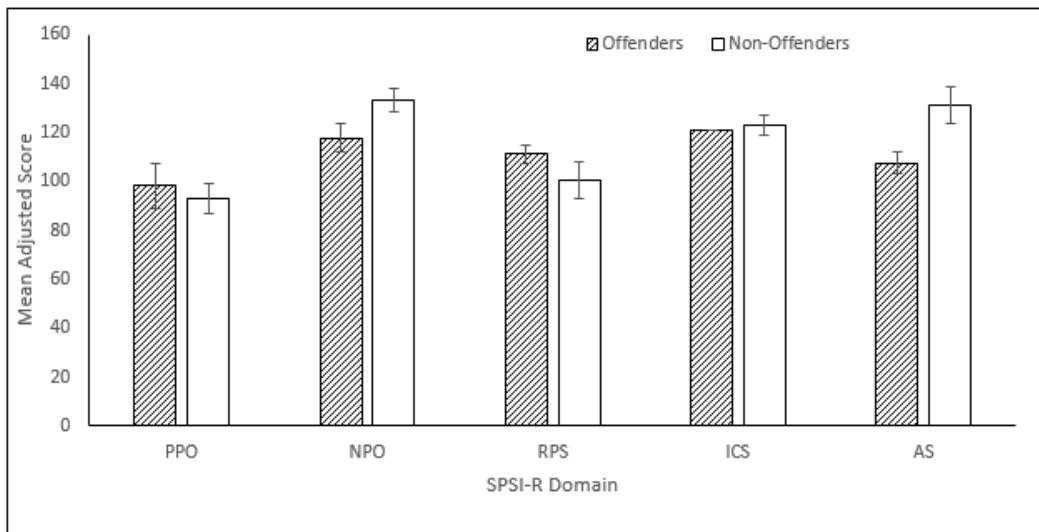


Figure 5. Comparison of SPSI-R Scores by Domain.

Lastly the influence of IQ on the various analysed domains was examined; ANCOVA was deemed inappropriate as two control participants had refused consent for WAIS-IV administration and the small sample size precluded imputation. Instead, using the reduced sample ($N=9$) full-scale IQ and the four IQ subscales were correlated with scores on the three components of the TASIT and with adjusted SPSI-R scores. A significant positive relationship was observed between the verbal comprehension subscale and the SIM domain, $r(9)=0.678$, $p=0.045$. No other significant relationships were observed ($p>0.05$).

Discussion

The TASIT results support the thesis of no overall differences in emotion recognition ability between offenders and non-offending controls. However, interaction effects suggest that offenders may be less able to recognise anxious emotions relative to controls, tending instead to misidentify anxiety as surprise. Further, contrary to hypothesis, the results demonstrate no significant difference in overall social inference ability between ID offenders and non-offending controls; the absence of a significant difference was found in both the minimal social inference condition and the enriched condition, where wider contextual cues were present. However, interaction effects revealed that offenders were significantly worse at identifying feeling in the absence of broader contextual cues.

Perhaps surprisingly, the SPSI-R results contradicted the study hypothesis, finding that offenders had increased problem-solving scores relative to non-offending controls. Offenders' lower AS scores suggested that they might be somewhat more proactive in dealing with social problems, although this difference was not significant. Finally, correlational analysis demonstrated a significant positive relationship between the verbal comprehension and social inference (minimal). No other significant relationships were observed.

Results from the emotion evaluation component of the TASIT are broadly consistent with previous studies of emotional cue recognition in ID; like the current study, both Woodcock & Rose (2007) and Matheson & Jahoda (2005) found no relationship between aggression and overall emotion recognition ability. The current study has the advantage of clear objective criteria (presence or absence of a person-centred offence) for separating the two groups, adding strength to this conclusion. Further, the use of an offending sample moves this research closer toward similar research in populations of non-impaired offenders. The results offer support for the extrapolation of the findings from the Vachon, Lynam & Johnson (2014) meta-analysis to offenders with intellectual disabilities, as no significant difference in overall empathic ability was identified. Therefore, at face value the study supports the premise that the encoding of cues aspect of the social information processing framework (Crick & Dodge, 1994) remains largely intact in ID offenders.

However, interaction effects demonstrated reduced ability to identify anxious emotion in ID offenders relative to non-offending ID controls. Here, it is important to consider the TASIT administration manual's definition of 'anxious': 'anything from feeling very worried about something, right up to feeling fearful or scared about something'. This reference to fear is important as research in non-impaired person-centred offenders consistently finds that offenders show reduced fear recognition relative to non-offending populations (Marsh & Blair, 2008, Gillespie et al., 2015, Gery et al., 2009). The *post hoc* analysis in which surprise was identified as offenders' most common anxiety-misinterpretation also corresponds with research in non-disabled offenders (Gery et al., 2009). Therefore, while the cue encoding aspect of the social information processing framework appears to remain relatively intact in ID offenders, a specific deficit in fear and anxiety processing may be present as observed in neuro-typical offenders.

Although the current study cannot overtly explain the origin of this fear insensitivity or directly illuminate its relationship with enhanced person-centred violence, the results may correspond with the violence inhibition of mechanisms model (VIMM) (Blair, 2001). The VIMM suggests that human distress (fear or anxiety) is a submission cue which, when witnessed by an aggressor, leads to enhanced autonomic activity and subsequent freezing or backing down. However, appropriate application of this response is hypothesised to rely on effective moral socialisation; here VIM system activation is paired with representations of moral transgressions and associated distress. Subsequently, disruption of this process through poor moral socialisation blunts this response, leading to reduced withdrawal likelihood (Blair, 1995, 2001). VIMM offers an explanation of how reduced anxiety recognition may lead to enhanced person-centred violence. Further, it suggests that this decreased anxiety sensitivity could stem from poor moral socialisation; anecdotally this is supported as the offending group all experienced traumatic upbringings. However, the absence of a detailed life history for the control group makes contrast and thus confirmation of this hypothesis impossible.

The lack of significant group differences in overall SIM and SIE scores suggests that offenders have relatively intact social inference ability. This observed lack of significance in the SIE domain, alongside a small Bayes factor, argues against the hypothesis that offenders lack ability to integrate wider contextual cues. Consequently, the present study cannot offer support to studies finding that aggressive ID individuals show deficits in their ability to integrate wider contextual cues in general (Matheson & Jahoda, 2005) or those suggesting that they are less able to determine social intent (Basquill et al., 2004, Jahoda, Pert & Trower, 2006). Instead, the observed group similarity suggests that the SIP cue interpretation aspect remains relatively intact in ID offenders (Crick & Dodge, 1994).

That noted, offenders did show reduced scores in the SIM ‘feeling’ domain, suggesting that in the absence of wider contextual cues they have a reduced ability to use paralinguistic cues to inform feeling identification. Considering this result in conjunction with offenders’ reduced anxiety recognition abilities, it could be suggested that this detriment in feeling inference might stem from subtle deficits in identifying the underlying emotional response, rather than from wider deficits in their ability to successfully integrate speech-based cues. To extend this line of thinking, the lack of group differences in the SIE ‘feeling’ domain suggests

that ID offenders show intact feeling recognition when wider contextual cues are present. Thus, it could be inferred that when attempting to determine emotional response offenders place a greater emphasis on external cues. However, Bayesian analysis does not conclusively reject group differences in the SIE feeling domain.

Rather than intact feeling inference in cue-heavy environments, the comparable SIE feeling scores could instead reflect a false negative driven by methodological limitations. While the offending group were assessed on each TASIT component in individual sessions, the control group on all but one occasion were assessed in a single sitting. Given that individuals with intellectual disabilities typically display reduced attentional capacities (Tarver & Hallahan, 1974, Bradley & Isaacs, 2006) and that the SIE component was the last measure to be administered, it may be that control scores were reduced by attentional effects.

Unfortunately, this was an unavoidable practical constraint; the research was time-limited meaning multiple sessions for control participants were impossible to organise. While the control group were offered breaks at multiple points throughout the study, studies attempting to replicate and to extend this work should closely match administration procedures to minimise the potential confound of attentional load.

Additionally, the positive correlation between verbal comprehension and SIM suggests that the reduced SIM feeling scores in offenders could stem from reduced verbal comprehension. Regrettably, the absence of IQ scores for two control participants meant inclusion of IQ as a covariate was impracticable; therefore, it is impossible to determine what proportion of group SIM score difference can be accounted for by verbal comprehension. This relationship with verbal comprehension also calls into question the validity of the TASIT for determining social inference ability in ID individuals. While it was felt the many similarities between ID and TBI warranted trial of the TASIT in ID, key population differences do exist. Notably, ID individuals experience profound neurological deficits throughout their school years, limiting their engagement with education (Department of Health, 2001). Consequently, ID individuals likely show greater impairment in skills relying on educational engagement – such as verbal comprehension. This drawback is indicative of a wider difficulty: assessing social cognition whilst minimising the confounding impact of verbal skills. Future studies should attempt to adapt the measure to minimise the potential confound of verbal comprehension; simplified language and utilisation of visual aids have been shown to

increase psychometric validity in ID populations (Hartley & Maclean, 2006, Bailey, Willner & Dymond, 2011).

The significantly greater SPSI-R scores in the offending group directly contradicted the study hypothesis, conflicting with previous results in both aggressive ID individuals (Basquill et al., 2004, Van Nieuwenhuijzen et al., 2009) and non-impaired offenders (McMurran et al., 2005, Nezu et al., 2005) which consistently find a relationship between reduced social problem-solving and aggressive behaviour. Instead, the study suggests that ID offenders – at least in this sample exposed to rehabilitative treatment - demonstrate an enhanced ability to solve problems in social situations; in the context of the SIP framework this result suggests that offenders are better able to construct and select goal-orientated responses when making social decisions.

Intuitively the reduced cognitive capacities in ID individuals lend themselves to the assumption that violent behaviour is predominantly reactive. However, enhanced social problem-solving appears to suggest that ID violent offenders possess a relatively enhanced ability to rationalise, plan and therefore manipulate; characteristics that are consistently shown to relate to psychopathy and proactive aggression in non-disabled populations (Tulloch, 2010, Dodge et al., 1997, Sutton, Smith & Swettenham, 1999). Thus, operationalising all aggressive behaviour in ID populations as purely reactive may underplay the role of proactive aggression; in conjunction with a violent goal, strong social problem-solving ability may enhance an individual's ability to systematically plan and execute violent actions.

Alternatively, these results could merely suggest that social problem-solving plays a negligible role in ID offending. As noted by Lindsay et al. (2011), previous research into social-problem solving in ID offenders is limited and inconsistent. Nevertheless, social problem-solving interventions are regularly translated from non-ID populations for use in ID offenders (Lindsay et al., 2011, O'Connor, 1996). The assumption here is that the same processes underpin offending in both populations. Given the array of differences between ID and neurotypical populations, this direct translation of ideas seems simplistic; subtly different processes likely underpin offending in ID populations. In particular, complex

cognitive processes may play less of a direct role in ID offending given that cognitive capacity is reduced overall.

These results suggest that clinicians working to reduce offending behaviour in ID populations should avoid simplifying and reapplying complex social-cognitive interventions designed for neuro-typical populations. Instead, or in addition, therapeutic input would be better targeted at more basic processes of emotion recognition such as fear perception. Micro-expression training appears to target such a deficit, here commonly confused expressions are presented and the subtle differences between them are explained. Participants are then tasked to label the explored emotions using the feedback provided (Ekman, 2003). Such training has been demonstrated to improve emotion recognition in populations diagnosed with schizophrenia (Russell, Chu & Phillips, 2006) and in medical students (Endres & Laidlaw, 2009). Any such specific recommendations are made cautiously; above all, this finding emphasises the need for in-depth examination of the causal factors in ID offending. Such research would enable clear identification of the underlying processes in ID offending, facilitating the creation of targeted interventions and subsequently reducing reliance on ill-fitting translations of interventions originally developed for non-impaired individuals.

All conclusions and inferences are tentative as, alongside a notably small sample, SPSI-R scores in the offender group were still considerably lower than non-disabled control norms (D'Zurilla, Nezu, Maydeu-Olivares, 2002). Increased SPSI-R scores could instead reflect the success of intensive social problem-solving rehabilitation efforts, which are common in forensic rehabilitation units (Robertson, Barnao & Ward, 2011); these improvements may be amplified by the highly artificial environment common to both rehabilitation unit practice and psychological testing. If heightened SPSI-R scores are a result of treatment focus the results could instead be interpreted to suggest that the area is an effective malleable treatment target. The absence of pre-treatment baseline measures means that these alternatives cannot be differentiated by the current results.

The counterintuitive SPSI-R differences could in part stem from the fact that controls were recruited via community psychologists and were thus known to mental health services. This possibility is particularly noteworthy given that the largest SPSI-R sub-domain difference appeared in the AS scale, which measures procrastination, diversion of responsibility and

reliance on others (D'Zurilla, Nezu, Maydeu-Olivares, 2002). Such tendencies are associated with increased mental health concerns; for instance, self-reported procrastination is associated with a higher incidence of mental health problems in undergraduates (Stead, Shanahan & Neufeld, 2010). Similarly, low-self-esteem and irrational beliefs correlate with student procrastination (Beswick, Rothblum & Mann, 1988). This observed relationship between avoidant-type traits and mental health concerns suggests that avoidant problem-solving style is likely over-represented in individuals who receive psychological input. Thus, the observed group difference may be at least in part a function of the control population used. Ideally future research should seek to access pre-treatment offenders to eliminate potential treatment confounds. Simultaneously, control groups are better drawn from populations with no history of mental health problems to ensure they accurately represent non-offending ID individuals.

The present study applied aspects of the SIP framework to identify where deficits in social-cognition exist in ID offenders. The long-term aim was to inform the development of novel treatments targeted on identified areas of difficulty. The results, pending confirmation, suggest that (ID orientated) social cognition rehabilitation approaches might benefit from incorporating focus on fear-orientated emotion recognition, alongside structured work on paralinguistic identification of feelings. Results from the SPSI-R component admit multiple interpretations, making it difficult to draw definite conclusions. However, there is a suggestion that complex cognitive processes such as social problem-solving may be less important in ID populations, relative to non-ID offenders. Therefore, the study outlines the need for increased research into the factors underlying ID offending, to inform construction of targeted interventions; such research is best conducted with pre-treatment offenders to minimise extraneous variables.

Overall, research into the social cognition profiles in offenders with intellectual disabilities remains in its infancy. However, themes appearing in previous research are for the most part reinforced by the differences observed in the current study: focus on specific aspects of social cognition provides a promising avenue for enhancing understanding of offending behaviours in this unique population, and for developing effective treatments. Simultaneously, variation in social cognitive ability between offenders and non-offending controls, regardless of direction, suggests that the domain warrants focus in rehabilitation

efforts. However, the study highlights the lack of baseline and outcome measures in current service provision, making rehabilitation attempts difficult to evaluate and comparisons with other populations difficult to draw. Both for direct benefit to individual patients and for indirect benefit via basic and applied research, services should aim to measure patient progress objectively and quantitatively.

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