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External locus of control and cognitive ability independently distinguish men in prison from community living non-offending men

Maria Isabel Fontao[1] | **Thomas Ross**[2,3]

[1]Department of Psychology, University of Konstanz, Konstanz, Germany

[2]Department of Forensic Psychiatry, Reichenau Psychiatric Centre - Forensic Psychiatry, Reichenau, Germany

[3]Department of Psychosomatic Medicine and Psychotherapy, Ulm University - Medical Faculty, Ulm, Germany

Correspondence

Maria Isabel Fontao, Department of Psychology, University of Konstanz, Konstanz, Germany.
Email: maria.fontao@uni-konstanz.de

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Abstract

Background: The ability to cope with failure and subsequent feedback is crucial for prisoner rehabilitation. Impaired executive function in prisoners, high trait aggression and external locus of control can undermine the capacity to react to feedback in socially adaptive ways.

Aim: To investigate the relationships between aggression, locus of control, and attribution in an experimental task involving feedback about failure and success.

Methods: Two groups were compared: 1. Imprisoned men, 2. Community living men without a history of incarceration. Aggression, locus of control and reasoning ability were assessed by means of psychometric instruments. An experimental task building on cognitive ability and providing performance-related feedback was carried out. Attributions of failure and success were measured using an ad hoc rating scale.

Results: Prisoners reported higher levels of aggression and generalised externality, but poorer reasoning ability than the comparison group. Aggression was associated with external locus of control. In the experimental task, the community group showed higher success rates; higher scores on the task were correlated with less external attribution of own performance. Higher external locus of control and lower reasoning

ability were independently associated with being a prisoner in a logistic regression model.

Conclusions and Implications: Men in prison were characterised by greater social and fatalistic externality paired with lower reasoning ability than never incarcerated community men. In-prison rehabilitation strategies should pay early attention to improving reasoning ability and enabling men to recognise likely overuse of externally attributing their difficulties to fate, then helping them to become more realistic in their attributions and make use of realistic feedback.

KEYWORDS
aggression, attribution of success and failure, locus of control, offender rehabilitation, task performance

1 | INTRODUCTION

Deficits in executive cognitive function play a central role in self-regulation and are crucial for the understanding of criminal behaviour. Specific executive dysfunctions have been found to be associated with both violent and non-violent offending in general prison populations (Hancock, Tapscott & Hoaken, 2010; Meijers et al., 2017). In aggressive or violent individuals, impaired cognition and deficits in social cognition, such as poor planning ability, mental inflexibility or rigidity, low verbal intelligence and attentional deficits have been linked to impaired ability to cope with internal or external stressors. This may ultimately lead to excessively aggressive behaviour or violence (Elliott & Mirsky, 2002). These relationships are supported by findings in non-clinical populations (Holley et al., 2017). Executive behavioural competencies have been linked to trait hostility, aggressive behaviour and symptoms of conduct disorder prior to age 15 years (King et al., 2018; Iselin, McVey & Ehatt, 2016; Verhoef et al., 2019).

The effect of feedback and the role of impaired feedback-processing have been examined in experimental studies investigating the link between cognitive dysfunction and aggression. In a study using the Taylor Aggression Paradigm, a task simulating real situations of social interactions to elicit aggressive behaviour and negative emotions, adolescents with a history of violent behaviour showed higher reactive and proactive aggression as well as higher impulsivity than the controls when confronted with negative (emotional) feedback. Evidence was also found for impaired regulation of negative affect and inhibitory control in comparison with control participants (Chen, Chiou & Ko, 2018). Deficits in cognitive flexibility (set-shifting) and impaired feedback-processing have been advanced to explain the persistent pattern of aggressive behaviour among young male prisoners, despite negative consequences of the aggression apparent to others (e.g., Vilà-Balló et al., 2015). The way prisoners attribute failure and success following feedback about their own performance has not yet, however, been clarified. In particular, it is not known how these attributions relate to trait aggression, locus of control or reasoning ability.

Our aim for this study was to investigate the relationships between aggression, locus of control, reasoning ability and attribution using an experimental design that involved cognitive performance and feedback about failure and success.

The following hypotheses were tested:

(1) compared with never incarcerated men, prisoners' self-reported aggression will be higher, locus of control more external and reasoning ability lower;

(2) in the experimental task, the prisoner group will have poorer performance, that is fewer correct answers than the never incarcerated men, especially in the high difficulty tasks;
(3) the prisoners will exhibit a stronger tendency than never incarcerated men to attribute their performance in the experimental task to external factors;
(4) aggression, locus of control, reasoning ability, performance in the experimental task, and attribution of failure and success in the experimental task will differ between the two groups.

2 | METHODS

2.1 | Ethics

The study was approved by the Ethics Committee of Ulm University. All participants were informed about the aims and procedure of the study, and written informed consent was obtained from each. The principles for ethical conduct in research, outlined by the German Psychological Association, were applied in all aspects of this study.

2.2 | Participants and procedure

The inclusion criteria for both samples were: (1) male gender, (2) fluency in German language, (3) German nationality; in addition, the community comparison group had never been incarcerated. The prisoners were all sentenced men recruited from one correctional facility in South West Germany, housing about 450 sentenced men. To ensure that all prisoners were aware of the study, relevant information was disseminated through written notices in communal areas and by prison staff. The community sample was recruited in two South West German cities by means of announcement boards in the premises of public offices and through word of mouth. We calculated that the sample size needed to attain medium effect size — with an alpha of 0.05 and 90% power, the sample size needed would be 116 (Hemmerich, 2019).

Data collection took place in three steps: Step 1, sociodemographic and criminal history data were recorded using a purpose-designed questionnaire; Step 2, the psychometric instruments were administered; Step 3, the experimental task was conducted.

All rating scales and assessments were carried out by members of the project team who were trained for this purpose.

The prison sample was tested in prison; the experiment was conducted in private under supervision of a researcher or a research assistant; the questionnaires were filled out in a classroom setting, again under supervision of a researcher or a research assistant. The community sample was studied in public premises with a private room suitable for an experimental study, again with only a researcher or research assistant present during the experiment, and the self-assessment. Thus, as far as possible, the study conditions of the two groups did not differ.

2.3 | Instruments

Aggression was assessed using the German version of the Buss and Perry Aggression Questionnaire (Buss & Perry, 1992). The instrument measures trait aggression and four aggression sub-traits: 1. physical and 2. verbal aggression, which include hurting and harming others, and relate to the motor or instrumental component of behaviour; 3. anger, the affective component of aggression; 4. hostility, involving feelings of ill will and injustice, and the particularly cognitive component of behaviour. For the German version, Cronbach's Alpha ranges from 0.62 to 0.88 (von Collani & Werner, 2005).

Locus of control. The Inventory for the Measurement of Self-Efficacy and Externality (I-SEE; Krampen, 1991) measures competence and contingency expectations over different life events and experiences. Primary scales refer to the generalised self-concept of one's own abilities (SK) and aspects of generalised control beliefs: internality (I), social externality (P), and fatalistic externality (C). On the secondary level of measurement, the primary scales are combined to form scales assessing self-efficacy (SKI = SK + I) and generalised externality in locus of control (PC = P + C). The test-retest reliability varies between $r = 0.63$ and $r = 0.74$ for an interval of six months. The internal consistency of the scales (Cronbach's Alpha) varies between 0.70 and 0.89 (Krampen, 1991). Examples of items for social externality (P) are: 'My life essentially depends on other people', 'I have little chances to protect my interests against other people'. Examples of items for fatalistic externality (C) are: 'Whether or not I have an accident is a matter of luck (or bad luck), "Planning ahead is no good for me, I am doomed anyway"'.

Reasoning ability was measured using Subtest 3 of the System for Performance Testing (LPS; Horn, 1983), which is a German intelligence test based on Thurstone's primary mental abilities. In Subtest 3, one of the eight characters in each line contradicts an underlying rule; the rule has to be identified and the wrong character crossed out. Subtest 3 draws on Raven's Progressive Matrices and is highly associated with mathematics grades ($r = 0.80$). The test-retest reliability is rtt ≥ 0.90 for all scales; the convergent validity is $r = 0.86$. Further correlations and factor analyses support the factor structure of the test battery (Horn, 1983, pp. 19–27).

2.3.1 | Experimental stimuli

The experimental paradigm is a modified version of the classical mental rotation task designed by Shepard and Metzler (1971), adapted by Fladung et al. (2010). Consecutive trials started with a fixation cross in the middle of a computer screen (2500 milliseconds [ms]). The cross was followed by an object on the left side and a transformed version of the same object on the right side, either rotated (1), or rotated and mirrored (2700 ms; Figure 1). Participants were asked to decide whether the object on the left side could be transformed through rotation to the object on the right side or not (because it was additionally mirrored); they responded using two response keys of the keyboard (arrow down: yes, or arrow up: no). The time frame for delivering the response was 3900 ms. Responses outside this frame were counted as errors. The responses were timed, meaning that participants were performing under time pressure. After expiration of the response window, a visual and auditory feedback was presented for 3000 ms, and the next trial started after 50 ms. Visual feedback stimuli were presented for correct (face icon ☺ or icon 👍) and incorrect trials (face icon ☹ or icon 👎). Auditory feedback was given simultaneously ('Great! That was correct!' or 'Oh dear! That was wrong!'). Eight sentences for correct reactions and eight sentences for incorrect reactions were spoken each by a male and a female voice and brought into equal length. Visual stimuli, sentences and male and female voices were balanced. Task difficulty was varied by changing the rotation angle of the reference stimulus from 20° to 180° in steps of 20° and by using two- and three-dimensional stimulus objects. Time and error rate for the mental rotation of an object rises with increasing the rotation angle (Shepard & Metzler, 1971), and three dimensional objects are more difficult to rotate than two-dimensional objects. There was a total of 128 rotation tasks presented in three difficulty levels (low, moderate, high). The trials were assigned to blocks of difficulty levels comprising 16 trials each. There were three blocks of low and moderate and two blocks of high difficulty level (eight blocks in total), run in three sessions. Within each session, blocks were presented with increasing level of difficulty (low, moderate, high) to increase stress and the likelihood of failure. Performance feedback was given after each trial (Fladung et al., 2010). Subjects were not informed about the increasing difficulty of the task, but remuneration depended on the percentage of hits per session, regardless of difficulty.

All participants received a minimum of 15 Euros, but earnings increased up to 20 Euros for correct responses ≥ 85%. The purpose of paying more for more correct responses was to boost the effect of performance feedback by encouraging the participants to try hard and do their very best.

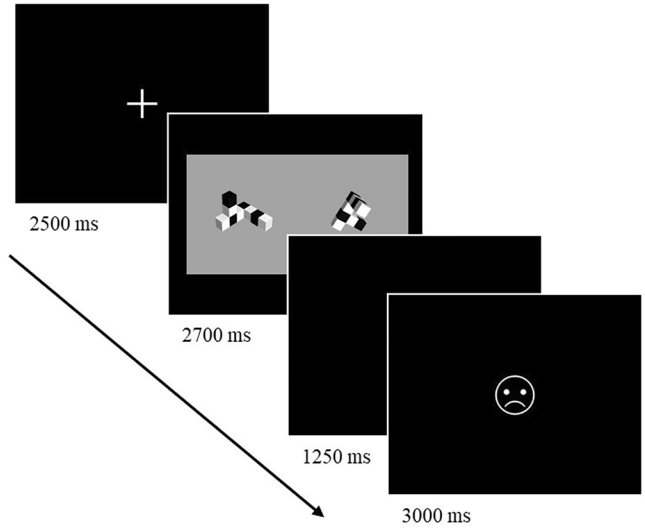

FIGURE 1 One trial of the experimental task (moderate difficulty)

2.3.2 | Attribution of success and failure

After finishing the experiment, the participants were first asked to evaluate their subjective reaction in terms of valence and arousal to negative and positive feedback during the experiment. The questions about negative and positive feedback were accompanied by icons to help the participants recall their reaction and read as follows: 'Please remember the tasks from just now. How did you feel after negative feedback (☹)?' On a separate sheet, participants' evaluation of reaction after positive feedback was requested: 'How did you feel after positive feedback (☺?)

For feedback, a self-assessment rating scale of the icons ranging from 1 (very good) to 9 (very bad) was used (Self-Assessment Manikin [SAM]; Lang, 1980; for further information see: irtel.uni-mannheim.de/pxlab/demos/index_SAM.html).

Participants were then requested to evaluate their thoughts after negative and positive feedback during the experiment on a five-point rating scale ranging from 1 (not at all) to 5 (totally agree). The items for the section on negative feedback, which we equated with 'failure', were: (a) Maybe I'm not that effective (internal attribution-failure); (b) The task is damn hard! (external attribution-failure); (c) I just have no luck with something like that (external attribution-failure); (d) I did not really make an effort (internal attribution-failure). The items for the section on positive feedback (i.e., 'success') were: (a) Luck probably played a big role in that! (external attribution-success); (b) I can solve these tasks especially well! (internal attribution-success); (c) I have tried hard (internal attribution-success); (d) Everyone can do that well (external attribution-success). To compute total scores for external and internal attribution, item values across the failure and success conditions were averaged.

2.4 | Statistical analysis

Hypotheses (1), (2) and (3) were tested using Mann-Whitney *U* tests; nonparametric tests were preferred because of the unequal group size. The grouping variable was group membership (prisoner/never incarcerated). The test variables were: for hypothesis (1), total aggression, generalised externality scale (PC) and reasoning ability scores; for hypothesis (2), the performance in the experimental task operationalised as the sum of correct answers across all

difficulty levels (hit total) and the correct answers in each high difficulty block (hit block [3] [6]); for hypothesis (3), scores for the tendency to attribute the own performance (failure and success) externally in the experimental task.

For hypothesis (4), Spearman rho correlations were calculated between aggression, locus of control and number of correct answers scores in the experimental task. Then, a binary logistic regression analysis was conducted. Group membership (prisoner/never incarcerated) was the dependent variable. Those variables that had significantly differentiated the groups according to the bivariate analyses were chosen as independent variables. These were aggression, generalised externality, reasoning ability and the number of correct answers in the experimental task; external attribution of failure and success in the experimental task was included for theoretical reasons.

Statistical analyses were carried out using SPSS 26 for Mac.

3 | RESULTS

3.1 | General characteristics of the sample

3.1.1 | Prisoners

This group consisted of 76 men, of mean age 25.97 years old (SD = 5.65; range 18–36). Most reported that they were attending or had already finished an apprenticeship programme, which in Germany typically can be started after nine years of primary and lower secondary education (n = 54; 71%). Seventeen (22%) participants reported only nine years of school education (lower secondary education) and five (7%) had completed 10 years education (middle secondary education). Nearly a third of the men had been convicted of a violent assault (23, 30%), 20 (26%) of a drug offence, 18 (24%) of theft, eight (10.5%) of robbery, two of homicide and five of other offences.

3.1.2 | Never incarcerated men

This group consisted of 31 men, all without criminal convictions, of mean age 22.45 years (SD = 4.82; range 18–39). Most (19; 61%) were attending or had already finished an apprentice programme; among the others, six reported 12 years of school education (higher secondary education), two reported 10 years of school education (middle secondary education) and four participants attended university.

To check for differences in age, formal education level and family status between the two groups, Mann-Whitney U test (age), Fisher's tests and Monte Carlo calculations were applied. The prisoners proved to be older than the never incarcerated men (respective medians 24: 20; U [Nprisoners = 76, Ncontrols = 31] = 577.5; z = −4.15, $p \leq 0.001$) and the groups differed in formal education. In the non-prisoner group, one third of the participants reported higher secondary and/or ongoing university education (Fisher's test $p \leq 0.001$). Marital status (numbers and proportions single, married/cohabiting, divorced) did not differ between the groups (Fisher's test, p = 0.098, ns).

Hypothesis 1 – *aggression, locus of control and reasoning ability compared between prisoners and never incarcerated men*

Table 1 shows the comparisons between the two groups on all aggression, locus of control and reasoning ability measures. Prisoners rated their physical aggression and hostility at significantly higher levels than did the comparison men, but the groups were similar in verbal aggression and anger self-ratings. On the locus of control scales, prisoners were significantly more likely to rate themselves as vulnerable to external factors than were the never incarcerated men but had a more positive self-appraisal of their own abilities; the groups did not differ on internalising or sense of self-efficacy. The prisoners had significantly lower mean scores on reasoning ability than the never incarcerated men.

Hypothesis 2 – *performance in the experimental task compared between prisoners and never incarcerated men*

The prisoners made fewer correct answers in the experimental task than did the never incarcerated men, overall and at the highest level of difficulty tested separately (see Table 2).

Hypothesis 3 – *attribution of effectiveness of performance will be more external among prisoners than never incarcerated men*

Table 2 also shows the comparison of the scores for the tendency to attribute failure and success externally and internally in the experimental task for both groups. Against prediction, there were no significant group differences in this task specific sense of locus of control.

Hypothesis 4 – *variables associated with prisoner or community group membership*

Table 3 shows the correlation matrix between the three sets of ratings — aggression, locus of control, reasoning ability and the total number of correct answers in the experimental task (hit total). Here taking the prisoners and never imprisoned together, higher aggression scores correlated significantly with higher self-ratings of own abilities, higher external locus of control scores, lower reasoning ability scores and lower number of correct answers on the experimental task. The lower the number of correct responses on the experimental task, the more men attributed responses to external factors (Table 3).

Table 4 displays the results of a binary logistic regression analysis with membership of the prisoner/never incarcerated groups as the dependent variable and aggression, generalised externality, reasoning ability, total number of correct answers on the experimental task (hit total) and external attribution of failure and success in the experimental tasks as independent variables.

The fit of the model was acceptable (Nagelkerke R-square = 0.261). The regression indicates that externality and reasoning ability are significantly and independently associated with group membership (Chi-square (5) = 21.6, $p = 0.001$, $N = 107$). Externality and reasoning ability are significant at the 5% level (externality Wald = 5.294, $p = 0.021$, <0.05; reasoning ability Wald = 4.184, $p = 0.041$, <0.05). The odds ratio for externality is 1.071 (95% CI 1.010–1.135) and for reasoning ability 0.887 (95% CI 0.790–0.995). Higher scores in externality and lower scores in reasoning ability are independently associated with prisoner group membership. The model correctly assigned 92.1% of cases in the prisoner group and 45.2% of cases in the never incarcerated group, giving an overall percentage correct distribution rate of 78.5%.

4 | DISCUSSION

Our sample of men in prison differed from a comparison group of never incarcerated men in self-ratings of trait aggression, as well as in physical aggression and hostility, but they were not more likely to rate themselves as verbally aggressive and angry. Prisoners were more likely to have an external sense of locus of control and lower reasoning abilities than the community sample. In the experimental task, the imprisoned men performed less well than the never incarcerated men, gaining fewer correct responses. In logistic regression, only reasoning ability and locus of control independently distinguished the prisoners from the never incarcerated men.

4.1 | Aggression

Measurement of aggression among prisoners is complex (Berlin et al., 2021). Our broad findings of higher ratings in general aggression, physical aggression and hostility among the prisoners than among the never incarcerated men is

TABLE 1 Comparison of self-rated aggression, locus of control and reasoning ability between prisoners and never incarcerated comparison men

	Prisoners *n* = 76		Community men *n* = 31			
	M (SD)	Mdn	M (SD)	Mdn	z	*p*
Aggression						
Physical aggression	21.45 (5.35)	20.50	17.65 (4.95)	17.00	−3.29	0.001
Verbal aggression	11.74 (2.50)	11.00	11.13 (1.82)	11.00	−1.09	ns
Anger	12.95 (3.42)	12.00	12.81 (3.54)	12.00	−0.29	ns
Hostility	16.61 (4.23)	16.00	15.00 (4.43)	14.00	−2.16	<0.05
Aggression	59.79 (11.36)	58.50	53.71 (11.75)	52.00	−2.76	<0.01
Locus of control						
Self-concept	31.95 (4.38)	31.00	29.39 (2.91)	29.00	−2.94	<0.01
Internality	35.29 (4.87)	36.00	35.00 (5.18)	36.00	−0.43	ns
Social externality	27.74 (5.09)	28.00	25.23 (5.38)	25.00	−2.73	<0.01
Fatalistic externality	28.80 (5.42)	28.00	24.77 (6.76)	25.00	−3.01	<0.01
Self-efficacy	67.24 (7.74)	68.00	64.39 (6.76)	64.00	−1.85	ns
Externality	56.54 (7.95)	55.00	50.00 (10.90)	50.00	−3.19	0.001
Reasoning ability	23.87 (5.55)	24.00	28.00 (4.92)	30.00		≤0.001

Note: M, SD and Mdn, Mann-Whitney-*U*-tests for independent samples, two tailed.

Abbreviations: M, Means; SD, standard deviations; Mdn, medians.

TABLE 2 Comparison of performance and attribution of failure and success in an experimental task between prisoners and never incarcerated comparison men

	Prisoners *n* = 76		Community men *n* = 31			
Experimental task	**M (SD)**	**Mdn**	**M (SD)**	**Mdn**	**z**	***p***
Hit total	100.09 (14.81)	103.50	107.03 (12.46)	108.00	−2.19	<0.05
Hit block 3	10.22 (2.35)	10.00	11.19 (2.33)	11.00	−1.90	ns
Hit block 6	10.28 (2.88)	11.00	12.35 (2.40)	13.00	−3.50	≤0.001
External attribution	2.11 (0.56)	2.00	1.97 (0.57)	1.75	−1.22	ns
External-failure	1.76 (0.73)	1.50	1.71 (0.74)	1.50	−0.45	ns
External-success	2.45 (0.66)	2.50	2.23 (0.69)	2.00	−1.31	ns
Internal attribution	2.78 (0.57)	2.75	2.81 (0.67)	3.00	−0.53	ns
Internal-failure	2.30 (0.82)	2.50	2.18 (0.82)	2.00	−0.72	ns
Internal-success	3.25 (0.85)	3.50	3.44 (0.91)	3.50	−0.82	ns

Note: M, SD, Mdn, Mann-Whitney-U-tests for independent samples, two tailed. Hit total: Total number of correct answers in the experimental task; hit block 3, hit block 6: Number of correct answers in the high difficulty blocks 3 and 6.

Abbreviations: M, Means; SD, standard deviations; Mdn, medians.

TABLE 3 Correlations between scores of aggression, locus of control, reasoning ability, performance and attribution of failure and success in an experimental task (prisoners and never incarcerated comparison men)

N = 107	1	2	3	4	5	6	7	8	9
1 aggression	-								
2 self-concept	0.45 **	-							
3 internality	−0.06	0.35 **	-						
4 self-efficacy	0.19	0.77 **	0.85 **	-					
5 externality	0.35 **	0.39 **	−0.16	0.13	-				
6 reasoning ability	−0.30 **	−0.24 *	−0.03	−0.13	−0.25 **	-			
7 hit total	−0.22 *	−0.20 *	−0.02	−0.12	−0.11	0.56 **	-		
8 external attribution	0.18	0.18	0.06	0.12	0.15	−0.29 **	−0.37 **	-	
9 internal attribution	−0.12	0.03	−0.03	−0.01	−0.08	−0.01	0.06	0.16	-

Note: Spearman rho. Hit total: Total number of correct answers in the experimental task.

* Correlation is significant at the 0.05 level (2-tailed).

** Correlation is significant at the 0.01 level (2-tailed).

TABLE 4 Binary logistic regression on the variables associated with prisoner/never incarcerated comparison men group membership (*N* = 107)

							95% CI	
Variable	**B**	**SE**	**Wald**	**df**	**sig**	**Exp(B)**	**Lower**	**Upper**
Aggression	0.018	0.023	0.584	1	0.445	1.018	0.972	1.066
Externality	0.068	0.030	5.294	1	0.021	1.071	1.010	1.135
Reasoning ability	−0.120	0.059	4.184	1	0.041	0.887	0.790	0.995
Hit total	−0.012	0.022	0.269	1	0.604	0.988	0.946	1.033
External attribution	−0.178	0.512	0.121	1	0.728	0.837	0.307	2.285
Constant	0.942	3.012	0.098	1	0.754	2.565		

Notes: Variables entered on step 1: Aggression, Externality, Reasoning ability, Hit total, External attribution. Summary of the model: Step 1: −2 log likelihood = 128.807; Cox & Snell R-square = 0.183; Nagelkerke R-square = 0.261.

in accordance with previous findings (e.g. Gilbert & Daffern, 2010; Ling, Umbach & Raine, 2019; Ogilvie et al., 2014; Rogier, Marzo & Velotti, 2019), but self-ratings of verbal aggression and anger did not differ between the groups. This may be because verbal aggression and anger are more subtle forms of aggression than actual physical violence and their self-assessment requires certain skills, including aspects of social cognition, which have shown to be impaired in offenders (van der Stouwe et al., 2021; Winter et al., 2017). If this is the case, the prisoners may have been much angrier than the comparison group, but they did not recognise their anger, leading to the same results, although their scores should have been much higher.

4.2 | Locus of control

Self-concept of own abilities, social externality, fatalistic externality and the composite score of externality (generalised externality) were all higher among the prisoners. High social externality may be interpreted as following from incarceration, because prisoners experience much real social control by others. Fatalistic externality, however, reflects a belief of one's life being under the influence of chance and the assumption that one can do nothing to influence

outcome. This is more likely to reflect an intrinsic trait and a possible target for treatment interventions, given that belief in ability to desist from offending may be a key step towards not actually reoffending.

4.3 | Reasoning ability

Reasoning ability was lower in the prisoner group. This finding is entirely in line with other studies that have examined cognitive executive functions in prisoners (Tuominen et al., 2014) and protective factors for criminal behaviour (Portnoy, Chen & Raine, 2013). Further, environmental variables during childhood, especially physical abuse, neglect and poor formal education may play a role in cognitive impairment (Fishbein et al., 2009; Borrani et al., 2015) and, while we did not ask about adverse childhood experiences, we did find that prisoners had many fewer years of education than the never incarcerated men, so enhancing educational opportunities in prison and perhaps training in specific cognitive abilities could help.

4.4 | Experimental task and attribution of the own performance

As expected, overall performance in the experimental task was lower for the prisoner group. Although the performance of the groups differed, their mean values of internal and external attributions of failure and success in the experimental task did not diverge. Thus, performance in the task and the performance-related feedback do not seem to have had a direct effect on attribution of failure and success. If one assumes that different levels of performance in a group comparison design should affect the extent of external or internal attribution measures, but this is not the case, this could be due to group differences in cognitive processing (of performance-related information). Our results are, then, in line with previous findings on cognitive flexibility and feedback-processing relating to own performance (Vilà-Balló et al., 2015). Social information processing can be improved by means of specific psychological training and be a valuable tool in offender rehabilitation (Zajenkowska et al., 2021).

4.5 | Relationships between aggression, locus of control and the experimental task

For the whole sample, aggression was positively correlated with external locus of control and negatively with reasoning ability. Overall performance in the experimental task was negatively associated with external attribution of the own performance. The better the performance was, the less the tendency was to attribute failure and success to external factors; the poorer the performance scores, the greater the tendency to attribute to chance or others. The number of correct responses was, however, strongly related to reasoning ability, which indicates self-agency.

In the regression model, aggression was not independently associated with group membership; higher externality and lower reasoning ability were related to being in the prisoner group. The poorer outcomes of the prisoner group in the performance task align with extensive evidence about specific executive deficits in general prison populations (Meijers et al., 2015). If these deficits are paired with misconceptions about the cause of (social) failures and successes, such as attributing failures to the (harmful) influence of others or to chance, may, on a superficial level and in the short term, be self-protective and self-esteem enhancing. Lacking insight into the causes of failures may, however, also hamper prosocial behavioural changes. Self-esteem in terms of (inflated) self-concept of one's own abilities has been shown to correlate with aggression (Smith et al., 2015; Woessner & Schneider, 2013).

4.6 | Indications for future practice and research

The two variables that independently distinguished the prisoners from the never incarcerated men were generalised externality and reasoning ability. In future research with offender samples, both of these variables should be examined more closely. Reasoning ability and other cognitive skills should be recorded and analysed on several levels, for example, by using multidimensional intelligence tests (e.g., IST-Amthauer) or neuropsychological tests tapping different dimensions of executive functioning (e.g., Cambridge Neuropsychological Test Automated Battery). Such detailed assessment could be a starting point for practising specific cognitive problem-solving skills and provide valuable additional information for the implementation of rehabilitative interventions, such as the R & R programme (Ross, Fabiano & Ewles, 1988). To complement R & R type social problem-solving tasks, it would be useful to link these tasks to the participants' locus of control in the sense that external control beliefs can be challenged, allowing for greater cognitive flexibility in dealing with everyday problems.

4.7 | Limitations

The research conditions under which recruitment took place did not allow for random sampling and adequate matching procedures. As the study was slightly underpowered, the regression model should be cross-validated in larger samples to control for overfitting and other problems associated with small sample size. If, for example, age is added as a further variable in the regression model, reasoning ability is no longer independently associated with prisoner status. The meaning of this is unclear, since in absolute terms there were only 3.5 years between the mean ages of the groups. As far as self-report measures are concerned, social desirability and impression management in completing the questionnaires were not controlled, but it seems unlikely that this had much impact on our findings as on three out of five aggression scales, including physical aggression, hostility and total aggression, the prisoners scored higher than the comparison group, as expected, suggesting that social desirability did not play much role in self-reporting aggression. A ceiling effect in the experimental task – that is a high number of correct responses in both groups - cannot be ruled out. The experimental task should be adjusted for sensitivity for best chance of detecting performance differences between groups.

5 | CONCLUSIONS

Men in prison were characterised greater social and fatalistic externality paired with lower reasoning ability compared to never incarcerated community men. In prison rehabilitation strategies should take account of this, paying early attention to improving reasoning ability and enabling men to recognise likely overuse of attributing their difficulties to fate or to other people, then helping them to become more realistic in their attributions and make use of realistic feedback.

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DATA AVAILABILITY STATEMENT

The data that support the findings of this study are available from the corresponding author upon reasonable request.

ORCID

Maria Isabel Fontao https://orcid.org/0000-0002-4326-1409

Thomas Ross https://orcid.org/0000-0002-0368-2954

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