Remarkable Differential Verbal and Non-Verbal/Performance Cognitive Profiles in Homicide and Sexual Offenders with Adult Victims

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ABSTRACT

Introduction: On average prison populations show lower cognitive scores than the general population, but it is also acknowledged that inmates are highly heterogenous and that verbal and non-verbal ability scores might uncover differential patterns. *Method:* We consider 140 participants divided into five groups: controls, non-sexual and non-homicidal inmates (other inmates), sex offenders with adult victims (AVS) and child victims (CVS), and homicide offenders. All participants completed two WAIS-III subtests to obtain reliable estimates of their verbal and non-verbal abilities. The quotient 'matrices/similarities' (UIQ) was also computed. *Results:* Homicide and AVS offenders showed lower general scores than controls; AVS and homicide offenders showed lower non-verbal scores than controls; homicide offenders showed lower verbal scores than the other groups; and homicide, AVS offenders and "other inmates" were the most dissimilar groups regarding UIQ. *Conclusions:* The findings support the relevance of distinguishing among criminal offenders to avoid unwarranted generalizations when cognitive abilities are considered.

Notables diferencias de perfiles cognitivos verbales y no-verbales en homicidas y agresores sexuales con víctimas adultas

RESUMEN

Introducción: En promedio, la población penitenciaria presenta menores puntuaciones cognitivas que la población general, aunque los internos son muy heterogéneos, por lo que sus puntuaciones en test cognitivos de naturaleza verbal y no-verbal pueden revelar patrones diferenciales de interés. *Método:* Consideramos 140 participantes divididos en cinco grupos: controles, internos no sexuales ni homicidas (otros internos), agresores sexuales con víctimas adultas (SVA) y con víctimas menores (SVM) y homicidas. Todos cumplimentaron dos subtest del WAIS-III para obtener estimaciones fiables de sus aptitudes verbales y no-verbales. Se calculó el cociente "matrices/semejanzas" (UIQ). *Resultados:* Los homicidas y agresores SVA presentaron menor aptitud general que los controles; agresores SVA y homicidas mostraron menor aptitud no verbal que los controles, los homicidas tuvieron una menor aptitud verbal que los demás grupos y los homicidas, agresores SVA y "otros internos" presentaron los mayores desequilibrios en el UIQ. *Conclusiones:* Los resultados apoyan la importancia de distinguir entre tipos de delincuentes para evitar generalizaciones infundadas al valorar sus capacidades cognitivas.

The association between antisocial behavior and cognitive ability is well-established. Prison inmates show average IQ scores half a standard deviation below the mean of the general population (mean of 100 and standard deviation of 15). (Chico Librán, 1997; Guay et al., 2005; Herrnstein & Murray, 1994; Moffitt, 2018; Oleson, 2016; Schwartz et al., 2015).

The relationship between cognitive ability and criminal offending has been described both as linear (Schwartz et al., 2015) and curvilinear (Mears & Cochran, 2013). Regardless of the pattern, (a) their association remains even after controlling for factors such as childhood socioeconomic factors, ancestry, and parental characteristics (Frisell et al., 2012), and (b) the number of individuals with remarkably low cognitive abilities is large within penitentiary populations (Freeman, 2012).

Beyond this broad pattern, however, the relationship between cognitive ability and different types of criminal behavior is much less

investigated. This might be relevant because of the acknowledged heterogeneity within the offender population. Thus, for instance, there is evidence showing that the victim's age is associated with different cognitive ability levels in sex offender samples. In this regard, when sex offenders are grouped based on the age of the victim, sex offenders with adult victims show average IQ scores within the range of the general offender population. However, there is a negative relationship between child sexual abuse and cognitive level (Cantor et al., 2005). Importantly, these results might change when specific cognitive abilities are considered and groups are defined in more detail (e.g., pedophilic vs. non-pedophilic individuals (Joyal et al., 2014; Turner & Rettenberger, 2020).

Unfortunately, the relationship between cognitive ability and criminal behavior has been explored by comparing samples broadly defined as 'violent offenders' (vs. non-violent offenders), which usually merges participants convicted for diverse offenses like homicide, assault, arson, or kidnapping (Frisell et al., 2012; Guay et al., 2005; Jacob et al., 2019). There is, however, circumstantial evidence showing that homicidal offenders differ from other violent offenders in several factors, such as emotional self-regulation and expressive aggression (Gabrielle Salfati & Taylor, 2006; Gillespie et al., 2018; Matias et al., 2020).

In this later regard, another distinction that deserves attention relates to verbal and non-verbal (abstract) cognitive abilities. This suspicion was first noted by Wechsler (1958), who pointed out that juvenile offenders exhibit a pattern in which their performance IQs (PIQ) are remarkably higher than their verbal IQs (VIQ). Several studies conducted afterwards reported uneven PIQ-VIQ scores in antisocial populations. Thus, for instance, Isen (2010) examined 131 studies reporting uneven cognitive profiles in antisocial individuals. The observed discrepancy was affected by age, as noted by Wechsler, being clearer in juvenile offenders (6 points) and smaller, but still present, in adults (3 points). Most adolescent samples (n = 110) showed a PIQ > VIQ profile, and only five exhibited predominant VIQ > PIQ profiles. Regarding adult samples, 84.6% showed PIQ > VIQ profiles.

Verbal low scores have been associated with antisocial behavior and other externalizing problems like ADHD (Dowson & Blackwell, 2010) or callous unemotional traits (Muñoz et al., 2008). The PIQ > VIQ profile has also been associated with psychopathic traits (Nijman et al., 2009). Several explanations have been proposed to explore the relationship between low VIQ and antisocial behavior, which include academic failure, negative attitudes towards education, and antisocial attitudes (Walters, 2022). Even when this research considered moderators such as age, ethnicity/ancestry, and gender, the antisocial individuals were treated as a homogeneous group and, therefore, the differential nature of their crimes was ignored. However, this might be relevant, as noted above.

Wallinius et al. (2019) investigated the cognitive ability of 269 young (age range 18-25 years) violent offenders in Sweden, finding uneven cognitive profiles in one-third of their sample. Most cases (89%) portrayed a PIQ > VIQ profile. Moreover, offenders with evident uneven cognitive profiles showed lower scores in antisocial behavior scales ($-.11 \leq rs \geq -.15$), educational level (rs = -.14), and drug abuse (rs = -.18), albeit with moderate effects. However, as usual, the sample was not analyzed considering distinguishable crimes or antisocial behaviors.

Some research focused on the PIQ-VIQ performance differences among different criminal types. For example, Nijman et al. (2009) studied 133 Dutch male forensic psychiatric patients in six different criminal categories (arson, murder, robbery, children's sex offenders, sex offenders with adult victims, and aggravated assault). They found that VIQ did not differ significantly across these different criminal types. However, they found differences in PIQ. Sex offenders with adult victims showed a marked PIQ > VIQ (discrepancy = 13.4 points) compared to the other groups. This difference remained significant

even after controlling for general IQ, educational achievement, drug abuse, or family background. The authors concluded that these differences might be linked to personality types, specifically cluster B personality disorders, rather than educational and family disadvantages or general intelligence low scores.

Whilst sex offenders with adult victims seem to portray a clear PIQ > VIQ profile (Nijman et al., 2009), this does not seem to be the case for other violent offenders, such as offenders convicted of homicide. In fact, the PIQ > VIQ discrepancy appears to be non-characteristic of inmates convicted for homicide (Deiker, 1973). DeWolfe and Ryan (1984) studied the IQ profiles of 70 violent and non-violent offenders, which were also divided by criminal type. In the homicide group, 33% of the offenders showed a PIQ > VIQ discrepancy instead of 87% regarding the sex offenders. Therefore, the uneven cognitive profile was not idiosyncratic to violent criminals, but rather to the different criminal types. When they compared non-violent offenders against violent offenders, excluding murders from this group, results showed significant differences between them with a PIQ > VIQ discrepancy in 79% of the violent inmates and 48% of the non-violent ones. According to DeWolfe and Ryan (1984), inconsistent findings observed in cognitive profiles of violent individuals may have been influenced by the presence of homicide offenders, and they suggest that this group should be studied separately.

In summary, cognitive ability and PIQ-VIQ discrepancies have usually been considered when studying samples broadly defined as antisocial or violent. The potential role of specific criminal profiles was generally ignored despite the recognized heterogeneity of these antisocial and violent populations. More specifically, sex offenders with adult victims and homicide offenders were studied apart due to their characteristic cognitive profiles.

The present study is part of a wider project focused on studying cognitive abilities and executive functions in violent offenders (Herrero et al., 2019). Here we compare cognitive abilities in differentiated offenders' samples including different types of sex offenders, non-sexual and non-homicidal offenders, and a new group of homicide offenders. Community controls are also considered. Finally, we also explore the potential relevance of PIQ/VIQ discrepancies.

Method

Participants

The scores of interest were obtained from a total of 140 participants: 34 community controls, 23 non-sexual and non-homicidal inmates, 26 sex offenders with adult victims (AV sex offenders), 17 sex offenders with child victims (CV sex offenders), and 40 inmates convicted of homicide. All participants were Spanish native speakers or proficient in Spanish. We classified the offenders' groups according to the United Nations' International Classification of Crime for Statistical Purposes (United Nations Office for Drughs and Crime, 2015). "Homicide offenders" includes intentional, non-intentional, and attempted intentional homicide, and "sex offenders" encompasses rape and sexual assault, both for offenders with adult victims and children. There were no participants within the homicide offender group who had committed non-intentional homicide.

The 23 non-sexual and non-homicide inmates included men who committed crimes of intimate partner violence (two), theft (nine), drug trafficking (seven), fraud (two), bank robbery (one), and forced prostitution (two). These typologies represent 64.5% of the crimes committed by the male penitentiary population in Spain (Secretaría General de Instituciones Penitenciarias, 2022). Therefore, this group comprises the most common criminal categories in Spain, thus resulting in an appropriate comparison group. None of

the sex offenders were convicted for other non-sexual crimes or homicide.

Measures

Due to the special nature of the sample and the imperative time restrictions during the psychological assessments done within the penitentiary institutions, it was not feasible to administer the complete WAIS-III battery. Following previous research in this area (Herrero et al., 2010; Herrero et al., 2019) we chose two subtests from the WAIS-III Spanish version (García et al., 2003) to obtain reliable estimates of verbal/crystallized (similarities) and abstract/fluid (matrices) cognitive abilities.

PIQ and VIQ measures were obtained by first transforming the raw scores of matrices and similarities into scalar scores with the information from the normative groups of the WAIS-III Manual. Next, these scalar scores were standardized using means and standard deviations also obtained from the normative groups. Finally, these standardized scores were transformed into IQ metrics (mean 100 and standard deviation 15), obtaining PIQ ('matrices') and VIQ ('similarities') scores. The global IQ was calculated as follows: IQ = (PIQ + VIQ)/2.

Given that our sample was assessed from 2007 to 2022 with the same WAIS-III subtests, we controlled for the Flynn Effect. The Flynn Effect estimates a population IQ increase of 1/3 point per year (Colom et al., 2023; Flynn, 1984, 1987). Studies have shown that this inflation in cognitive measures can modify the obtained results (O'Keefe & Rodgers, 2020). Consequently, we applied a post-hoc adjustment for all cognitive measures with the following formula: Corrected IQ = IQ score − ((Year of Evaluation − Year of WAIS-III publication) * 0.33).

Uneven cognitive profiles were obtained by computing the quotient UIQ = PIQ/VIQ to avoid difference scores because previous research has shown these difference scores are highly unreliable (Ackerman & Hambrick, 2020; Frischkorn et al., 2022; Jensen, 2006). Quotients greater than 1 reflect higher scores on the Matrices test, whereas values lower than 1 mean higher scores on the Similarities test. Moreover, to obtain marked uneven cognitive profiles (± 1 *SD*) and explore the direction of the profiles, we calculated the mean and global standard deviation of our UIQ corrected variable and this information was used to standardize the UIQ measure. The obtained *Z* scores were then scaled with a mean of 100 and an *SD* of 15. In this way, the UIQ score was in the same metric as the remaining cognitive measures. Now a score greater than 100 reflects higher scores on the Matrices test (reasoning, non-verbal ability) while a score less than 100 reflects higher scores on the Similarity test (verbal ability). Then, we identified the uneven profiles where 1 *SD* below the mean implies a VIQ > PIQ profile (UIQ < 85) and 1 *SD* above the mean represents a PIQ > VIQ profile (UIQ > 115).

Procedure

Offenders were volunteers who did not receive any compensation for their participation. All were informed of the nature of the study and signed a written informed consent form. The individual assessment took place in private offices inside the prison facilities. Community controls were assessed at home. The inmates convicted for homicide were assessed in four prisons from 2018 to 2022, while the rest were assessed in another prison from 2007 to 2015. Besides the cognitive measures mentioned above, socio-demographic data and further measures were also registered for other research purposes.

The General Secretary of Penitentiary Institutions (Ministry of Interior of Spain) granted ethical approval for the data sampling and analysis.

Data Analyses

After confirming that the homoscedasticity and normality assumptions were met, we performed ANOVA tests to compare differences among groups.

First, we analyzed age and educational level. We also report Pearson correlations for the IQ measures and age and educational level for the whole sample. The latter is of special relevance for the objectives of the present study due to the relationship between educational level and intelligence scores (Haier, et al.,2023). If there are differences in educational level among groups, possible differences in the measures of cognitive ability could be affected by them. Secondly, the variables IQ, VIQ, PIQ, and UIQ were also analyzed. We computed post hoc analyses when significant differences among groups were found in the ANOVA analyses applying Bonferroni corrections and using a *p* level of .01. Effect sizes (Cohen's *d* with Hedge correction) are also presented.

Finally, to explore unequal cognitive profiles (± 1 *SD*), a *Z*-test was reported to examine the null hypothesis of equal proportions of these profiles in each group, along with the corresponding effect size estimates (Cohen's *d*).

All analyses were conducted using R statistical software version 4.0.3 (R Core Team, 2022).

Results

Table 1 shows the correlations between IQ measures, age, and educational level. There were no significant correlations between age and educational level or any of the IQ measures. Educational level showed moderate positive correlations with IQ (*r* = .29), PIQ (*r* = .28), and VIQ (*r* = .22). As expected, a) global IQ measures were highly positively correlated with PIQ (*r* = .88) and b) VIQ and UIQ had a positive significant relationship with PIQ (*r* = .52) and a negative relationship with VIQ (*r* = -.43).

Table 1. Correlations for Age, Educational Level, IQ, PIQ, VIQ, and UIQ

|	Age	Education	IQ	PIQ	VIQ	UIQ
Age	1	.775	.662	.501	.938	.363
Education	-.025	1	.001	.001	.009	.251
IQ	.038	.290	1	.000	.000	.462
PIQ	.058	.284	.883	1	.000	.000
VIQ	.007	.223	.871	.538	1	.000
UIQ	.078	.098	.063	.515	-.428	1

Note. Pearson correlation coefficients below the diagonal, *p* values above the diagonal.

Table 2 shows the descriptive statistics for the age, educational level, and IQ measures for the five groups (controls, other inmates, AV sex offenders, CV sex offenders, and homicide offenders) along with *F* and η^2 values. ANOVA analyses revealed statistically significant group effects for age, $F_{(4, 135)} = 9.07$, *p* < .000, η^2 = .21, general IQ, $F_{(4, 135)} = 11.72$, *p* < .000, η^2 = .26, PIQ, $F_{(4, 135)} = 8.48$, *p* < .001, η^2 = .20, VIQ, $F_{(4, 135)} = 13.41$, *p* < .000, η^2 = .28, and UIQ, $F_{(4, 135)} = 7.418$, *p* < .000, η^2 = .18. Educational level did not show any statistically significant differences. Therefore, and importantly, cognitive ability distinguishing groups can be analyzed in a meaningful way. Next, we calculated post hoc comparisons for the IQ variables. Figure 1 shows the mean comparisons of the cognitive ability measures.

Concerning general IQ, homicide offenders presented lower scores than controls (*p* = .000, *d* = 1.49), other inmates (*p* = .000, *d* = 0.99), and CV sex offenders (*p* = .002, *d* = 0.94). AV sex offenders also showed significant differences with the control group (*p* = .003, *d* = 1.15). All differences revealed large effect sizes. The other groups did not present significant differences in their average IQ.

Table 2. Descriptive Statistics, F, p, and η2 Values for Community Controls, Non-sexual and Non-homicidal Offenders (Other Inmates), Sex Offenders with Adult Victims, Sex Offenders with Children Victims, and Homicide Offenders

	Controls		Other inmates		AV Sex offenders		CV Sex offenders		Homicide		$F_{(4, 135)}$	η^2
	M	SD	M	SD	M	SD	M	SD	M	SD		
Age	30.06	4.88	35.30	8.20	37.85	8.87	44.76	11.51	41.18	12.86	9.07***	.21
Education	8.12	1.37	9.00	2.52	8.38	2.97	8.71	3.02	8.95	3.05	0.64	.01
IQ	102.68	7.67	98.67	11.22	91.87	11.06	98.52	12.47	86.19	13.10	11.72***	.26
PIQ	101.80	9.96	95.67	13.56	84.47	12.81	97.38	15.44	87.46	15.70	8.48***	.20
VIQ	103.56	8.75	101.67	12.37	99.27	12.48	99.67	13.58	84.92	13.88	13.41***	.28
UIQ	98.72	10.41	94.60	12.45	85.50	11.50	98.68	15.64	104.03	17.31	7.418***	.18
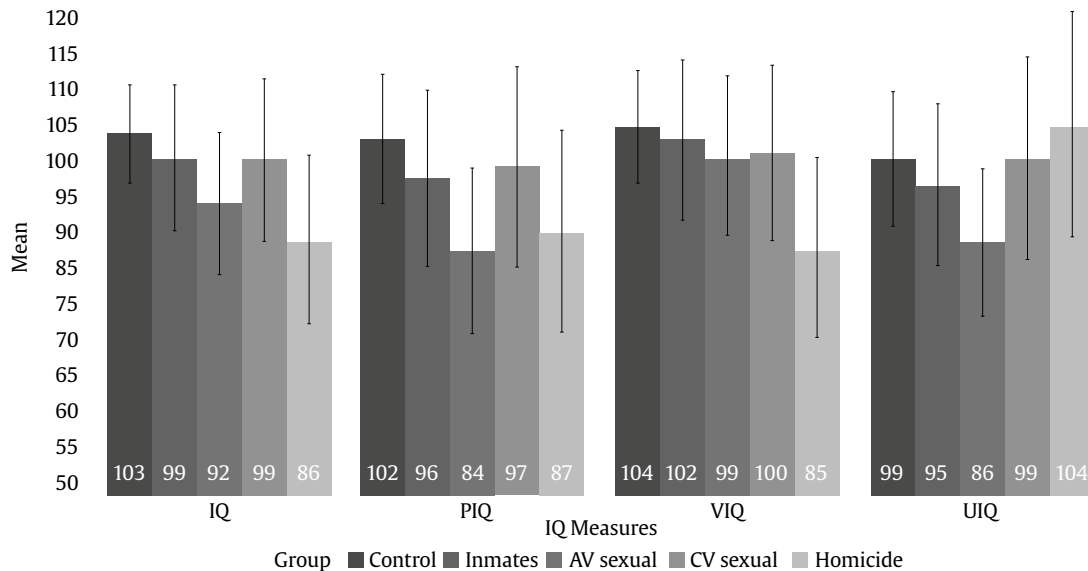
Figure 1. Cognitive Ability Scores for the Five Comparison Groups.
Note. The y-axis has been shortened to improve the visualization. Error bars represent ± *SD.*

Regarding PIQ, the AV sex offenders showed significant differences and large effect sizes with controls, (*p* = 000, *d* = 1.52) other inmates (*p* = 0.045, *d* = 0.837), and CV sex offenders (*p* = 0.027, *d* = -0.912). Homicide offenders also presented significant differences and a large effect size compared to the control group (*p* = .000, *d* = 1.06). No significant differences were observed in the average PIQ for the rest of the comparisons.

For VIQ, homicide offenders displayed significant differences with large effect sizes with all groups; control (*p* = -000, *d* =1.56), other inmates (*p* = -000, *d* = 1.24), AV sex offenders (*p* = .000, *d* = 1.06), and CV sex offenders (*p* = .000, *d* = 1.06). The rest of the groups did not present significant differences in their average VIQs when post hoc comparisons were made.

Lastly, concerning UIQ, AV sex offenders presented statistically significantly different scores compared to controls (*p* = .003, *d* = -1.20), homicide offenders (*p* = .000, *d* = -1.20), and CV sex offenders (*p* = .027, *d* = -0.975). No significant differences were found in the mean UIQ for the rest of the comparisons.

To further understand the nature of these uneven cognitive profiles, we analyzed those cases where the participants displayed a ± 1 *SD* uneven cognitive profile. Table 3 shows the proportion of uneven cognitive profiles and the results of the *Z*-test. All groups displayed uneven cognitive profiles. Moreover, there were statistically significant differences in the other inmates (*Z* = 2.191, *p* = .028, *d* = 0.55) and AV sex offenders (*Z* = 3.162, *p* < .001, *d* = 1.33) groups in favor of the VIQ > PIQ profile. Effect sizes were moderate for other inmates and large for AV sex offenders.

Discussion

Summary of Findings

Here we compared a heterogeneous sample of sexual, non-sexual, and non-homicidal offenders, homicide offenders, and community controls in verbal and non-verbal (abstract reasoning) measures. Sex offenders with adult victims (AV) and homicide offenders emerged as the groups with the worst intellectual performance. Nevertheless, their cognitive profiles revealed interesting differences.

Regarding global IQ, both groups showed worse scores than community controls. In the case of the AV sex offenders' sample, this could be attributed to their lower scores on the matrices (reasoning) subtest. Their scores on abstract reasoning might be a remarkable vulnerability, but this is also true for homicide offenders. Furthermore, the homicide offenders also performed worse than the other groups on the similarities (verbal) subtest.

These results suggest that offenders with overtly violent behavior showed the most salient cognitive difficulties in comparison with controls. It is important to note that the CV sex offenders group included individuals who had sexually molested underage victims through non-violent strategies (something unnecessary due to the overwhelming power asymmetry with their victims). The remaining offender group comprised inmates who were sentenced, in most cases, due to non-violent offenses such as theft, fraud, or drug-related crimes.

AV sex offenders and homicide offenders also showed the most salient uneven IQ profiles, but interestingly in opposite directions. While the PIQ > VIQ pattern was more frequent among homicide

offenders (despite this difference not reaching statistical significance), AV sex offenders displayed the opposite tendency, where their verbal IQ was higher than their performance (reasoning) IQ.

Thus, here we replicated the association between sexual offending with adult victims and lower IQ, according to the results of Cantor et al.'s (2005) meta-analytic findings. Furthermore, our results do not replicate the worse scores of CV sex offenders in comparison with sex offenders with adult victims. These authors failed to find differences between rapists and non-sexual offenders. Likewise, they did not consider the level of violence displayed by non-sexual offenders which could be a factor mediating their results. Here, when non-sexual and non-homocidal offenders and homicide offenders were separated, AV sex offenders clearly differed from the former in their IQ level.

Table 3. Proportion of Uneven Cognitive Profiles (± 1 *SD*) by Group and *Z, p, d* Values

Group	n	%VIQ > PIQ (n)	% PIQ > VIQ (n)	Z (p)	d
Control	34	5.9 (2)	8.8 (3)	Z = -.456 (.648)	-0.113
Other Inmates	23	21.7 (5)	4.3 (1)	Z = 2.191 (.028)	0.550
AV sex offenders	26	38.5 (10)	0.0 (0)	Z = 3.162 (< .001)	1.330
CV sex offenders	17	11.8 (2)	11.8 (2)	Z = 0 (1.000)	0.000
Homicide	40	10.0 (4)	22.5 (9)	Z = -1.502 (.133)	-0.345

Concerning the scores of our CV sex offenders, some moderating factors were not evaluated. Particularly relevant for the IQ level is the presence of a pedophilic disorder. Pedophilic individuals may perform at the same level as controls (Jahnke et al., 2022). Research findings suggest that deficient cognitive performance is associated with child sexual abuse but not with pedophilia as a clinical disorder (Kruger & Kneer, 2021). The prevalence of pedophilia was not evaluated in our sample; therefore, it is impossible to evaluate the potential impact of this factor on our findings.

Our results regarding the relative scores in PIQ and VIQ are to a certain extent in tension with previous findings. For example, Nijman et al. (2009) found a clear uneven profile in a sample of sex offenders and attempted homicide offenders. Their results replicated the classic PIQ > VIQ profile in both cases, especially in the sex offenders' group. In the present study, the sex offenders displayed, however, the opposite pattern. This could be accredited to potential differences in sample composition. Participants in the Nijman et al.'s (2009) study were inmates from two forensic hospitals who presented psychiatric disorders ranging from personality to psychotic disorders. In that vein, the PIQ > VIQ uneven profile has been traditionally associated with psychiatric conditions (Isen, 2010). Importantly, our sample comprised exclusively inmates serving sentences in regular penitentiary centers.

Sex offenders with adult victims and homicide offenders shared low PIQ scores, while homicide offenders also showed low VIQ scores. Some relevant psychological vulnerabilities for violent offending could be associated with low levels of different, albeit related, cognitive abilities. For example, low empathy levels are considered a strong correlate of violent offending, and this association is apparently more robust for the cognitive aspects of empathy which involve processes like thinking about the mental states of another person, such as thoughts, beliefs, intentions, and motivations (Jolliffe & Farrington, 2004). The meta-analysis by Morrow (2020) concluded that sex offenders display lower levels of cognitive empathy, while their levels of emotional empathy do not differ significantly from the general population. Empathy development seems to be associated with both verbal and non-verbal IQ. Bigelow et al. (2021) found a positive correlation between the vocabulary (*r* = .72) and matrices (*r* = .62) subtests from the

WASI-II and measures of cognitive empathy in a sample of children with ages ranging from 5 to 12 years. Therefore, the development of empathy seems to be associated with different intelligence factors. Furthermore, low verbal abilities have been consistently linked with persistent criminal behavior (Bellair et al., 2016; Schwartz et al., 2015; Ttofi et al., 2016). There is also some evidence indicating that low verbal ability is related to the severity of criminal activity in young offenders (Anderson et al., 2016).

Theoretical remarks

The results reported here suggest that there could be differences within clearly defined groups of offenders regarding verbal intelligence. For example, our sample of non-homicidal and non-sexual offenders did not show worse verbal IQ scores than controls, and neither did the CV sex offenders. Homicide offenders showed low scores in both abstract and verbal abilities. Therefore, the most severe forms of violent offending could be particularly associated with lower general IQ scores, while other groups perform closer to non-criminal groups or show more specific deficits in abstract reasoning (like our AV sex offenders' sample). We suggest that a more generalized intellectual deficit might be associated with lower empathic skills and higher vulnerability to severe forms of criminal offending.

Research has identified an overlap between cognitive abilities and executive functions (Barbey et al., 2012; Verdejo-García & Bechara, 2010). Moreover, low IQ and violent behavior have been linked to executive functions. Regarding AV sex offenders, in a previous study, Herrero et al. (2019) found that this sample performed poorly in PIQ and executive updating. The meta-analysis of 161 studies by Santarnecchi et al. (2021) found a strong overlap of neural correlates between fluid intelligence and executive updating (80% overlapping) while results were much lower for switching (17%) and inhibition (30%). The concept of cognitive deconstruction, suggested by Ward et al. (1995), could be useful to explain the association between low PIQ and some aspects of executive functioning and sexual assault. According to these authors, during a sex offense offenders suspend some self-regulatory processes, embracing self-serving, superficial, and simplistic thinking. This vulnerability could be reflected in a PIQ < VIQ uneven profile.

Focusing on homicide offenders, there are reasons to suggest that extreme forms of violent behavior are associated with distinctive cognitive features. Sajous-Turner et al. (2020) found gray matter differences in adult homicide offenders compared to non-homicide offenders. Significant structural deficits were found in the frontal and prefrontal cortex areas along with limbic regions. These regions were thought to be involved in emotional processing, behavioral control, executive function, and social cognition. They highlighted the association between frontal areas and the development of cognitive empathy. Therefore, it would be very interesting to explore whether these neurological differences also underlie the tendency of the predominance of the PIQ > VIQ profile in homicide offenders that have been previously found in the literature and our results (albeit the difference is not statistically significant in our work).

Limitations

First, our sample may be small (*N* = 140), especially for some groups of offenders. Therefore, replication with bigger samples is mandatory. Nevertheless, it is important to note that this sample size is typical in studies that explore offender populations, where average total sample sizes of *N* = 90 are usually found (e.g., DeWolfe & Ryan, 1984; Gabrielle Salfati & Taylor, 2006; Nijman et al., 2009). This is caused due to the low prevalence of these cases and the difficult access for evaluation.

Second, due to time constraints on face-to-face assessments in prisons, we were unable to assess inmates with all WAIS-III subscales. Although other studies have approached this problem with the same strategy used here (e.g., Ginsberg et al., 2010; Herrero et al., 2010; Herrero et al., 2019), it is worth noting that our IQ, PIQ, and VIQ are proxy measures obtained through the Similarities and Matrices tests. Future research would benefit from more comprehensive and detailed measures of cognitive abilities.

Third, as mentioned before, we could not assess some relevant constructs like pedophilic tendencies in CV sex offenders. Future research would benefit from measuring other relevant constructs that might shed light on the differences between these offenders' groups and IQ.

Conclusions

The results reported here suggest that worse cognitive scores are associated with greater violent forms of antisocial behavior. This disadvantage is greater in homicide offenders. Moreover, uneven cognitive profiles are markers of antisocial groups, but different VIQ/PIQ patterns are clearly associated with specific criminal profiles. These differences reinforce the need to study offender groups separately and not as a homogeneous group when the analyses of cognitive abilities are at play.

Conflict of Interest

The authors of this article declare no conflict of interest.

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