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NEUROCOGNITIVE DISORDERS AND COGNITIVE RESERVE: A STUDY ON A PSYCHIATRIC REHABILITATION PATIENTS SAMPLE

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SUMMARY

Background: *Research on neurocognitive disorders and cognitive reserve in psychiatric rehabilitation patients is crucial to understanding how cognitive function impacts rehabilitation outcomes. Cognitive reserve refers to the brain's resilience to neuropathological damage, and exploring its role in psychiatric patients can provide insights into their varying responses to treatment and recovery potential. Investigating whether there are differences in cognitive reserve and neurocognitive disorders between offenders and non-offenders within psychiatric rehabilitation can help tailor interventions and improve rehabilitation strategies. This study explores cognitive reserve (CR) and neurocognitive disorders (NCDs) in a sample of psychiatric patients within a Psychiatric Rehabilitation Center, with a particular focus on differences between offenders and non-offenders following the closure of Judicial Psychiatric Hospitals in Italy (March 31, 2015).*

Method: *In our observational study, were recruited a total of 59 patients (20 females and 39 males, mean age = 45.39 years) from various Psychiatric Rehabilitation Communities in Southern Italy. The patients were assessed using the Structured Clinical Interview for DSM-5 (SCID-5 CV) and a battery of tests, including in particular the Cognitive Reserve Index Questionnaire (CRIq), Brief Psychiatric Rating Scale (BPRS), Aberrant Salience Inventory (ASI) and the World Health Organization Disability Assessment Schedule 2.0 (WHODAS 2.0).*

Results: *Results indicated significant differences between offenders and non-offenders in cognitive reserve, psychopathological symptoms and personal and social functionality.*

Conclusion: *Understanding these distinctions is important for developing specialized therapeutic approaches that address the rehabilitation needs of each group that also include neurocognitive aspects such as cognitive reserve.*

Key words: *cognitive reserve - psychiatric rehabilitation - offender patients*

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INTRODUCTION

Neurocognitive disorders (NCDs) which include impairments in memory, attention, executive function, and processing speed, are common among individuals with severe mental illnesses (SMIs) such as schizophrenia (Vacca et al. 2019), bipolar disorder, and major depressive disorder (Franza 2022). These cognitive deficits can significantly hinder the rehabilitation process by affecting the patient's ability to engage in therapy, adhere to treatment, and integrate back into society.

Cognitive Reserve and Its Role in Psychiatric Rehabilitation

Cognitive reserve (CR) refers to the brain's ability to cope with neuropathological damage, helping explain the variability in clinical outcomes among individuals with similar degrees of brain pathology (Nucci et. al. 2012, Franza et al. 2018). Cognitive reserve has been widely studied in various populations, showing that higher cognitive reserve is associated with better outcomes in neurodegenerative and psychiatric disorders. For instance, Stern (2002) highlighted that cognitive reserve could explain why individuals with similar levels of brain pathology exhibit different levels of clinical symptoms. Cognitive reserve is influenced by factors such as education, occupation, and intellectually stimulating activities. In psychiatric populations, higher cognitive reserve is thought to mitigate the impact of neurocognitive disorders, leading to better functional outcomes and more successful rehabilitation (Minò 2019, Franza et al. 2018). This concept is critical in psychiatric rehabilitation because it suggests that enhancing cognitive reserve could improve patients' cognitive performance and overall rehabilitation outcomes.

Differences Between Offender and Non-Offender Psychiatric Patients

Research in psychiatric populations often distinguishes between offender and non-offender patients due to the different psychosocial and clinical profiles these groups typically exhibit. Offender patients those with a history of criminal behavior often present with more severe psychopathology, including higher rates of antisocial personality disorder, substance use disorders, and more pronounced cognitive deficits. These differences could be related to factors such as earlier onset of mental illness, higher levels of stress and trauma, and different life experiences compared to non-offender patients.

Offender patients are more likely to exhibit significant deficits in executive functioning, impulse control, and decision-making abilities, which are cognitive domains closely linked to antisocial behavior and recidivism. These deficits can complicate the rehabilitation process, making it more challenging to achieve successful outcomes. There is evidence to suggest that offender patients may have lower cognitive reserve than non-offender patients, potentially due to lower levels of educational attainment, less stable employment histories, and less engagement in cognitively stimulating activities. This lower cognitive reserve may exacerbate the impact of neurocognitive disorders, leading to poorer outcomes in psychiatric rehabilitation.

In Italy, Judicial Psychiatric Hospitals (OPG) were officially closed in 2016. The closure process was initiated by March 31, 2015. The law was part of a broader reform aimed at shifting from a custodial model to a system that provided more humane care for individuals with mental illnesses who committed crimes. These individuals were gradually transferred to specific rehabilitation communities; they were also integrated with the other patients into Psychiatric Rehabilitation Communities. This shift raised concerns about the adequacy of existing rehabilitation programs to address the needs of these individuals, particularly regarding their cognitive reserve and neurocognitive functioning.

METHOD

Aim

This study aims to investigate cognitive reserve and neurocognitive functioning in a sample of patients placed in psychiatric rehabilitation communities, comparing offenders and non-offenders in terms of their cognitive profiles, psychopathological symptoms and overall disability that may interfere with personal and social functioning. The findings will contribute to understanding the role of cognitive reserve in psychiatric rehabilitation and inform the development of more effective, individualized treatment strategies.

Participants

The study included 59 psychiatric inpatients from several Psychiatric Rehabilitation Communities in Southern Italy, including “Don Tonino Bello” in Brindisi, “Citta Solidale” in Latiano, “EPASS” in Grottaglie, and SIR “Villa dei Pini” in Avellino. The sample consisted of 20 females (mean age: 45.45 years) and 39 males (mean age: 45.36 years). Of these, 24 patients were classified as offenders (mean age: 46.16 years) and 35 as non-offenders (mean age: 44.89 years). All participants met DSM-5 diagnostic criteria for various psychiatric disorders, including mood disorders, personality disorders, psychotic spectrum disorders, and schizophrenia, as determined by the SCID-5 CV (First et al. 2016).

Assessments

The following assessments were administered to all participants:

Clinical Scales:

- *Brief Psychiatric Rating Scale (BPRS)* (Overall & Gorham 1988): Measures the severity of psychopathological Symptoms.
- *Aberrant Salience Inventory (ASI)* (Cicero et al. 2010): Assesses aberrant salience experiences, often linked to psychotic symptoms.

Neurocognitive Scales:

- *Cognitive Reserve Index Questionnaire (CRIq)* (Nucci et al. 2012): Evaluates cognitive reserve based on years of education, occupational complexity, and engagement in leisure activities.
- *Estimated IQ (T.I.B.)* (Sartori et al. 1997): Provides an estimate of premorbid intelligence, based on general intelligence and reading ability. The TIB is then indicated for the evaluation of the premorbid intellectual level.

Measurement of Personal and Social Functioning:

- *World Health Organization Disability Assessment Schedule 2.0 (WHODAS 2.0)* (Üstün et al. 2010): an instrument developed to assess functioning, mainly in psychiatric inpatients.

Statistical Analysis

Descriptive statistics were used to summarize demographic and clinical characteristics. Independent t-tests were conducted using the EZAnalyze 3.1 Excel Platform to compare differences between offenders and non-offenders across various neuropsychological and clinical measures.

RESULTS

The tables show the results of the administered scales.

Epidemiological data

The mean years of education (Table 1) for the total sample was 12.36 years, with females averaging 12.71 years and males 12.18 years. Offenders had a lower

mean education level (11.42 years total, 15.50 females and 11.06 males) whit compared to non-offenders (13.01 years total, 12.39 females, 13.03 males).

Diagnostic Distribution (Table 2)

Mood disorders were the most common diagnosis, affecting 23.56% of the total sample, with a higher prevalence among non-offenders (42.86%) compared to offenders (20.83%). Personality disorders were present in 22.03% of patients, with similar distributions between offenders (20.83%) and non-offenders (22.85%). Psychotic spectrum disorders were more prevalent among offenders (37.50%) compared to non-offenders (5.71%), while schizophrenia was more common among non-offenders (28.57%) than offenders (4.16%).

Psychopathology and Functioning

The BPRS scores (Table 3) indicated that offenders had significantly lower psychopathological symptom severity (mean score: 41.50) compared to non-offenders (mean score: 53.92, $p<0.05$). Females among the offenders had notably higher BPRS scores (mean score: 59.5), counterparts (mean score: 39.86) while the score of non offenders males is significantly higher (54.77) in comparison whit offenders (39.86).

Aberrant Salience ASI scores (Table 3) were higher for non-offenders (mean score: 20.14) compared to offenders (mean score: 16.25), suggesting more pronounced experiences of aberrant salience in the non-offender group.

Cognitive Reserve (Table 3)

The non-offenders had a significantly lower mean CRIq score (31.43%) compared to offenders (20.83 medium high and 33.33% high store). The distribution of cognitive reserve levels also differed, with 25% of offenders classified as having low cognitive reserve, compared to 31.43% of non-offenders. In contrast, 33.33% of offenders had high cognitive reserve, while only 2.86% of non-offenders did.

Table 1. Epidemiological Data

	N	Age (yrs)		Education (yrs)		S		No smoking
		Mean age	St. Dev.(±)	Mean age	St. Dev.(±)	Mean age	St. Dev.(±)	
Total	59	45.39	10.93	12.36	3.41	11.19	8.60	27.12%
Females	20	45.45	7.85	12.71	2.77	9.15	8.74	35.00%
Males	39	45.36	12.31	12.18	3.71	12.21	8.46	23.00%
Offenders	24	46.16	12.39	11.42	3.50	14.42	8.78	20.83%
Females	2	49.00	11.31	15.50	3.53	8.5	12.09	50.00%
Males	22	45.86	12.67	11.06	3.33	14.95	8.59	18.19%
Non offenders	35	44.89	9.96	13.01	3.48	9.25	8.85	34.29%
Females	18	45.06	7.73	12.39	2.62	9.22	8.76	38.89%
Males	17	44.71	12.14	13.03	3.48	8.65	7.01	23.53%

Table 2. Diagnostic data in offenders and non-offenders

	Total			Offenders			Non-offenders		
	N	%	Age (mean y)	N	%	Age (mean y)	N	%	Age (mean y)
Mood disorders	20	23.56	47.95	5	20.83	53.60	15	42.86	46.07
Personality disorders	13	22.03	43.23	5	20.83	45.40	8	22.85	41.87
Psychotic spectrum disorders	11	18.64	44.81	9	37.50	44.89	2	5.71	44.50
Schizophrenia	11	18.64	44.73	1	4.16	35.00	10	28.57	45.60
Other	4	6.78	43.00	4	16.67	43.00	0	0	-
Total	59			24			35		

Table 3. Data BRPS, CRIq and ASI scales

	BPRS		CRIq		CRIq (percentage)					ASI	
	Mean Score	St. Dev. (±)	Mean Score	St. Dev. (±)	low	medium -low	medium	medim-high	high	Mean Score	St. Dev. (±)
Total	48.86	13.64	102.23	59.07	28.81	15.25	16.95	23.72	15.25	18.60	6.09
Females	53.75	7.64	92.45	26.31	25.00	15.00	25.00	35.00	-	20.05	4.22
Males	46.37	15.36	107.99	71.50	30.78	15.38	12.82	17.94	23.95	17.79	7.78
Offenders	41.50	16.91	126.76	88.82	25.00	16.67	8.33	20.83	33.33	16.25	7.19
Females	59.50	3.54	119.50	13.44	-	-	-	100	-	22.00	1.41
Males	39.86	16.71	126.73	94.11	8.33	16.66	4.16	12.50	41.67	15.72	7.29
Non offenders	53.92	7.72	88.92	27.26	31.43	14.26	22.86	28.56	2.86	20.14	4.69
Females	53.11	7.76	89.44	25.83	27.78	16.67	22.22	33.33	-	18.31	4.39
Males	54.77	7.81	88.35	29.49	35.29	11.76	23.53	23.53	5.88	20.47	5.10

Table 4. Data TIB, WHODAS 2.0 and EHI scales

	T.I.B.		WHODAS 2.0	
	Mean Q. I.	St. Dev. (±)	Mean Disability (%)	St. Dev. (±)
Total	101.20	13.05	59.74	11.20
Females	103.65	13.34	61.10	9.79
Males	99.97	13.35	58.94	12.02
Offenders	98.80	13.68	56.84	11.64
Females	110.16	4.02	67.50	3.35
Males	97.77	13.81	55.93	11.65
Non offenders	102.88	12.54	61.31	10.79
Females	102.93	12.88	60.39	10.59
Males	102.93	12.55	62.29	11.76

T.I.B. (Table 4)

Estimated IQ scores (T.I.B.) were slightly higher in non-offenders (mean IQ: 102.88) compared to offenders (mean IQ: 98.80).

Measurement of personal and social disability WHODAS 2.0 (Table 4)

WHODAS 2.0 scores revealed that non-offenders experienced greater overall disability (mean score: 61.31) compared to offenders (mean score: 56.84).

DISCUSSION

The study sought to explore the differences in cognitive reserve, neurocognitive functioning, and social disability between offender and non-offender psychiatric patients within a rehabilitation context. The results revealed notable distinctions between these two groups, particularly in the areas of cognitive reserve, severity of psychopathological symptoms, and social functionality.

Psychopathological Symptoms

One of the most striking findings was the lower severity of psychopathological symptoms among offender patients compared to non-offender patients, as evidenced by the Brief Psychiatric Rating Scale (BPRS) scores. This counterintuitive result might be explained by the structured environment in which the offender patients reside. Offender patients are often subjected to stricter controls and more consistent therapeutic interventions due to the legal framework of their rehabilitation, particularly within the context of mandatory security measures. These patients typically remain in the community for the entire duration of their rehabilitation, ensuring continuous exposure to therapeutic activities, medication adherence, and monitoring. Such a structured setting might mitigate the expression of severe psychopathological symptoms, leading to lower BPRS scores in this group. Aberrant psychotic thoughts, measured with the ASI, are also found to be less severe in offender patients.

Cognitive Reserve

The study also found that cognitive reserve was significantly higher among offender patients compared to non-offender patients. This finding can be attributed to the extended duration of rehabilitation that offenders often undergo, which includes ongoing cognitive and occupational therapies. The extended rehabilitation period may contribute to the enhancement of cognitive reserve, as the consistent engagement in cognitively stimulating activities, educational programs, and structured routines likely helps in maintaining or even increasing cognitive reserve over time. In contrast, non-offender patients may have more freedom to discontinue or engage less consistently in therapeutic programs, which might lead to lower cognitive reserve scores. Furthermore, the construct of cognitive reserve, proves to be more independent of premorbid IQ estimated of te T.I.B.

Personal and Social Disability

In contrast, social disability was found to be higher among offender patients, as indicated by the World Health Organization Disability Assessment Schedule 2.0 (WHODAS 2.0) scores. This heightened social disability could be due to difficulties in managing impulsivity, a common issue among individuals with a history of offending. Impulsivity can severely impact personal relationships, employment opportunities, and overall social integration, leading to greater challenges in achieving successful rehabilitation. Recent research supports the notion that impulsivity is closely associated with social dysfunction and poor integration outcomes, particularly in populations with antisocial tendencies.

CONCLUSION

The results of this study highlight the complex interplay between cognitive reserve, psychopathological symptoms, and social functionality in psychiatric rehabilitation patients. The finding that offender patients exhibit lower psychopathological symptoms and higher cognitive reserve, yet greater social disability, underscores the importance of developing tailored rehabilitation programs. These programs should account for the unique challenges faced by offender patients, particularly in enhancing social skills and managing impulsivity. Furthermore, the results suggest that the structured nature of rehabilitation programs for offenders might contribute positively to cognitive reserve and symptom management, though it also indicates a need for more targeted interventions to address the social disabilities prevalent in this group.

Future research should explore the long-term outcomes of these patients, particularly focusing on how improvements in cognitive reserve can be leveraged to reduce social disability and promote successful reintegration into society. Additionally, examining the role of specific interventions, such as cognitive-behavioral therapy or social skills training, in mitigating social disability among offender patients could provide valuable insights for refining rehabilitation strategies.

Implications for practice

- *Enhanced Rehabilitation Programs:* Given the higher cognitive reserve in offender patients, rehabilitation programs could benefit from integrating more cognitively demanding tasks and activities that further build on this reserve.
- *Targeted Social Skill Interventions:* Considering the higher social disability in offender patients, interventions focusing on social skills, impulse control, and community integration should be prioritized in this population.
- *Continuous Monitoring and Support:* The structured environment of offender rehabilitation appears to contribute to lower psychopathological symptoms, indicating that continuous monitoring and support play a crucial role in maintaining mental health stability.

In conclusion, this study provides important insights into the rehabilitation needs of psychiatric patients, particularly those with a history of offending, and underscores the necessity of personalized and continuous therapeutic interventions to optimize rehabilitation outcomes.

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Contribution of individual authors:

All authors made substantial contributions to the design of the study, and/or data acquisition, and/or its analysis and interpretation.

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