

The Influence of Substance Abuse on Inhibition Capacities and Risky Decision in a Group of Outpatient Schizophrenia Patients

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Abstract

Objective: Substance abuse is common among patients with schizophrenia, is related to worse course and outcome of illness. Unfortunately, little is known about how substance abuse affects the cognitive function of schizophrenia patients, whose cognitive function is often already comprised. Neurocognitive functioning includes inhibition control and decision-making, and both schizophrenia and substance use disorder are related to impairments of inhibition control. However, the influence of substance abuse on inhibition capacities among schizophrenia patients is unclear.

Methods: This study measured the influence of substance use disorder on inhibition capacities and risky decision-making in a group of 39 schizophrenia patients that were evaluated using a socio-demographic questionnaire and clinical assessment using the Positive and Negative Syndromes Scale for Schizophrenia. To assess inhibition control we utilized the Matching Familiar Figure Test (MFFT) and the Stroop task, and to evaluate decision-making we used the Iowa Gambling Task (IGT) and self-report questionnaire, the Barratt Impulsiveness Scale.

Results: Univariate analysis found significant differences between the groups with regard to criminal history ($\chi^2 = 5.97, p = .015$), smoking status ($\chi^2 = 12.30, p < .001$), and total BIS score ($t = -2.69, df = 37, p = .01$). Our model did not find a significant effect of substance abuse on the first response time and number of errors on the MFFT or in the total interference index of Stroop performance and net score on risky decision-making in the IGT. The two groups did not differ significantly either in first response time or in number of errors on the MFFT ($F = 0.54, p = .47, d = .24, 95\% \text{ CI } [-.4, .88]$; $F = .28, p = .60, d = .61, 95\% \text{ CI } [0, 1.26]$, respectively), nor did they differ in the total interference index of the Stroop task ($F(1) = .49, p = .49, d = .25, 95\% \text{ CI } [-.38, .88]$).

Conclusion: The analyses did not detect any statistically significant effect of substance abuse on inhibition control or risky decision-making processes in outpatients diagnosed with schizophrenia, despite increased impulsivity, criminal history and smoking status. These results neither support nor disprove previous findings.

Keywords: schizophrenia, substance abuse, neurocognitive tests, risky decisions, inhibition

Declaration of interest: Dr Kertzman is an employee of Animascan Ltd that provide the neurocognitive tests.

Table 1

Demographics and Clinical Differences between the Two Groups

	Schizophrenia	Dual Diagnosis	<i>p</i> value
<i>N</i>	21	18	NS
Demographics			
Age (years)			
<i>M (SD)</i>	34.86 (11.73)	34.11 (8.02)	0.821
Living with Family			
<i>n (%)</i>	11 (52.4)	15 (83.3)	0.088
High School Diploma			
<i>n (%)</i>	10 (47.6)	4 (22.2)	0.189
Completed Mandatory Army Service			
<i>n (%)</i>	5 (23.8)	5 (27.8)	1
Currently Employed			
<i>n (%)</i>	12 (57.1)	7 (38.9)	0.415
Receiving Disability Benefits			
<i>n (%)</i>	20 (95.2)	17 (94.4)	1
Comorbid Physical Illness			
<i>n (%)</i>	7 (33.3)	6 (33.3)	1
Carrier of a Hepatitis and-or HIV			
<i>n (%)</i>	0 (0.0)	1 (5.6)	0.938
Presence of Criminal History			
<i>n (%)</i>	2 (9.5)	9 (50.0)	0.015*
Number of Criminal Acts on Record			
<i>M (SD)</i>	0.29 (1.10)	2.28 (4.93)	0.08
Prior imprisonment			
<i>n (%)</i>	3 (14.3)	7 (38.9)	0.166
Clinical history			
Adherence to Medication Regimen			
<i>n (%)</i>	21 (100.0)	17 (94.4)	0.938

Alcohol Use			
<i>n</i> (%)	3 (14.3)	3 (16.7)	1
Not Smoking Cigarettes			
<i>n</i> (%)	12 (57.1)	0 (0.0)	<0.001***
History of Psychiatric Hospitalization			
<i>n</i> (%)	20 (95.2)	15 (83.3)	0.489
Past Involuntary Psychiatric Hospitalization			
<i>n</i> (%)	11 (52.4)	12 (66.7)	0.563
Attempted Suicide			
<i>n</i> (%)	2 (9.5)	6 (33.3)	0.15
Receiving IM Medication			
<i>n</i> (%)	6 (28.6)	7 (41.2)	0.638
Family history			
Family History of Substance Use Disorder			
<i>n</i> (%)	2 (9.5)	6 (33.3)	0.15
Family Psychiatric Hospitalization			
<i>n</i> (%)	8 (38.1)	10 (55.6)	0.442
PANSS			
Total PANSS Score			
<i>M</i> (<i>SD</i>)	52.19 (12.65)	54.00 (17.45)	0.71
Positive Subscale Score			
<i>M</i> (<i>SD</i>)	10.43 (3.19)	10.94 (4.68)	0.686
Negative Subscale Score			
<i>M</i> (<i>SD</i>)	17.14 (5.45)	16.44 (6.95)	0.727
General Subscale Score			
<i>M</i> (<i>SD</i>)	24.62 (5.56)	26.61 (8.33)	0.379
BIS-11			
Total BIS-11 Score			
<i>M</i> (<i>SD</i>)	59.38 (9.21)	68.11 (11.07)	0.011*

Attention Impulsivity Score			
M (SD)	14.71 (3.65)	18.17 (3.79)	0.006**
Non-planning Impulsivity Score			
M (SD)	24.14 (4.76)	24.67 (6.08)	0.765
Motor Impulsivity Score			
M (SD)	20.52 (3.49)	25.28 (3.75)	<0.001***

Note. M = Mean; SD = Standard Deviation.

* p ** p ***p

Table 2

Descriptive Statistics

	MFFT First response time		MFFT Number of errors		Stroop Total interference index	
	Schizophrenia	Dual diagnosis	Schizophrenia	Dual diagnosis	Schizophrenia	Dual diagnosis
Mean (ms)	16995	15132.111	3.524	2	387.157	320.589
Std. Deviation	8386.321	7302.37	2.909	2.449	255.154	284.061
Range	8979–41188	3829–33105	0–8	0–9	-229.2–912.9	8.3–1109.1

Note. ms = Milliseconds.

Table 3

*Comparison between patients with schizophrenia vs. dual diagnosis on performance variables:
ANCOVA*

MFFT: first response time						
Parameter	Sum of Squares	df	Mean Square	F	P	d
Dual Diagnosis vs. Schizophrenia	3.541e +7	1	3.541e +7	0.544	0.466	0.236
Age	42315.209	1	42315.209	6.503e -4	0.98	
Criminal History	1.010e +8	1	1.010e +8	1.553	0.222	
Smoking Status	317376.494	1	317376.494	0.005	0.945	
Total BIS score	2.191e +7	1	2.191e +7	0.337	0.566	
Residual	2.147e +9	33	6.507e +7			

MFFT: number of errors						
Parameter	Sum of Squares	df	Mean Square	F	p	d
Dual Diagnosis vs. Schizophrenia	2.197	1	2.197	0.277	0.602	0.613
Age	3.136	1	3.136	0.396	0.534	
Criminal history	3.527	1	3.527	0.445	0.509	
Smoking status	1.603	1	1.603	0.202	0.656	
Total BIS score	0.463	1	0.463	0.058	0.81	
Residual	261.483	33	7.924			

Stroop: total interference index						
Parameter	Sum of Squares	df	Mean Square	F	p	d
Dual Diagnosis vs. Schizophrenia	34659.019	1	34659.019	0.486	0.491	0.248
Age	207805.467	1	207805.467	2.913	0.097	
Criminal History	41022.81	1	41022.81	0.575	0.454	
Smoking status	53885.749	1	53885.749	0.755	0.391	
Total BIS Score	2685.524	1	2685.524	0.038	0.847	
Residual	2.354e +6	33	71336.714			

Table 4

Results of Mixed Multiple Linear Regression Model

Fixed effects	Estimate	Standard Error	Df	t value	Pr (> t)
Trial (1:5)	0.38	0.21	44.09	1.79	0.08
Dual Diagnosis	0.86	1.2	42.59	0.71	0.48
Age	-0.01	0.04	42.59	-0.18	0.86
Smoking Status	1.28	1.14	42.59	1.12	0.27
Criminal History	-1.41	1	42.59	-1.41	0.16
Total BIS Score	0	0.04	42.59	-0.05	0.96

Note. The lmer function automatically calculates *t*-tests using Satterthwaite approximations to degrees of freedom.

