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Aggressivity in Schizophrenia: The Risk and Confounders in a Romanian Setting

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Abstract: *There is an increased stigma in Romania regarding schizophrenia patients, who are thought to be violent and dangerous. However, there is little research on this topic that analyzes the exact risk of aggressive behavior, especially considering the high prevalence of alcohol and substance abuse, conditions also associated with a potential risk of violent behavior. The objectives of this study were to compare aggressivity levels between patients with schizophrenia admitted to an emergency hospital and healthy individuals and to find possible risk factors. This case-control study, matched for age and gender included 50 patients hospitalized for schizophrenia and 50 healthy participants from an emergency psychiatric facility in Romania. We collected demographic data and screened for major mental disorders using the Mini International Neuropsychiatric Interview (MINI). Aggressivity levels were measured with the Buss-Perry Aggression Questionnaire (BPAQ). The CAGE questionnaire and the Drug Abuse Screening Test (DAST-10) were used to screen for alcohol and substance use disorder. The results highlighted a 3.93 times increase in aggressivity in the schizophrenia group, with the involvement of specific violent domains. Younger men with alcohol abuse had a higher risk of violent acts. Schizophrenia patients appear to present an increased risk of violence, but this must be carefully assessed and confounders considered. Public health programs are needed to increase treatment compliance and decrease alcohol and other psychoactive substances consumption.*

Keywords: *schizophrenia; aggressive behavior; violence.*

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1. Introduction

Schizophrenia is a chronic severe mental disorder, affecting approximately 0.5-1% of the population, characterised in the Diagnostic and Statistical Manual of Mental Disorders, Fifth Edition (DSM-5) by the presence of positive symptoms (hallucinations, delusions, disorganised speech, and behavior) and negative symptoms such as anhedonia, avolition, alogia, and affective flattening (American Psychiatric Association, 2013).

Even though psychotic patients have a much higher risk of becoming a victim of violence, they also show a potential for delusional motivated crimes, sometimes executed in a bizarre manner, constituting 5-20% of all homicides (Nielssen & Large, 2010; Wehring & Carpenter, 2011). The prevalence of aggressive behavior among schizophrenia patients was reported to be two up to ten times higher than in the general population (Fazel et al., 2009). This increases the stigmatization from the general public and deepens their social isolation (Wehring & Carpenter, 2011).

Predictive factors for aggressiveness include the male gender, low educational level, low income, being single, unemployed, being a victim of child physical or sexual abuse, and certain premorbid personality traits such as lack of frustration tolerance and empathy, mistrust and the inability to assume responsibility (Caruso et al., 2021; Iozzino et al., 2015; Siserman, Gyorgy, et al., 2022; Spidel et al., 2010). The predominance of positive symptoms such as imperative auditory hallucinations, persecutory delusions, as well as lack of insight, low treatment compliance, multiple psychiatric hospitalisations, especially involuntary admissions are predictors for violent behavior (Caruso et al., 2021; Cornaggia et al., 2011; Dack et al., 2013; Iozzino et al., 2015; Rund, 2018). Nevertheless, the highest rate of homicides, around 40%, are committed during the first psychotic episode (Rund, 2018). In some cases, legal guardianship is needed in order to hospitalise the patient without his consent to prevent him from acting on violent threats (Perju-Dumbrava et al., 2020). Other special circumstances, such as the recent COVID-19 pandemic, during which access to psychiatric care was restricted and alcohol abuse was increased, led to an increase in violent acts both from the general population and from psychiatric patients (Ahn et al., 2021).

The neurobiological basis of aggressive behavior in schizophrenia patients is complex and comprises anatomical structures, neurotransmitters, genes, and inflammatory markers. Current literature depicts heterogeneous results regarding anatomical structures involved in violent behavior. A distinction between areas affected by aggression and those affected by schizophrenia itself must be made. A recent article compared schizophrenia patients with violent history, patients without such history, and healthy controls using brain imaging techniques (Lu et al., 2024). They described a smaller gray matter volume in the right insula in the violent schizophrenia group compared with the non-violent schizophrenia group. They observed a decreased gray matter volume in the right temporal pole and the left orbital part of the superior frontal gyrus only in the violent schizophrenia group compared to the healthy control group. Moreover, they presented a positive link between gray matter volume in the areas of the left superior temporal gyrus, bilateral insula, and left medial orbital part of the superior frontal gyrus and impulsivity in the violent schizophrenia group. The findings also agree with those of previous studies. (Kuroki et al., 2017; Nummenmaa et al., 2021; Tiihonen et al., 2008; Wylie & Tregellas, 2010) On the matter of genetic predisposition to violence, the most incriminated gene appears to be the COMT gene (especially for methionine [Met] homozygotes) but also MAO-A and DRD4. (Soyka, 2011). Some inflammatory markers (tumor necrosis factor alpha – TNF α and interleukins-1, 4, 6, and 10) are also presumably involved in the pathogenesis of violent behavior (Fritz et al., 2023). Several neurotransmitters play a role in the modulation of aggressive behavior. Thus, activation of the 5-HT_{2A} and 5-HT₃ serotonin receptors (Popova et al., 2022), DAT blockade, a lower density of type 2 Dopamine receptors (D2, D3, D5) in the caudate and putamen (Lukkarinen et al., 2024; Ruchkin et al., 2021; Suri et al., 2023), GABA_A receptor inhibition (Chaibi et al., 2021; Jager et al., 2020) and AMPA Glu3 receptor dysfunction were all associated with an increase in aggression (Peng et al., 2022). Nevertheless, the involvement of external factors, such as alcohol and psychoactive substances must be considered.

Alcohol and substance use disorder, especially cannabis (AUD and SUD), are associated with violent behavior due to disinhibition, increased impulsiveness, and an increase in psychotic symptoms, such as paranoid delusions (Ahn et al., 2021; Archibald et al., 2019; Dervaux et al., 2010; Moulin et al., 2022).

Our study aims to assess aggressivity levels in schizophrenia patients compared to the general population and to find potential risk factors for this type of behavior in a Romanian sample from Transylvania.

2. Material and methods

We conducted an observational case-control study including 50 adult patients admitted for a schizophrenia diagnosis (according to DSM-5 criteria) in the Psychiatry Department of Cluj County Clinical Emergency Hospital, Romania between July and September 2023 and 50 healthy individuals matched for age and gender. The patients were selected from an emergency hospital, not a forensic setting. We excluded patients with another comorbid psychiatric diagnosis except alcohol and other substance use disorders. The control group consisted of individuals, aged between 18 and 71, selected from the general population. Data were collected through an anonymous self-administered questionnaire distributed via online platforms. Only individuals who explicitly reported no history of psychiatric disorders were included in the control group. Participants provided informed consent before completing the questionnaire.

2.1. Ethical Aspects

All participants were older than 18 years and signed the informed consent and GDPR forms. No financial incentive was offered. The study followed the Declaration of Helsinki's ethical guidelines. The research was approved by the Ethical Committee of Iuliu Hațieganu University of Medicine and Pharmacy in Cluj-Napoca (registration number 119/26.06.2023).

2.2. Questionnaires

We collected demographic information: age, gender, education, marital status, monthly income (less than 2000 RON, 2000-4000 RON and more than 4000 RON).

The Mini International Neuropsychiatric Interview (MINI) was used to screen for psychiatric disorders (major depressive episodes, manic or hypomanic episodes, anxiety disorders, obsessive-compulsive disorder, posttraumatic stress disorder, alcohol and substance use disorder, psychotic episode, anorexia nervosa, bulimia nervosa and antisocial personality disorder) (Sheehan et al., 1998).

The Buss-Perry Aggression Questionnaire (BPAQ) is a self-reporting inventory comprising 29 questions subdivided into four factors: physical and verbal aggression, anger, and hostility. A total aggressivity score as well as four subdomain scores can be obtained (Buss & Perry, 1992).

The Modified Overt Aggression Scale (MOAS) is an instrument used by the clinician to assess the patient's aggressive behavior in the previous week. It is applied by the health professional after the psychiatric interview with the patient and their family and consists of four domains: verbal aggression, aggression against objects, against self, and others (Kay et al., 1988).

The CAGE Questionnaire is a four-question screening test for AUD in the previous 12 months. Each affirmative answer represents one point. More than two points are suggestive of an AUD (Ewing, 1984).

The Drug Abuse Screening Test (DAST-10) is a ten-question screening questionnaire for psychoactive substance use, not including alcohol or nicotine. More than three points indicate problematic substance consumption (Skinner, 1982).

2.3. Statistical Analysis

We performed a descriptive analysis of the data expressed as means $\pm$ SD, absolute values, and fractions. The Kolmogorov-Smirnov and Shapiro-Wilk tests were used to analyse the distribution of continuous variables. The chi-square and Fisher's exact test were used for comparing categorical variables and Student t or Mann-Whitney U test were employed to compare continuous variables. Spearman's rank correlation coefficient (rs) was used to test the relationship between the two variables. We used a linear regression model to evaluate each variable's impact on aggressivity scores. The significance level was set at $P < 0.05$. The statistical analysis was performed with IBM SPSS Statistics, version 26.0.

3. Results

We included 50 schizophrenia patients and 50 healthy individuals, matched for gender (74% male) and age (42.2 ± 12.6 years). Their demographic characteristics are shown in Table 1 and Figure 1. Schizophrenia patients were significantly less educated, with a smaller income, and more likely to be single. AUD and SUD were equally prevalent.

Table 1. Demographic characteristics of participants

#		Schizophrenia Group - N (%) = 50	Control Group - N (%) = 50	p
1	Education			
	<8 years	8 (16%)	1 (2%)	0.001
	High school	29 (58%)	16 (32%)	
	University	13 (26%)	33 (66%)	
2	Marital Status (Single)	35 (70%)	23 (46%)	0.021
3	Income			
	<2000 RON	40 (80%)	7 (14%)	0.001
	2000-4000 RON	8 (16%)	14 (28%)	
	> 4000 RON	2 (4%)	29 (58%)	
4	Alcohol use disorder	15 (30%)	12 (24%)	0.653
5	Substance use disorder	4 (8%)	5 (10%)	0.727

In Table 2 we presented the aggressivity scores. Schizophrenia patients had significantly higher total scores than the healthy control group in both BPAQ and MOAS. Furthermore, the verbal aggression domain was not significantly different in both questionnaires. Also, the MOAS domain of aggression against others was similar between the two groups.

Considering a cut-off value of 3 points of the MOAS score, the incidence of aggressive behavior was 58% in the schizophrenia group compared to 26% in the control group and an odds ratio of 3.93 times (95%CI 1.68-9.15) to engage in violent acts.

Table 2. Aggressivity levels according to the Buss-Perry Aggression Questionnaire (BPAQ) and the Modified Overt Aggression Scale (MOAS)

#		Schizophrenia Group	Control Group	p
1	BPAQ Total ^a	69.24 $\pm$ 18.83	59.52 $\pm$ 14.63	0.007
	Physical aggression	19.2 $\pm$ 7.84	15.6 $\pm$ 5.83	0.02
	Verbal aggression	13.5 $\pm$ 3.64	12.9 $\pm$ 3.69	0.353
	Anger	16.22 $\pm$ 5.21	14.1 $\pm$ 5	0.028
	Hostility	20.32 $\pm$ 6	16.92 $\pm$ 4.47	0.002
2	MOAS Total	5.8 $\pm$ 6.55	2.2 $\pm$ 3.18	0.004
	Verbal aggression	1.12 $\pm$ 0.98	0.94 $\pm$ 0.76	0.416
	Aggression against objects	1.68 $\pm$ 2.11	0.72 $\pm$ 1.65	0.005
	Aggression against self	2.04 $\pm$ 3.85	0.06 $\pm$ 0.42	0.001
	Aggression against others	0.96 $\pm$ 2.49	0.48 $\pm$ 1.31	0.499

^aExpressed as mean $\pm$ Standard deviation (Man-Whitney test)

We used linear regression models to assess the impact of each variable on the total aggressivity scores on the BPAQ and MOAS. In Table 3, we analysed the influence of each variable

on the BPAQ and observed that age was inversely correlated with aggressivity (being one year older decreased the aggressivity by 0.473%), and alcohol use increased the score by 27.711% (B value), by far the most influential variable. The total aggression score was not significantly higher in the schizophrenia group than in the control group.

Table 3. Linear regression model for the variables influencing the total aggression score for the Buss-Perry Aggression Questionnaire (BPAQ)

#	Model	Unstandardised Coefficients		Standardised Coefficients	t	p
		B	Std. Error	Beta		
1	(Constant)	87.568	7.484		11.7	0.001
2	Case/Control group	5.412	3.195	0.156	1.694	0.094
3	Gender	-4.087	2.798	-0.103	-1.460	0.148
4	Age	-0.473	0.120	-0.339	-3.927	0.001
5	Marital status	1.117	2.108	0.045	0.530	0.598
6	Income	-1.340	2.013	-0.067	-0.666	0.507
7	Education	-2.339	1.767	-0.112	-1.324	0.189
8	Alcohol use disorder	27.711	2.884	0.554	7.527	0.001
9	Substance use disorder	-0.385	4.659	-0.006	-0.083	0.934

The MOAS total score (Table 4) was increased by 3.877% (B value) in the schizophrenia group. Also, being a younger man with an alcohol use disorder significantly increased his aggressivity level. There was not a significant difference between the two groups in both MOAS and BPAQ on scores regarding marital status, income, education, and substance use disorder.

Table 4. Linear regression model for the variables influencing the total aggression score for the Modified Overt Aggression Scale (MOAS)

#	Model	Unstandardised Coefficients		Standardised Coefficients	t	p
		B	Std. Error	Beta		
1	(Constant)	10.910	2.835		3.848	0.001
2	Case/Control group	3.877	1.21	0.358	3.203	0.002
3	Gender	-2.647	1.060	-0.215	-2.497	0.014
4	Age	-0.177	0.046	-0.409	-3.885	0.001
5	Marital status	0.736	0.799	0.095	0.921	0.359
6	Income	0.390	0.763	0.063	0.512	0.610
7	Education	-0.27	0.669	-0.042	-0.404	0.687
8	Alcohol use disorder	2.652	1.093	0.218	2.427	0.017
9	Substance use disorder	0.930	1.765	0.049	0.527	0.599

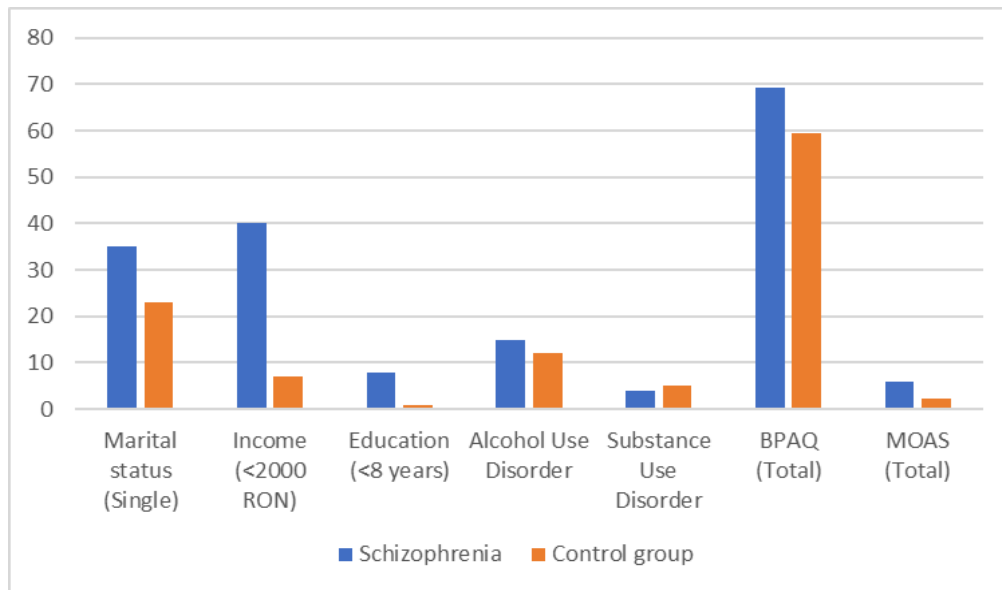


Figure 1. Demographic and total aggression scores in BPAQ and MOAS questionnaires

4. Discussion

Our study showed an increased level of aggression in our schizophrenia group in both BPAQ and MOAS questionnaires. This finding remained significant in the linear regression model for the MOAS total score but failed to reach significance on the BPAQ total aggressivity score.

Schizophrenia patients were 3.93 times more likely to engage in violent behavior, in accordance with the 2-10 times increase reported in the literature (Fazel et al., 2009; Rund, 2018). Verbal aggression scores were similar between the two groups, possibly due to the negative symptoms, such as blunting of affect and poverty of speech (Buchanan et al., 2019). Significant differences were observed for anger, hostility, and physical aggression items on BPAQ and aggression against objects and aggression against self domains on MOAS. Given that the schizophrenia group was constituted entirely of inpatients, the higher scores could be a result of severe positive symptoms of schizophrenia, but could also be attributed, in part, to the impact of involuntary psychiatric admission (Li et al., 2020), particularly anger and hostility. Surprisingly, the MOAS aggression against others domain showed no difference in the schizophrenia group. This might be due to one of the limits of our study, the dissimulative attitude of some patients, and the fact that the most psychotic and hostile patients refused to participate in the study. An important remark regarding aggression against others would be, as mentioned by Rueve et al. (Rueve & Welton, 2008) that victims of violent behavior manifested by mentally ill patients are usually known to the patient, in comparison to non-psychiatrically ill criminals, who may manifest violence towards strangers (often concerning alcohol and substance abuse).

The heterogeneous results obtained on specific subtypes of the violence scales highlight the importance of understanding the dimensions of aggressive behavior, beyond the most common “aggression against others” domain. This could help understand the complexity of schizophrenia patients for both medical health providers and the general population and encourage a personalised approach and treatment protocol for each patient. When assessing violence risk, it is essential to thoroughly analyze the confounding conditions. Being a younger male with alcohol use disorder significantly increased the risk for violent behavior, as demonstrated by the linear regression models for both MOAS and BPAQ. By far, the most important risk factor of aggressivity in our study was alcohol consumption. Alcohol use increases the frequency of violent acts both in the general population and especially in the case of schizophrenia patients. According to the WHO 2024 report, Romania has the highest alcohol consumption globally, with an average daily intake of 36.9 grams of pure alcohol and a total alcohol per capita consumption of 17 liters of pure alcohol. (Global

Status Report on Alcohol and Health and Treatment of Substance Use Disorders, 2024) Treating AUD could reduce aggression and hospitalization rates and improve the overall quality of life of psychotic patients (Ahn et al., 2021; Archibald et al., 2019).

Although our study showed no significant influence of SUD on aggressivity scores, other studies indicated a major impact of substance abuse on the prevalence of violent behavior. (Lamsma & Harte, 2015; Rueve & Welton, 2008) Rund described in his review comorbid substance abuse in schizophrenia as “the most severe form of violence”. (Rund, 2018).

Steadman et al. reported no statistical difference in aggressive behavior between the general population and treatment-compliant schizophrenia patients without alcohol or other substance abuse, a year after discharge from the hospital (Steadman et al., 1998). Other studies reported only a moderate decrease in violent acts after adjusting for substance abuse but found an increase in aggression in siblings of schizophrenia patients, suggesting genetic and environmental factors are not necessarily linked to a psychotic episode (Fazel et al., 2009).

An important limitation of our study derives from the population with schizophrenia investigated. The study evaluated patients admitted to the hospital through the psychiatric emergency room. The reasons for admission were various, the most common being the worsening of positive symptoms. Thereby, the assessed risk of violence of these patients could have been greater than in the outpatient community, considering that schizophrenia patients with treatment-controlled symptoms do not usually present in the emergency room. Further research on this topic is in progress. An important limitation of our study was the small sample size, leading to mixed results, part of which were not statistically significant. In addition, there was a small proportion of individuals with substance use disorder, thus explaining the lack of association with aggressivity, in opposition to the literature. (Buchanan et al., 2019; Fazel et al., 2009). Although the prevalence of SUD is high (10.7% of people between 18 and 64 years old declared they have used at least one illicit drug in their life, 6% in the last year, according to the National Antidrug Agency from Romania), many patients with a substance use disorder comorbidity refused to participate in our study, leading to a low representability for this category of patients.

The particularity of our study was the investigation of violent behavior in schizophrenia patients from Romania, an Eastern European country with a high level of stigmatization of mental illness. As discussed by Popescu and colleagues (Popescu et al., 2017) the Romanian culture is not as lenient regarding mentally ill patients as other Western European cultures. (Krendl & Pescosolido, 2020) Moreover, people are taught to stigmatise and be afraid of psychiatric patients, who are considered dangerous. That is emphasised by a faulty media representation of mentally ill individuals. Nawka et al., (2012) analysed the printed media from the Czech Republic and Slovakia and found that most papers that described mentally ill persons' involvement in acts of violence, depicted them as perpetrators (71.8%), thus preserving stigma (Nawka et al., 2012). A study comparing populations from Russia and the United States found that people from both states considered schizophrenia patients as unpredictable and dangerous, with a higher extent in the Russian population (Nersessova et al., 2019). However, there is little research on this topic from our country.

Therefore, it was important to assess the exact risk of violence of these patients and the comorbid conditions that influence this risk. As discussed above, alcohol and substance abuse are important mediating factors for aggressive behavior. Better public health policies for treating these conditions, especially in a country with a high level of addiction, might significantly reduce the violent behavior in both schizophrenia patients and individuals with such a diagnosis.

5. Conclusion

To conclude, the risk of aggression in schizophrenia patients appears to be increased compared to the general population. However, different violence subtypes show various levels of involvement. Significant increases were seen for the items of physical aggression, anger, and hostility in the BPAQ and aggression against objects and self in the MOAS scale. The total scores

were significantly increased in both scales but lost significance for the BPAQ after linear regression. Moreover, comorbidities such as alcohol and substance abuse disorders must be considered. Younger men with alcohol abuse were found to have a higher risk of violent acts. Public health policies are needed to increase treatment compliance and the primary and secondary prevention of alcohol and other substance use disorders. More research on this topic is required before reaching firm conclusions.

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