Diagnosis of Schizophrenia Using Statistical Analysis of Assessment Tools

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Abstract. Schizophrenia is a severe mental disorder that impacts a person's thought process, perception, social interaction, and interpersonal relationships. This disorder causes psychosis that makes a person feel disconnected from the real world. There are three types of symptoms, namely positive, negative and cognitive symptoms. Different assessment tools are designed based on the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) and the International Classification of Diseases (ICD-11) in order to assess the severity of symptoms. The Positive and Negative Symptoms Scale (PANSS), Brief Negative Symptom Scale (BNSS), Scale for Assessment of Negative Symptoms (NSA-16), and Scale for Assessment of Positive Symptoms (SAPS) are the evaluation instruments that are used in this paper to identify the symptoms. Each scale comprises 20 questions related to symptoms, and these are self-report questionnaires. Participant responses are collected from both online and offline modes. Statistical techniques, such as Analysis of Variance (ANOVA), T-test, and Chi-square test, are used to determine the validity and reliability of the data for both healthy controls and individuals with schizophrenia. The statistical results showed that the validity of the data was measured in terms of p-value for assessment scales. For healthy controls, the p-values for PANSS, SAPS, and BNSS were found to be 0.305, 0.948, and 0.565, respectively. Similarly, for schizophrenia patients, the p-value of PANSS was found to be p=0.007, SAPS was found to be p=0.611, and BNSS was found to be p=0.637. The validity data from schizophrenia patients for PANSS alone revealed a significant difference since the p-value was <0.05, whereas there was no significant difference in the remaining scales. Though this approach has proven to be promising in identifying the severity of symptoms, it can still be enhanced by combining a statistical approach with multimodal data for better performance.

Keywords: Reliability of data, Schizophrenia, Severity of symptoms, Statistical analysis, Validity of data.

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1 Introduction

Schizophrenia is a serious chronic mental illness that disrupts a person's thinking ability, expression, concentration and memory of a person. Schizophrenia is caused by various factors that include environmental, physical, psychological, and genetic factors. Nearly 1% of people suffer from schizophrenia worldwide. This disorder is characterised by hallucination, delusion, disorganized thoughts, and cognitive symptoms. Treatment plans and patients' outcome highly depends upon accurate and early diagnosis. The traditional method of diagnosis uses clinical and psychiatric interviews that are biased. Nowadays, the combination of statistical methods with machine learning has emerged as an appropriate approach in enhancing the accuracy of diagnosis through assessment tools and biomarker data. This paper examines the various statistical approaches used for identifying the patterns of schizophrenia through clinical and laboratory assessment data. This integration of various assessment tools and statistical approaches reveals reliable patterns and biomarkers that are key factors in diagnosing at an early stage. The results and findings enable enhanced therapeutic interventions and decision-making by expanding the early, objective, and reproducible diagnosis of schizophrenia. The following fig.1 portrays the block diagram of the diagnosis of schizophrenia using statistical analysis.

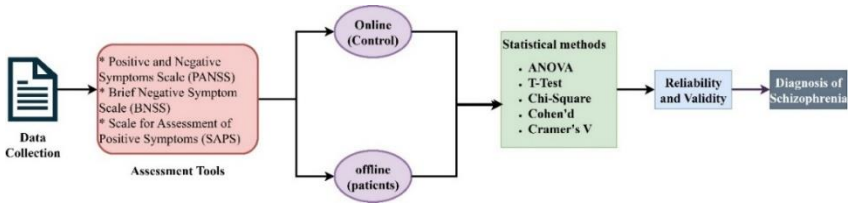

Fig. 1. Diagnosis of Schizophrenia using Statistical Analysis

2 Related Work

Diagnosis of schizophrenia using statistical approaches and tools has been used in different scenarios for evaluating the diagnostic accuracy. Various statistical methods and techniques have been explored and discussed in recent research papers. Through the analysis of neuroimaging, behavioral, and clinical assessment data, the effective diagnosis of schizophrenia is explored on biological and clinical markers [1]. The precision of schizophrenia is investigated through brain connectivity patterns and the correlation between symptoms. Using a multimodal approach, data is collected through assessment tools, participating groups, and evaluated through statistical analysis. The results showed that altered brain connectivity, correlations, and cognitive and emotional biomarkers contribute to distinguishing healthy controls from schizophrenia patients. Limited sample size, design, medication effects and multi-centre replication are some of the drawbacks of this system.

Biomarkers and cognitive correlations are identified using behavioral and neuroimaging tests for effective diagnosis of schizophrenia [2]. Better diagnosis and enhanced diagnostic accuracy can be achieved through analysis of structural and

functional brain changes, observing clinical symptoms, cognitive impairments and psychometric test results. This analysis involves a cross-sectional and quantitative research design approach for better prediction. The results showed that schizophrenia patients displayed significant changes in brain connectivity. These neurobiological and psychometric indicators help in enhancing the diagnosis and treatment plans. The usage of single-site data limits the validity and replication potential of the system.

To assess the safety and efficacy of an emerging treatment or intervention for schizophrenia with an emphasis on clinical, cognitive and functional outcomes [3]. This analysis is compared with the standard treatment and identifies significant changes that lower the severity of symptoms. This study followed a randomised, double-blind, controlled clinical trial design and was analyzed through PANSS and cognitive performance tests. The results are evaluated through t-test, ANOVA and regression analysis. The statistical results supported the clinical efficacy of the intervention in managing schizophrenia symptoms. This system requires longitudinal and multi-centre trials for robustness.

To assess the negative symptom dimensions in amotivation/pleasure (MAP) and diminished expression (EXP) of first-episode schizophrenia (FES), sex differences and psychosocial functioning of patients for the past year are analyzed [4-5]. This can be estimated using a multicenter, naturalistic, and longitudinal study following the patients for three years. PANSS, Montgomery-Asberg depression rating scale (MADRS) and young mania rating scale (YMRS) are used for assessing clinical symptoms and Global Assessment of Functioning (GAF), functioning assessment short test (FAST), premorbid adjustment (PAS) and cognitive reserve are used for assessing the functional symptoms. The results proved that fewer negative symptoms were shown in females than males and also showed better premorbid adjustment with $R^2 = 0.494$ and $p<0.001$.

The effect of a social skills training program on social skills, quality of life, and stigma levels is evaluated in patients diagnosed with schizophrenia [6]. This is analyzed using a quasi-experimental and one-group pretest-post-test design, and the severity of symptoms is evaluated through the social skills questionnaire, quality of life scale, and internalised stigma of mental illness scale (ISMIS) assessment tools. Results showed that social skills positively correlated with quality of life, with $r = 0.864$ and $p<0.001$ and social skills negatively correlated with stigma, with $r = 0.843$ and $p<0.001$. Further research can be done with larger, randomised control trials.

To enhance the cultural competence of healthcare providers and reduce racial disparities in the overdiagnosis of black patients, a single-group pretest-posttest quality improvement is designed [7]. A 7-hour cultural competemility training (CCT) and BPRS-24 are used for training intervention. Results showed that out of 64 patients, 40.6% patients were misdiagnosed with schizophrenia. Misdiagnosis rates were equal, showing enhanced equity in diagnostic clarity. The Childhood Experiences International Questionnaire (ACE-IQ) assessment tool is used to examine the relationship between adverse childhood experiences (ACEs) [8-9]. 95% reported at least one ACE. To assess the mental health screening at prison entry in Australia and test their concurrent validity and predictive validity, an observational,

prospective and longitudinal study was conducted [10]. 291 participants were randomly selected from 7685 people entering custody. Screening is done through self-reported psychiatric history, psychological distress, and a clinical consensus algorithm. Concurrent validity results showed moderately valid (AUC >0.70), predictive validity showed lower validity (AUC 0.58-0.71).

To assess the changes in clinical symptoms, cognitive flexibility, quality of life, and functioning through a befriending program that helps in the diagnosis of schizophrenia or schizoaffective disorders [11-13]. This program is conducted through a 4-week befriending session, which is focused on neutral conversation topics that address therapy-specific goals. The progress is evaluated through assessment tools like PANSS, NSA-16, cognitive flexibility scale (CFS), quality of life enjoyment and satisfaction questionnaire, and perceived stress scale (PSS). Results showed a significant decrease of about $p=0.034$ in the PANSS general anxiety scale. This method reduces isolation. Similarly, the diagnosis of schizophrenia was established by examining the test-retest reliability, internal consistency, and practice effect of the Test of Visual Perceptual Skills-4th edition (TVPS-4) [14]. TVPS-4 was administered twice every two weeks for about 80 adults with schizophrenia. Results showed that the overall scale displayed excellent test-retest reliability, with an ICC of 0.93 and a correlation coefficient of 0.95. The relationship between schizophrenia related traits and spatial attention biases using motion-induced blindness (MIB) is analyzed through horizontal and vertical visual field biases [15]. The severity of symptoms was measured using the schizotypal personality questionnaire (SPQ) and perception aberration scale (PAS). The smartphones used by youngsters can be used for self-monitoring psychiatric symptoms and measuring their validity and reliability [16]. The app showed high test-retest reliability with ICCs ranging from 0.741 to 0.876 and all significant at $p<0.001$.

The reliability and validity of the Turkish version of the assessment of positive occupation-15 (APO-15) were investigated in people having serious mental illness [17-18]. This study used a cross-sectional validation design, with data collected face-to-face during routine patient follow-ups. This APO-15 showed a better result in confirmatory factor analysis (CFA) with CFI=0.964 and TLI =0.955. To assess the food addiction symptoms in patients with first-episode schizophrenia (FES), the modified Yale food addiction scale (mYFAS), PANSS, and global assessment for functioning (GAF) scales are used [19]. Data is collected from schizophrenia patients, siblings and healthy controls. Food addiction was significantly higher in FES patients at about 32.1%. Similarly, the validity and reliability can be measured for the Persian translation of the paranoia scale (PS) [20]. Paranoid thoughts were measured among non-clinical young adults through online surveys and assessment tools. These data are validated through principal component analysis (PCA) and CFA.

3 Methodology

3.1 Data Collection and Analysis

The sample for this study was collected through two methods. Control data was collected through online mode, where PANSS, SAPS, and BNSS questionnaires were circulated among the public by Google Forms. Patient data is collected from SRM Hospital College and Research Centre, where questionnaires are administered to patients in the presence of attenders by investigators, and responses are selected based on the investigation.

Participants are screened based on the inclusion and exclusion criteria. The inclusion criteria include: i) participants should be between late teens (early twenties) and early thirties in age. ii) should satisfy at least one of the symptoms of delusions, hallucinations, or disorganized speech when observed during a period of one month. The exclusion criteria include: i) participants having a history of autism spectrum disorder, communication disorder of childhood, schizoaffective disorder, or depressive or bipolar disorder with psychotic features are excluded from the study.

Nearly 45 responses were collected online, out of which 13 participants were male and 32 members were female, for control data, with an age group of 25 to 50 years. Similarly, for patient data, nearly 57 responses were collected offline, consisting of 35 female and 22 male patients with an age group of 17 to 73 years. Each participant was asked to fill out all three questionnaires, where each questionnaire scale consists of 20 questions related to the symptoms. All responses were numerically coded using a Likert scale (1 = strongly disagree and 5 = strongly agree). Thus, all the responses were converted into codes, and the total score was calculated. Based on the total score obtained in each scale, a threshold score of 60 or higher was set for both control and patient data. In the PANSS screening control data, 31 out of 45 participants (11 male and 20 female) showed a total score below the threshold, while the remaining 14 participants had a score above the threshold and were therefore excluded from the study. Similarly, in the PANSS patient data, N=23 patients out of 57 (10 male and 13 female) showed a total score more than the threshold, and the remaining 34 patients showed a score less than the threshold due to various reasons, such as patients were in regular follow-ups, a few showed depressive and psychotic symptoms. Hence, these 34 patients were not included in the study. In the SAPS screening control data, N=38 participants out of 45 (26 female and 12 male) showed a total score less than the threshold, and the remaining 7 participants showed a score greater than the threshold, so they were not included in the study. Similarly, in the SAPS patient data, N=18 patients out of 57 (7 male and 11 female) showed a total score more than the threshold, and the remaining 39 patients showed a total score less than the threshold due to various reasons, such as patients were in regular follow-ups, a few showed depressive and psychotic symptoms.

Hence, these 39 patients were not included in the study. In the BNSS screening control data, N=32 participants out of 45 (12 male and 20 female) showed a total score less than the threshold, and the remaining 13 participants showed a score greater than the threshold, so they were not included in the study. Similarly, in the BNSS patient data, N=19 patients out of 57 (9 male and 10 female) showed a total

score more than the threshold, and the remaining 38 patients showed a total score less than the threshold due to various reasons, such as patients were in regular follow-ups, a few showed depressive and psychotic symptoms. The statistical analysis is done using Python software.

3.2 Assessment Scales

The PANSS screening is composed of 20 questions organized into three subscales to measure positive, negative, and general psychopathology symptoms. Each item is rated on a severity scale that ranges from 1(strongly disagree) to 5(strongly agree). out of the 20 questions, 7 questions define the positive scale (1-7), another 7 questions define the negative scale (8-14), and the remaining 6 questions define the general psychopathology scale (15-20). Similarly, the SAPS screening consists of 20 questions, organised to measure positive symptoms. Each item is rated on a severity scale that ranges from 1(strongly disagree) to 5(strongly agree). out of the 20 questions, 5 questions measure the severity of hallucination (1-5), 9 questions measure the severity of delusion (6-14), and the remaining 6 questions measure the bizarre behavior (15-20). Similarly, BNSS, NSA-16, is comprised of 20 questions to measure the severity of negative symptoms. Each item is rated on a severity scale that ranges from 1(strongly disagree) to 5(strongly agree). out of the 20 questions, 9 questions measure the severity of the blunting effect (1-9), 8 questions measure the severity of the lack of sociality and empathy (10-17), and the remaining 3 questions measure the severity of alogia (18-20). The responses are converted into codes, and the total score is measured for both control and patient data.

3.3 Statistical Analysis

The reliability and validity of data are evaluated using statistical methods. The data collected is in the form of a CSV file. These CSV files are extracted and analyzed for the validity of data using various statistical methods, such as ANOVA, T-Test, and Chi-square test, which compare the relationship between two or more groups and check whether these data are statistically significant. To measure the degree of consistency between two or more groups, Inter-Rater Reliability (IRR) tests such as cohen's d and Cramer's V techniques are used. Cohen's d is used to measure the magnitude of difference between two groups, and this technique not only tells whether the data is statistically significant or not, but also tells whether the difference is small or large. This test is typically used with the t-test or ANOVA, where two groups are being compared. Similarly, to measure the strength of the relationship between two categorical variables, Cramer's V technique is used. This technique is a normalised version of chi-square, which results in values ranging between 0 and 1.

4 Results and Discussion

The overall analysis indicates the relationship between demographic characteristics and various statistical methods that distinguish schizophrenia patients from healthy controls using three assessment scales (PANSS, SAPS and BNSS). The results show that the demographic analysis between control and schizophrenia patients in PANSS, SAPS and BNSS scales did not display major statistically significant differences in most of the comparisons between various statistical methods. The following table.1 depicts the comparison of demographic and statistical parameters

between control and schizophrenia patients across the assessment scales.

Table 1. Comparison of Demographic and Statistical Analysis of Assessment Scales.

Assessment scale		PANSS	SAPS	BNSS/NSA-16
Control	Demographic details	Male=11 Female=20	Male=12 Female=26	Male=12 Female=20
	F-Static	1.09	0.004	0.338
	t-static	-0.544	-0.073	-0.226
	p-value	0.305	0.948	0.565
	chi square	2.76	2.67	2.873
	degree of freedom	3	4	4
	Cohen's d	-0.392	-0.021	-0.212
	95% CI for Cohen's d	[-1.270, 0.360]	[-0.740, 0.650]	[-1.020, 0.610]
	Cramer's V	0.847	0.937	0.919
	95% CI for Cramer's V	[0.763, 1.000]	[0.879, 1.000]	[0.854, 1.000]
Schizophrenia patients	Demographic details	Male=10 Female=13	Male=7 Female=11	Male=9 Female=10
	F-Static	6.476	0.269	0.231
	t-static	-0.327	-0.174	-0.1566
	p-value	0.007	0.611	0.637
	chi square	4.99	3.53	3.82
	degree of freedom	8	4	3
	Cohen's d	-0.475	-0.251	-0.221
	95% CI for Cohen's d	[-1.350, 0.420]	[-1.310, 0.720]	[-1.120, 0.740]
	Cramer's V	0.748	1	1
	95% CI for Cramer's V	[0.723, 1.000]	[1.000, 1.000]	[1.000, 1.000]

In the PANSS assessment scale, the gender distribution showed minor variation between control groups and patients. There were about 11 males and 20 female healthy controls, and 10 males and 13 female patients. The statistical method, T-test, yielded non-significant results where t = -0.544, and p=0.305 for control and t = -0.327, p=0.007 for schizophrenia patients. Although the sample showed an effective

size with a Cohen's d value ranging from a small to moderate negative range of –0.392 to –0.475 with 95% confidence intervals crossing zero, this indicates non-significance. Similarly, Cramer's values (0.748–0.847) indicate weak associations of categorical values.

In the SAPS assessment scale, the gender distribution was balanced, with approximately 12 males and 26 females in the control group and approximately 7 males and 11 females in the patient group. Both groups showed non-significant results with the t-test results of p>0.6. Cohen's d value ranges from –0.021 to –0.251, which were negligible with wide confidence intervals spanning zero. Similarly, Cramer's values indicate no meaningful association with categorical values that approach 1.

In the BNSS/NSA-16 assessment scale, gender distribution was relatively balanced, with about 12 males and 20 females in the control group and about 9 males and 10 females in the patient group. Both groups showed non-significant results, with a t-test result of t = -0.22 and a p-value greater than 0.56. Cohen's d value ranges from –0.212 to –0.221, which indicates a negligible effect size with confidence intervals including zero. Similarly, Cramer's values indicate no meaningful association with categorical values that range from 0.919 to 1.000.

According to the studies, there was no significant difference in demographic parameters, specifically gender, between the control and schizophrenia groups on any of the three assessment scales (PANSS, SAPS, BNSS/NSA-16). Confidence intervals crossed zero, and effect sizes were consistently small, which further supported the lack of significant demographic differences. The slightly higher F-statistic for PANSS in the schizophrenia patient group might not be the actual demographic characteristics but shows slight variations in symptom signs and sensitivity measurement. The BNSS/NSA-16 and SAPS assessment tools show similar patterns, indicating that variations in symptom ratings are due to the design of scales rather than demographic factors.

Overall, these findings validate that gender, and demographic characteristics were evenly distributed across conditions and support the homogeneity of the sample groups. This enhances the internal validity of the data by comparing clinical outcomes and symptom histories, ensuring that demographic imbalance does not affect the diagnosis of schizophrenia. The following fig.2 displays the statistical comparison of assessment scales.

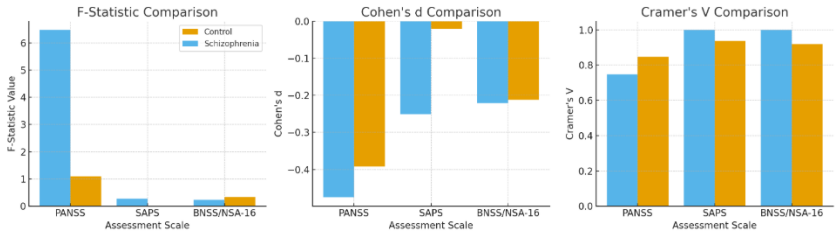

Fig. 2. Statistical Comparison of Assessment Scales

5 Conclusion and Future Work

In the current study, the diagnosis of schizophrenia is analyzed through statistical analysis using standard assessment tools. PANSS, SAPS and BNSS/NSA-16 are the assessment tools used for identifying the positive symptoms, negative symptoms and combined positive. Negative and cognitive symptoms. The results revealed sample comparability and supported the validity and reliability of the data, showing no apparent demographic difference across the groups. Effective size is measured using Cohen's d, Cramer's V and the confidence intervals crossing zero technique that showed insignificant to minor effects.

The PANSS scale showed higher F-statistics for schizophrenia affected patients, but this difference was not statistically significant, indicating that the differences were due to symptom variability rather than demographic variance. Overall, the statistical reliability of three assessment tools showed that PANSS, SAPS and BNSS/NSA-16 are effective when implemented on a demographically balanced population. This has proved as a promising method in assessing the severity of symptoms of schizophrenia. In conclusion, the study emphasises how crucial it is to use statistical analysis for diagnosing mental health. This analysis helps to continuously enhance the diagnosis of schizophrenia through quantitative diagnostic frameworks and evaluate them through effective size estimation with inferential statistics.

Future research can be expanded by incorporating larger and more diverse datasets to improve generalizability. Integration of various assessment tools with other forms of data, like voice, video and physiological data, can help in tracking the severity of symptoms and treatment responsiveness. This analysis of multimodal data allows dynamic modelling and improves the diagnostic accuracy. A combination of this multimodal data and analysis through machine learning models using multivariate statistical techniques can improve the validity of prediction and enhance the diagnosis of schizophrenia efficiently. Such integrative approaches using neurocognitive, neuroimaging and genetic biomarkers, along with assessment tools, can contribute to the development of data-driven and personalized diagnostic systems, thereby improving the diagnostic accuracy and patient outcomes.

References

1. Wolpe, Noham, Andrea Perrottelli, Luigi Giuliani, Zixu Yang, Gurpreet Rekhi, Peter B. Jones, Miquel Bernardo et al: Measuring the clinical dimensions of negative symptoms through the Positive and Negative Syndrome Scale. *European Neuropsychopharmacology* 93: 68-76 (2025).
2. Grot, S., Giguère, C.É., Smine, S., Mongeau-Pérusse, V., Nguyen, D.D., Preda, A., Potvin, S., van Erp, T.G. and Orban, P.: Converting scores between the PANSS and SAPS/SANS beyond the positive/negative dichotomy. *Psychiatry Research*, *305*, p.114199 (2021).
3. Vita, Antonio, Stefano Barlati, Roberto Cavallaro, Riccardo Cipelli, Giulio Corrivetti,

Dario Delmonte, Eleonora Lusito et al: The awareness, characterization, and burden of Cognitive Impairment Associated with Schizophrenia (CIAS) in clinical practice: Results from a nationwide survey in Italy. *Schizophrenia Research: Cognition* 40: 100352 (2025).

4. Amoretti, Silvia, Gisela Mezquida, Norma Verdolini, Miquel Bioque, Ana M. Sánchez-Torres, Laura Pina-Camacho, Iñaki Zorrilla et al: Negative symptoms and sex differences in first episode schizophrenia: What's their role in the functional outcome? A longitudinal study. *Spanish Journal of Psychiatry and Mental Health* (2023).
5. Tolppanen, Iisak: Evaluation of negative symptoms in schizophrenia using standardized assessment tools. literature review." PhD diss., Vilniaus universitetas., (2023).
6. Ali, Samah, Amal Awad, Hanaa Ewise, and Shimaa Adam: Social Skills Training Program and its Effect on Quality of Life and Stigma among Patients with Schizophrenia. *Evidence-Based Nursing Research* 7, no. 2: 1-11(2025).
7. Ballard, T. and Campinha-Bacote, J: Cultural Competemility Training and Use of a Standardized Assessment Tool in Reducing Misdiagnosis of Black Patients with Schizophrenia Spectrum Disorders and Psychotic Disorders. *Journal of the American Psychiatric Nurses Association*, *31*(3), pp.306-312 (2025).
8. Bojosi, K., Olashore, A.A., Roy, H. and Molebatsi, K.,: Correlates of adverse childhood experiences among admitted patients with schizophrenia in a referral psychiatric hospital in Botswana. *International Journal of Social Psychiatry*, *71*(2), pp.338-348 (2025).
9. Kutllovci, Faton: COMPARISON OF POSITIVE AND NEGATIVE SYMPTOMS IN PEOPLE DIAGNOSED WITH SCHIZOPHRENIA. *Revista de Gestão Social e Ambiental* 19, no. 2: 1-22 (2025).
10. Dean, Kimberlie, Christie Browne, Prabin Chemjong, Daria Korobanova, Natalia Yee, and Sarah-Jane Spencer: Testing approaches to mental health screening at prison entry, considering both concurrent and predictive validity in men and women. *International Journal of Forensic Mental Health* 24, no. 1: 16-26 (2025).
11. Iftene, F., Farcas, A. and O'Brien, S.: Is befriending a possible intervention in people living with schizophrenia? *Frontiers in Psychiatry*, *16*, p.1598355 (2025).
12. Pelizza, L., Plazzi, E., Leuci, E., Leucci, A.C., Quattrone, E., Azzali, S., Pupo, S., Paulillo, G., Pellegrini, P. and Menchetti, M.,: Diagnostic shift in adolescents with first episode psychosis: findings from the 2-year follow-up of the Parma Early Psychosis program. *Social Psychiatry and Psychiatric Epidemiology*, *60*(2), pp.375-385 (2025).
13. Pelizza, L., Leuci, E., Quattrone, E., Azzali, S., Paulillo, G., Pupo, S., Pellegrini, P., Gammino, L., Biancalani, A. and Menchetti, M.,: Borderline personality disorder vs. schizophrenia spectrum disorders in young people recruited within an Early Intervention in Psychosis service: clinical and outcome comparisons. *European Archives of Psychiatry and Clinical Neuroscience*, *275*(3), pp.893-905 (2025).
14. Lee, Shu-Chun, and En-Chi Chiu: Reliability of the Test of Visual Perceptual Skills-for people with schizophrenia. *PloS one* 20, no. 3: e0318148 (2025).
15. Paton, J. and van Boxtel, J.J.,: Attentional biases, as measured by motion-induced blindness, are linked to schizophrenia traits. *PLoS One*, *20*(6), p.e0325609 (2025).
16. Kim, Sung-Wan, Jae-Kyeong Kim, Min Jhon, Ju-Wan Kim, Seunghyong Ryu, Ju-Yeon Lee, and Jae-Min Kim: Validity of a smartphone application for self-monitoring psychiatric symptoms in patients with schizophrenia. *Digital Health* 11: 20552076251317556 (2025).
17. Özkan, E., Ercan Doğu, S., Noguchi, T. and Örsel, S.,: Validity and reliability of the Turkish adaptation of the assessment of positive occupation-15 (APO-15) in serious mental illness. *OTJR: Occupational Therapy Journal of Research*, *45*(2), pp.179-188 (2025).
18. Nistor, D.E., Horosan, L., Saftencu, M., Pavel, C., Ion, A. and Giurgiuca, A., Addressing psychiatric needs on non-psychiatric wards: training and collaborative insights from

medical trainees. *PSYCHIATRY AND PSYCHOTHERAPY*, p.69 (2023).
19. Fekih-Romdhane, F., Boukadida, Y., Hakiri, A., Homri, W., Cheour, M. and Hallit, S.,: Food addiction and associated factors in newly diagnosed patients with schizophrenia: a cross-sectional comparison with siblings and healthy controls. *Journal of Eating Disorders*, *13*(1), p.18 (2025).
20. Fasakhoudi, M.A., Arani, A.M., Roudsari, A.B., Mazaheri, M., Shahi, A., Fatollahzadeh, S. and Atef Vahid, M.K.,: Assessment of the construct of paranoia in a non-clinical sample: validation of the paranoia scale based on a continuum model. *BMC psychology*, *13*(1), p.640 (2025).