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**Związki zniekształceń poznawczych z funkcjonowaniem  
neuropsychologicznym u pacjentów z rozpoznaniem schizofrenii.**

The relationship between cognitive biases and neuropsychology  
functioning in schizophrenia patients.

Rozprawa doktorska na stopień doktora  
w dziedzinie nauk medycznych i nauk o zdrowiu  
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## SUMMARY

**Introduction:** Schizophrenia is a mental disorder that affects thoughts, perception, emotions, and behavior. According to cognitive models of schizophrenia, disruptions in information processing (cognitive biases) not only play a role in maintaining specific symptoms of the disease, such as delusions and hallucinations, but also contribute to their development. Previous studies have shown that patients have difficulties distinguishing between imagination and reality (source monitoring), make hasty decisions (jumping to conclusions), exhibit attribution errors, dismiss evidence contradicting their beliefs, and focus attention on threats. However, little is known about the underlying causes of these difficulties. To date, few studies have examined the relationships between specific cognitive biases and cognitive deficits, and their findings are inconclusive. Moreover, no existing study has considered more than one cognitive distortion at a time. The aim of this study was to analyze the relationships between neuropsychological functioning and the most well-documented cognitive biases in individuals with schizophrenia, measured both experimentally and through questionnaires. Additionally, the study assessed the associations between cognitive distortions and schizophrenia symptomatology.

**Methods:** The study included 111 individuals diagnosed with schizophrenia (56 men and 55 women,  $M = 41.95$ ;  $SD = 11.00$ ) and 75 participants from the control group (32 men and 43 women,  $M = 39.17$ ;  $SD = 12.36$ ). Neuropsychological tests were used to assess executive functions, verbal memory, working memory, processing speed, and attention. The following tools were used to measure cognitive functioning: the Color Trails Test (CTT), D2 Test of Attention, California Verbal Learning Test (CVLT), subtests from the Wechsler Adult Intelligence Scale (WAIS-R): Digit Span and Block Design, and the Wisconsin Card Sorting Test (WCST). Cognitive biases were measured using experimental tasks (Fish Task, Memory Task) and the self-report questionnaire—the Davos Assessment of Cognitive Biases Scale (DACOBS). The severity of psychopathological symptoms was evaluated using the Positive and Negative Syndrome Scale (PANSS), and the diagnosis was additionally confirmed through a structured interview (Mini International Neuropsychiatric Interview, MINI). The relationship between cognitive biases and neuropsychological functioning was analyzed using correlation and regression analyses. In addition, to ensure the reliability of the results of the regression analysis, control variables that showed a significant correlation with the dependent variable, such as age, disease duration and symptom severity, were included in the model.

**Results:** Conducted analyses indicate a relationship between the tendency to jump to conclusions and neuropsychological functioning. In the clinical group, performance on a behavioral task measuring jumping to conclusions was explained by visuospatial abilities, attention processes, executive functions, and verbal memory. In the control group, jumping to conclusions was explained by verbal memory, visuospatial abilities, and executive functions. All tested models were statistically significant and explained between 6% and 39.5% of the variance in the dependent variable. The ability to differentiate between imagined and performed actions in the patient group was particularly associated with verbal memory ( $R^2 = 0.063$ ). In the control group, associations were found with attention, working memory, and processing speed; however, in the regression model, none of the neuropsychological variables reached statistical significance. Conversely, source monitoring errors involving incorrect classification of two external sources were explained by neuropsychological factors (visuospatial abilities) only in the control group ( $R^2 = 0.11$ ). Subjective cognitive confidence in the source monitoring task was not explained by neuropsychological functioning in either group. Analyses of questionnaire-measured cognitive biases in the clinical group revealed associations with various aspects of neuropsychological functioning: processing speed (lack of cognitive flexibility), attention processes (lack of cognitive flexibility, threat-focused attention, external attribution), verbal memory (threat-focused attention), and working memory (external attribution). In the control group, lack of cognitive flexibility and threat-focused attention were explained by verbal memory; external attribution was explained by both verbal memory and executive functions; and the severity of jumping to conclusions was explained by working memory. Additionally, associations between cognitive biases and schizophrenia symptomatology were confirmed for all cognitive biases except source monitoring errors.

**Conclusions:** The present study complements existing knowledge and provides significant insights into the relationship between cognitive biases and neuropsychological functioning. The obtained results indicate that cognitive biases are associated with various cognitive domains and are modulated by task complexity. This means that the more complex the task, the greater the influence of cognitive abilities on decision-making. Furthermore, the findings suggest that objective and subjective measures used to assess jumping to conclusions may differ in their associations with both neuropsychological functioning and schizophrenia symptoms. Simultaneous analysis of various cognitive distortions revealed distinct neuropsychological mechanisms underlying them. The relationship between cognitive distortions and neuropsychological functioning tested in this study may have important

implications for clinical practice. The results suggest that patients with cognitive deficits are particularly prone to information processing errors, indicating the need to combine cognitive remediation techniques with interventions targeting these cognitive biases and to further investigate their effectiveness.