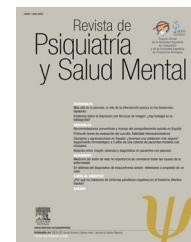




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ORIGINAL ARTICLE

Reaction time, processing speed and sustained attention in schizophrenia: Impact on social functioning[☆]

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KEYWORDS

Schizophrenia;
Reaction time;
Processing speed;
Attention;
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Abstract

Introduction: Previous studies have linked processing speed with social cognition and functioning of patients with schizophrenia. A discriminant analysis is needed to determine the different components of this neuropsychological construct. This paper analyzes the impact of processing speed, reaction time and sustained attention on social functioning.

Material and methods: 98 outpatients between 18 and 65 with DSM-5 diagnosis of schizophrenia, with a period of 3 months of clinical stability, were recruited. Sociodemographic and clinical data were collected, and the following variables were measured: processing speed (Trail Making Test [TMT], symbol coding [BACS], verbal fluency), simple and elective reaction time, sustained attention, recognition of facial emotions and global functioning.

Results: Processing speed (measured only through the BACS), sustained attention (CPT) and elective reaction time (but not simple) were associated with functioning. Recognizing facial emotions (FEIT) correlated significantly with scores on measures of processing speed (BACS, Animals, TMT), sustained attention (CPT) and reaction time. The linear regression model showed a significant relationship between functioning, emotion recognition ($p = .015$) and processing speed ($p = .029$).

Conclusions: A deficit in processing speed and facial emotion recognition are associated with worse global functioning in patients with schizophrenia.

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PALABRAS CLAVE

Esquizofrenia;
Tiempo de reacción;
Velocidad de
procesamiento;
Atención;
Reconocimiento de
emociones

Tiempo de reacción, velocidad de procesamiento y atención sostenida en esquizofrenia: impacto sobre el funcionamiento social

Resumen

Introducción: Estudios previos han relacionado la velocidad de procesamiento con la funcionalidad y la cognición social de los pacientes con esquizofrenia. Se necesita un análisis más discriminativo de los diferentes componentes de este constructo neuropsicológico. El presente trabajo analiza el impacto de la velocidad de procesamiento, del tiempo de reacción y de la atención sostenida sobre el funcionamiento social.

Material y métodos: Un total de 98 pacientes ambulatorios de entre 18 y 65 años con diagnóstico DSM-5 de esquizofrenia, con un período de 3 meses de estabilidad clínica, fueron reclutados. Se recogieron datos sociodemográficos y clínicos, y se midieron: velocidad de procesamiento (Test del Trazo [TMT], codificación de símbolos [BACS], fluidez verbal), tiempos de reacción simple y electiva, atención sostenida, reconocimiento de emociones faciales y funcionalidad.

Resultados: Las medidas que se asociaron con funcionalidad fueron: velocidad de procesamiento (medida solo a través de la BACS), atención sostenida (CPT) y tiempo de reacción electiva (pero no simple). El reconocimiento de emociones faciales (FEIT) se correlacionó de forma significativa con la puntuación en las medidas de velocidad de procesamiento (BACS, Animales, TMT), atención sostenida (CPT) y tiempo de reacción simple. El modelo de regresión lineal mostró una relación significativa entre funcionalidad, reconocimiento de emociones ($p = 0,015$) y velocidad de procesamiento ($p = 0,029$).

Conclusiones: El déficit en velocidad de procesamiento y reconocimiento facial de emociones se asocia a peor funcionamiento global en pacientes con esquizofrenia.

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Introduction

Processing speed is a central construct in the field of the cognitive alterations which affect schizophrenia patients.^{1,2} It has been defined as "the number of correct responses that a person is able to give in a test that requires a series of cognitive operations in a limited execution time."³ The tests that have traditionally been used to measure this capacity include verbal fluidity, the symbol coding test and the Trail Making Test (TMT).⁴ Some studies have shown that these tests may be valid and efficient indicators of overall cognitive functioning,⁵ and a poor performance in them has been associated with difficulties in overall psycho-social functioning,^{6,7} problem solving in everyday life,⁸ keeping a job⁹ and social skills.¹⁰ On the other hand, sustained attention or vigilance, defined as "the capacity of keep attention focused on a task during a long period of time" has also been shown to deteriorate in schizophrenia.¹¹ Poor performance in tests that evaluate sustained attention such as the Continuous Performance Test [CPT]) seems to be associated with genetic risk factors,¹² and it is present in the first stages¹³ as well as in the later phases of the disease.¹⁴

Some laboratory studies have tried to differentiate the most basic units in processing speed, using tests that measure reaction time using simple and elective response paradigms.¹⁵ Although they are closely related, reaction time is defined and differentiated from processing speed, as "the time required for a motor response to be initiated following the reception of a stimulus by sense organs, and it is set in the early stage of information processing".¹⁶ The fundamental difference is therefore that its value "is not the time taken by the execution of a response, but rather the time required for the external response to

be initiated".¹⁷ Although there are conceptual differences between processing speed and reaction time, very few studies have tried to discriminate between both constructs in schizophrenia.

Lastly, a cognitive domain that has been studied a lot in recent years is emotional processing, a part of social cognition that includes the capacity to identify, facilitate, understand and manager emotions.¹⁸ Given its relevance in the field of psychosis, social cognition has been included in the Consensus Battery for the evaluation of schizophrenia in the Measurement and Treatment Research to Improve Cognition in Schizophrenia (MATRICS).¹⁹ Several studies have found that schizophrenia patients have a facial emotions recognition and discrimination deficit,^{14,20} especially those of fear and anger.^{21,22} Recently it has been suggested that there is a connection between attention processes and emotional processing,²³ and this may explain the synergic impact of both cognitive dimensions on functioning.

Our working hypothesis is that reaction time, processing speed and sustained attention are variables which are inter-related but different, and that they have different impacts on the social functioning of schizophrenia patients. The aim of this work is to measure performance in terms of reaction time, processing speed and sustained attention in a group of schizophrenia patients, analysing their different impacts on emotional processing and functioning.

Material and method**Study design**

This is a transversal intragroup study that has the aim of analysing the relationships between reaction time, the

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