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Insight, neurocognition and psychopathology in schizophrenia

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Introduction. In recent years, research has been aimed at finding variables mediating between neurocognition and psychosocial functioning in schizophrenia, proposing insight as one of these variables. Some authors have found associations between insight and functional outcome, and between insight and symptomatology, although these associations remain unclear. These different findings could be explained by the insight definition used. The current study evaluates insight unidimensionally and multidimensionally and studies its relationship with cognitive and psychopathological variables.

Methods. The sample consisted of 94 subjects admitted to an outpatient Psychosocial Rehabilitation Program, all diagnosed of schizophrenia according to ICD-10 diagnostic criteria. A brief version of the Neuropsychology Battery Test Barcelona and the Wisconsin Card Sorting Test were used to evaluate cognitive variables. The Positive and Negative Syndrome Scale (PANSS) was used to evaluate psychopathology. Insight was assessed with the PANSS item «lack of judgment and insight», and with a semi-structured interview.

Results. Two insight factors were found, one including more specific knowledge about the disease and its consequences (cognitive factor), that is related to executive functions, and another referring to unspecific knowledge about suffering from an illness and the need for treatment (psychotic factor). Each factor was statistically related to positive symptoms and superior cognitive functions.

Conclusions. These findings support a relationship between insight and low cognitive performance.

Key words:
Schizophrenia. Insight. Neurocognition. Psychopathology.

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Insight, neurocognición y psicopatología en esquizofrenia

Introducción. La investigación de los últimos años ha intentado hallar variables mediadoras entre neurocognición y desempeño funcional en esquizofrenia, proponiéndose el *insight* como una posible variable. Diferentes autores han encontrado relaciones entre *insight* y diversos aspectos del desempeño funcional, y entre insight y sintomatología, aunque no hay unanimidad en la clase de relación existente. La falta de consenso podría explicarse por la definición de *insight* utilizada. El presente artículo valora el *insight* de manera uni y multidimensional y establece su relación con variables cognitivas y psicopatológicas.

Métodos. La muestra la constituyen 94 sujetos diagnosticados de esquizofrenia según criterios CIE-10 que acuden a un centro de rehabilitación psicosocial. La valoración cognitiva se realizó mediante una versión abreviada de la Batería Neuropsicológica Test Barcelona y el *Wisconsin Card Sorting Test*. Para valorar la sintomatología se usó la Escala de Síndromes Positivo y Negativo (PANSS). El *insight* fue evaluado mediante el ítem de la PANSS y mediante una entrevista semiestructurada que recogía diferentes componentes del mismo.

Resultados. Se encontraron dos factores de *insight,* uno que incluye un conocimiento preciso de la enfermedad y sus consecuencias y otro que hace referencia a un reconocimiento inespecífico de padecer una enfermedad y necesitar tratamiento. Cada factor mostró una relación estadísticamente significativa con funciones cognitivas superiores y con sintomatología positiva.

Conclusiones. Los datos encontrados apoyan una relación entre insight y bajo rendimiento cognitivo.

Palabras clave:
Esquizofrenia. *Insight.* Neurocognición. Psicopatología.

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INTRODUCTION

Research at the end of the 1980's and 1990's extensively documents the relationships existing between neurocogni-

tion and social adaptation in schizophrenia. Recently, Green et al.[1,2] have proposed variables that may be mediating this relationship, and they define the so-called social cognition and suggest social perception, social scheme, insight and coping strategies as mediating variables. These variables would maintain an association of the basic cognitive processes and functional outcome.

Specifically, there are many studies that somehow associate the capacity of insight with aspects such as functional adaptation in schizophrenic patients[3-5], social competence and adjustment[6-10], work performance[10-12] and a reduction in the number of rehospitalizations in long course patients[11-13].

However, when the relationship between neurocognition and insight capacity is subjected to research, there is no unanimous agreement between investigators. When some type of relationship was found, it was basically with assessment tests that presumably evaluate frontal lobe functioning[14,15], more specifically the executive function. Several authors have found a relationship between performance on the Wisconsin Card Sorting Test and insight[16-27].

Other published studies that analyze the relationship between neurocognition and insight have not found a clear relationship between both constructs[28-36]. Even in some studies where a relationship was found between insight and executive function, this was not found between insight and global cognitive functioning[17].

On the other hand, another question brought up by the Green model[1] is the relationship between psychotic symptomatology, more specifically the negative one, and social cognition. Several studies have found relationships of different degree between insight and different schizophrenia symptoms, mainly with positive symptoms[7,24,25,27, 32-34,37-43].

One of the difficulties derived from the study of insight and that could be related with the diversity of results found is the definition and evaluation made of this construct and its components. Different results are observed based on what aspects of the so-called insight we relate with the different study variables. Capacity of insight appears as a multidimensional construct[44] that may include aspects such as awareness of suffering a disease, of the symptoms, of the attributing of the symptoms to the disorder, of the need to receive treatment, and of the social consequences of the disease. Thus, some authors cannot consider insight as something that can be evaluated by single measurements[45].

The following article aims to assess insight by different items that refer to several components of it and to establish the possible relationship between them and different cognitive and psychopathological variables and to assess the possible discrepancies between the different measurements of insight.

METHODS

This study's sample is made up of a total of 94 users, evaluated when they were entered into a psychosocial rehabilitation site. All the users were diagnosed of schizophrenia (according to ICD-10 criteria), received neuroleptic medication at the time of the evaluation and signed an informed consent to participate in the study. The sample characteristics are specified in table 1.

To assess the symptomatology present on entering the rehabilitation site, the Positive and Negative Syndrome Scale in Schizophrenia (PANSS), in the Peralta and Cuesta Spanish version[46], was used. Both the scores of each item and the global scores of each scale (positive, negative and general psychopathology syndrome) and the total score were used.

Cognitive performance was evaluated with the J. Peña-Casanova Integrated Program of Neuropsychologic Examination Barcelona Test[47]. The following items of those making up this test were chosen: direct digits, inverse digits, categorial evocation, verbal memory (immediate and differed reproduction), calculation (mental and written), arithmetic problems, verbal abstraction (similarities and compre-

Table 1 Sociodemographic characteristics of the sample

Characteristics	N	Percentage
Age range		
- de 25	21	22.3
25-35	42	44.7
36-45	21	22.3
+ than 45	10	10.6
Gender		
Man	57	60.6
Woman	37	39.4
Civil status		
Single	87	92.6
Married	3	3.2
Separated	2	2.1
Divorced	2	2.1
Study level		
Incomplete	13	13.8
Primary/secondary	40	42.6
Senior High School/VT 1	8	8.5
Vocational Training 2	26	27.7
Middle university studies	4	4.3
University	3	3.2
Mean duration of the disease	10.61 (7.86)	

hension), numbered keys and cubes. The Wisconsin Card Sorting Test (WCST) was used[48] to examine if there was any relationship between executive function and insight.

On the one hand, capacity of insight was assessed with the PANSS item «absence of judgment and introspection». On the other hand, in the first interview maintained with the users, specific questions referring to different components of insight were included: awareness of having a disease; awareness of needing treatment; awareness of functional consequences caused by the disorder; awareness of having positive symptoms; awareness of having negative symptoms and attributing of the symptoms. These items were assessed with a Likert type scale (0: absence of insight; 1: partial awareness, and 2: complete awareness). The interview was administered by two examiners who jointly evaluated each one of the components mentioned. When there was discrepancy, the lowest score was used (Kappa index: 0.85).

Statistical analysis

The statistical analyses were done with the SPSS 13.0 program for Windows[49]. To verify the dimensionality of the different measurements of insight, the analysis of principal components with varimax rotation was used. Factors were extracted with «eigenvalues» greater than or equal to 1. Correlations between variables were established with Pearson's correlation coefficient.

RESULTS

The analysis of the principal components in which the six items used to evaluate insight were included, together with the item of the PANSS referring to the same thing (item 12) determined the extraction of two factors with eigenvalues greater than or equal to 1. Thus, factor 1, that represents 63 % of the variance, would include the items Awareness of the positive symptoms, Awareness of the negative symptoms, Attributing of symptoms, and Awareness of the consequences of the disease while factor 2, that represents 14 % of the variance, includes the items Awareness of the disease, Awareness of need for treatment and the PANSS item Absence of judgment and introspection.

The relationship between symptomatology and capacity of insight was assessed by a Pearson correlation between the PANSS scores and the factors derived from the insight components (table 2). Relationships were found between factor 2 of the insight components and the total scores of the Positive scales and General Psychopathology, the total score of the PANSS and the items «Delusions», «Suspiciousness/persecution», «Hostility», «Stereotyped thinking», «Uncooperativeness», and «Disturbance of volition». No relationships were found between negative symptomatology and insight.

Table 2 Correlation coefficients (Pearson) between factors obtained of insight and PANSS items

	Factor 1 (Awareness of positive symptoms, Awareness negative symptoms, Atributtion of symptoms, Awareness of consequences)	Factor 2 (Awareness of disease, Awareness of treatment, PANSS: Absence of judgement and introspection)
PANSS-P (positive scale)	−0.153	−0.366
	p = 0.180	p = 0.001
PANSS-N (negative scale)	0.026	−0.200
	p = 0.822	p = 0.080
PANSS-GP (general	−0.088	0.390
psychopathology)	p = 0.445	p < 0.001
Total score of PANSS	−0.083	−0.259
	p = 0.023	p = 0.023
P1. Delusions	−0.175	−0.270
	p = 0.125	p = 0.017
P6. Suspiciousness/	0.034	−0.238
persecution	p = 0.766	p = 0.037
P7. Hostility	−0.185	−0.424
	p = 0.104	p< 0.001
N7. Stereotyped thinking	−0.006	−0.237
	p = 0.955	p = 0.036
PG8. Uncooperativeness	−0.072	−0.455
	p = 0.532	p< 0.001
PG13. Disturbance of	−0.154	−0.297
volition	p = 0.177	p = 0.008

In the same way, to establish the relationship between insight and cognitive performance, Pearson's correlation between scores obtained in the Barcelona subtest and the factors derived from the components of insight was applied. A relationship was found between factor 1 and the scores on the subscales of Digit (direct and inverse), «Word learning», «Calculation», «Arithmetic problems», «Cubes» and «Similarities-abstraction» (table 3). No relationship was found between any of the Wisconsin Test measurements and insight (table 4).

CONCLUSIONS

Numerous discrepancies appear in recent literature in regards to what aspects of insight should be assessed and taken into account for their analysis. The results of our study suggest that there are differences in the degree of knowledge that persons with schizophrenia have of the different aspects of the disease. Specifically, there are differences in regards to assessing insight as global knowledge about suffering a disease and requiring treatment or about differentiating more precisely the degree of kno-

Table 3 Correlation coefficient (Pearson) between factors obtained of insight and Barcelona subtest

	Factor 1 (Awareness of positive symptoms, Awareness negative symptoms, Atribuction of symptoms, Awareness of consequences)	Factor 2 (Awareness of disease, Awareness of treatment, PANSS: Absence of judgement and introspection)
Direct digits	0.266	-0.149
	p = 0.021	p = 0.201
Inverse digits	0.231	-0.098
	p = 0.047	p = 0.404
Categorial evocation	0.021	-0.191
	p = 0.860	p = 0.103
Immediate text memory	0.200	-0.090
(evocation)	p = 0.088	p= 0.446
Immediate text memory	0.096	0.022
(questions)	p = 0.413	p = 0.854
Delayed text memory	0.132	-0.029
(evocation)	p = 0.263	p = 0.805
Delayed text memory	-0.030	0.007
(questions)	p = 0.800	p = 0.953
Word learning	0.304	0.025
	p = 0.008	p = 0.828
Immediate visual memory	0.174	-0.178
	p = 0.136	p = 0.126
Different visual memory	0.143	-0.133
	p = 0.275	p = 0.132
Mental calculation (score)	0.310	-0.055
	p = 0.007	p = 0.636
Mental calculation (time)	0.307	-0.068
	p = 0.007	p = 0.562
Written calculation (score)	0.325	-0.087
	p = 0.004	p = 0.459
Written calculation (time)	0.303	-0.110
	p = 0.008	p = 0.349
Arithmetic problems (score)	0.238	-0.070
	p = 0.041	p = 0.553
Arithmetic problems (time)	0.244	-0.083
	p = 0.036	p = 0.482
Similarities	0.254	-0.061
	p = 0.029	p = 0.608
Comprehension	0.049	0.158
	p = 0.679	p = 0.178
Cubes (score)	0.303	-0.191
	p = 0.008	p = 0.100
Cubes (time)	0.238	-0.189
	p = 0.040	p = 0.105

wledge of the different symptoms, causes and consequences of this disease.

Table 4 Correlation coefficients (Pearson) between the factors obtained of insight and WSCT scores

	Factor 1 (Awareness of positive symptoms, Awareness negative symptoms, Atribuction of symptoms, Awareness of consequences)	Factor 2 (Awareness of disease, Awareness of treatment, PANSS: Absence of judgement and introspection)
Total administered	–0.150	0.093
	p = 0.205	p = 0.434
Percentage of correct	0.074	–0.055
answers	p = 0.532	p = 0.641
Percentage of errors	–0.055	0.117
	p = 0.644	p = 0.321
Percentage of perseverative	–0.042	0.194
response	p = 0.724	p = 0.097
Percentage of perseverative	–0.040	0.204
errors	p = 0.736	p = 0.081
Percentage of answers	0.031	–0.108
on conceptual level	p = 0.791	p = 0.359
Categories completed	–0.040	–0.110
	p = 0.736	p = 0.349

The correlations that we find between the factorial scores of factor 1 (which we could call «cognitive» dimension of insight) and those tests that assess superior cognitive functions have also been stated in several studies[18,27,42].

Along this line, some investigators postulate that insight would be the result of neuropsychological deficits related with prefrontal lobe disturbances[15,20] and state that the term anosognosia, related with this area, and generally used to indicate the incapacity of recognizing one's own deficits, would be applied to schizophrenia.

However, our data do not support this hypothesis, since no clear relationships are found between insight and cognitive deficits associated to specific cerebral areas.

Another explanatory hypothesis of this correlation with cognitive deficits could be focused on the fact that the presence of major cognitive deterioration incapacitates the individual to recognize more precise characteristics of awareness of disease (which includes awareness of positive and negative symptoms, attribution of cause and of the consequences of the disorder). However, there was the possibility of the development of general and generic awareness of suffering the disorder.

Significant implications on basic aspects of the treatment, such as psychosocial rehabilitation of persons with schizophrenia could be derived from these results. This re-

quires a specific cognitive rehabilitation in order to improve the low insight that generally is present, given that this would require a certain conservation of the superior cognitive processes[16,25].

In regards to that referring to the relationship between insight and psychopathology, the results manifest an inverse relationship between both aspects. Thus, low scores on the items of awareness of having a disease and needing treatment (factor 2 or «psychotic» dimension of insight) correlate significantly with high scores of Delusions, Suspiciousness, Hostility. Uncooperativeness and Disturbance of volition, of the general and general Psychopathology scales. Similar relationships have been described previously[27,32, 33,40,50].

It can be concluded from this relationship that symptomatological stability may be necessary to reach a significant grade of insight which, as some authors have proposed[24,29,34,39], permits better treatment compliance and better levels of psychosocial functioning.

Thus, the most general variables of insight that we have evaluated, integrated into the «psychotic» dimension, correlate with fundamentally positive symptomatology. This would support the hypothesis that considers insight as a psychotic distortion of reality[37] or as a psychological coping strategy of this reality (negation)[19,25,51]. In this case, similarly to that which occurs with psychotic symptoms, insight could also be the mediating variable of the relationship between neuropsychological processes and functional outcome that is described by some authors[8,52].

Given our results, the importance of assessing this construct with non-global multidimensional scales that may supply us with more information or more specific information on insight for planning of interventions aimed at improving this aspects, as indicated by different authors[24,29,37,39], could be concluded.

According to the limitations of this study, conducted in patients who initiate a voluntarily accepted rehabilitation process, which could be a bias for the study of insight, it would be important for future research to give special attention to assessing this variable in different disease phases and treatment. It is also important to consider different drug doses that may be interfering both in the symptoms and in cognitive performance and to establish the possible existence of other moderating variable (social, personal, familial, etc.) that may provide more information on this construct. Since the data suggest that deficits in insight are multidimensional, it is also important to isolate each one of the factors that determine it with greater accuracy.

Future research should determine the role of cognitive rehabilitation in the improvement of these deficits. However, since even greater scientific evidence is required in this area, it may be more recommendable to intervene on insight with psychoeducative strategies.

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