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Cognitive insight, neurocognition and life skills in patients with schizophrenia

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Abstract

Background: The concept of cognitive insight refers to the capacity for self-reflectiveness as a mechanism for evaluating one's symptoms and self-certainty, understood as the ability to correct inappropriate interpretations and conclusions. There are no conclusive results regardingabout the clinical and neuropsychological variables involved and there are hardly any studies of their impact on functional outcomes. **Method:** The objectives were to analyze the neuropsychological and clinical cognitive insight in a sample of 22 stable patients diagnosed with schizophrenia, to assess its impact on life skills and to analyze whether it can be a mediating variable between cognitive deficits and daily functioning. A neuropsychological battery composed of tests of memory (TAVEC and WAIS-Digits), executive functioning (WCST and Stroop) and vocabulary, the BCIS, a measure of everyday functions (LSP) and the PANSS. **Results:** We found significant negative correlations between the WAIS vocabulary test, self-assurance, and life skills; although this is influenced to a greater extent by the negative symptomatology and the premorbid general cognitive level. **Conclusions:** A greater openness to corrective feedback of distorted thoughts, without specific cognitive capacities, improves the ability of patients with schizophrenia to adapt to the environment.

Keywords: Cognitive insight, neuropsychology, schizophrenia, daily functioning, memory.

Resumen

Insight cognitivo, neurocognición y funcionamiento cotidiano en pacientes con esquizofrenia. **Antecedentes:** el concepto de insight cognitivo hace referencia a la capacidad de auto-reflexión como mecanismo de evaluación de los propios síntomas y a la auto-certeza, entendida como capacidad para corregir las interpretaciones y conclusiones inadecuadas. No existen resultados concluyentes en cuanto a las variables clínicas y neuropsicológicas implicadas y apenas hay estudios sobre su impacto en los resultados funcionales. **Método:** los objetivos fueron analizar las relaciones neuropsicológicas y clínicas del insight cognitivo en una muestra de 22 pacientes estables con diagnóstico de esquizofrenia, analizar su impacto en el funcionamiento cotidiano y como variable mediadora entre los déficits cognitivos y dicho funcionamiento. Se administró una batería neuropsicológica, compuesta por pruebas de memoria (TAVEC y WAIS-Dígitos), funcionamiento ejecutivo (WCST y Stroop) y vocabulario, la BCIS, una medida de funcionamiento cotidiano (LSP) y la PANSS. **Resultados:** se encontraron correlaciones significativas de tipo negativo entre la prueba de vocabulario del WAIS, la auto-certeza, y el funcionamiento cotidiano, aunque este es influido en mayor medida por la sintomatología negativa y el nivel cognitivo general premórbido. **Conclusiones:** una mayor apertura a la retroalimentación correctora de los pensamientos distorsionados, sin que medien capacidades cognitivas específicas, mejora la capacidad de adaptación al medio en pacientes diagnosticados de esquizofrenia.

Palabras clave: insight cognitivo, neuropsicología, esquizofrenia, funcionamiento cotidiano, memoria.

The lack of awareness of disease, defined as the patient's knowledge of the symptoms and the need to receive treatment, has historically been considered an essential deficit of schizophrenia (Carpenter, Strauss, & Bartko, 1973). Cognitive insight (Beck et al., 2004; Beck & Warman, 2004) refers both to the capacity of self-reflectiveness as a mechanism to evaluate one's own symptoms and to one's self-certainty, understood as the capacity to correct inadequate interpretations and conclusions. It is these capacities that are attenuated to varying degrees in schizophrenia.

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The relationship between cognitive insight and psychopathological symptomatology is not clear. In their initial study, Beck et al. (2004) suggested that persons with psychosis had significantly lower levels of self-reflectiveness and significantly higher levels of self-certainty than the population without psychotic disorders. A later study by González-Blanch et al. (2014) associated the high levels of certainty with greater indices of positive symptomatology related to delusional ideation. As for the negative symptomatology, although Pedrelli et al. (2004) found a negative correlation with the index of self-certainty, the results are far from conclusive (Tranulis, Lepage, & Malla, 2008). Furthermore, Buchy et al. (2010), Engh et al. (2011), and Lepage et al. (2008) all suggested a relationship with deficits in memory and verbal learning. Such deficits are involved in the availability of information and in the search for immediate memories. So, according to Orfei, Spoletini, Banfi, Caltagirone, & Spalletta

(2010), they can affect certainty judgments due to the alteration in the source monitoring process. David, Bedford, Wiffen, & Gilleen (2012) found that errors in self- reflectiveness can be related to difficulties in the executive functions and that the high levels of self-certainty may be related to the lack of mental flexibility.

The impact of cognitive insight on daily functioning has hardly been studied at all; although Favrod, Zimmermann, Raffard, Pomini, & Khazaal (2008) did find better levels among those living independently, Giusti, Mazza, Pollice, Casacchia, & Roncone (2013) found a significant and positive correlation between the capacity for self- reflectiveness and social skills.

Some works of research, such as that of Lysaker et al. (2010), pointed to the role played by cognitive insight in the recuperation from psychosis and in the patients' functioning, above and beyond the neurocognitive deficits or the symptomatology. This led Riggs, Grant, Perivoliotis, & Beck (2012) to postulate that cognitive insight can mediate between the neuropsychological deficit and the functional result.

Aghotor, Pfueller, Moritz, Weisbrod, & Roesch-Ely (2010) recently developed diverse metacognitive intervention programs into schizophrenia which are starting to demonstrate their efficacy. Thus, the analysis of the neuropsychological bases of cognitive insight and its impact on life skills is now a useful clinical objective to improve symptomatology and quality of life.

Our objectives were to analyze the neuropsychological and clinical correlations of cognitive insight in a sample of patients with schizophrenia and to evaluate what impact this has on their daily functioning. On the basis of the reviewed research, we expected the neuropsychological function variables of cognitive flexibility and memory and the negative symptomatology to be defined as statistically significant predictors, allowing us to explain a large percentage of the variance in self-certainty (David et al., 2012, Orfei et al., 2010, Pedrelli et. al., 2004) and in life skills (Giusti et al., 2013).

Method

Participants

We selected the participants from among the 96 patients at three rehabilitation services for people with mental disorders in the Spanish region of Extremadura. We made a pre-selection of 68 patients diagnosed with schizophrenia, established by the Mental Health Team according to the criteria of the DSM-IV. The said patients were clinically stable (with no changes in treatment or psychiatric hospitalization in the three months prior to the study). We excluded those patients who presented persistent positive symptomatology and an average score above 4.5 in the positive symptomatology subscale of the PANSS. We also excluded patients when their clinical records from the Mental Health Team showed a history of severe brain damage, substance dependence, or intellectual disability.

Of the participants who complied with the requirements, 22 subjects finally consented to participate in the study. Their sociodemographic and clinical characteristics were similar to those of the users of the services. There were 17 men (77.3%) with an average age of 44.94 years (*DT* = 9.6) and five women with an average age of 46.8 years (*DT* = 13.7). Their ages ranged from 26 to 62 years. The average age at which the disease appeared was 21.86 years (*DT* = 5.07) and the average evolution of the disease was 23.5 years (*DT*= 8.92). Table 1 shows the clinical and sociodemographic characteristics of the participants.

Instruments

Beck Cognitive Insight Scale (BCIS, Beck et al., 2004); Spanish adaptation by Gutierrez-Zotes et al., (2012). This is a self-register measure with 15 items in a Likert-type response format with four intervals from 0 (*completely disagree*) to 3 (*totally agree*). It measures cognitive insight in the following dimensions: self-reflectiveness (SR), which evaluates objectivity, reflection and openness to feedback; and self-certainty (SC), which measures one's certainty of being right and resistance to correction. A composite index (CI) is calculated by subtracting the self-certainty score from the self- reflectiveness score. The original version of the instrument reported an internal consistency, measured using Cronbach's α, of 0.68 for the scale of self- reflectiveness and 0.60 for the scale of self-certainty. In the Spanish adaptation, the internal consistency for self- reflectiveness was 0.59, while for self-certainty it was 0.62. For the participants in our study we obtained an α of 0.71 and 0.72, respectively.

Life Skills Profile (LSP, Rosen, HadziPavlovic, & Parker, 1989); Spanish version by Bulbena, Fernández de Larrinoa, & Domínguez (1992). This measures how people with schizophrenia function in activities in the community during their daily lives. The information is obtained from professionals in daily contact with the subjects, so the tool has been adapted to fit the characteristics of the patients and services of each particular environment. It has 39 items with a response scale from 4 (*greater functionality*) to 1 (*lesser functionality*). There are five subscales: self-care, interpersonal social behavior, social communication-contact, impersonal social behavior, and independence. The global internal consistency of the original instrument was 0.79, oscillating between 0.56 and 0.83 for each of the five subscales. For the participants in our study, we obtained a global value for Cronbach's α of 0.809.

Positive and Negative Syndrome Scale (*PANSS*, Kay, Fiszbein, & Opler, 1987); Spanish adaptation by Peralta & Cuesta (1994). This scale is applied through an interview. The original version consists of 30 items grouped into three factors: positive syndrome (seven items), negative syndrome (seven items), and general

Table 1
Sociodemographic and clinical characteristics of the participants

		n (%)
Level of studies completed	Primary	10 (45.5)
	Secondary	7 (31.8)
	High School	3 (13.6)
	Vocational Education and Training	1 (4.5)
	University degree	1 (4.5)
Situation during exploration	Residential Rehabilitation Center	19 (86.4)
	Work Rehabilitation Center	3 (13.6)
Living situation	Family of origin	3 (13.6)
	Residence	16 (72.7)
	Tutored flat	3 (13.6)
Clinical diagnosis	Paranoid schizophrenia	16 (72.7)
	Undifferentiated schizophrenia	1 (4.5)
	Residual schizophrenia	5 (22.7)
	Disorganized schizophrenia	1 (2.3)

psychopathology (16 items). The indices of internal consistency measured with Cronbach's α in the Spanish version were 0.72 for the positive scale, 0.80 for the negative scale, and 0.56 for the general psychopathology. We obtained an α of 0.75, 0.73, and 0.69, respectively, for the participants in our study.

WAIS-IV (Wechsler, 2012). To be exact, we used the *Vocabulary Subtest* to estimate the premorbid cognitive functioning and the *Digit Subtest* to estimate work memory with two tasks applied independently: Digits in direct order and Digits in inverse order.

Verbal Learning Test for Spain-Complutense (TAVEC, Benedet & Alejandre, 1998)). This evaluates the verbal episodic memory and consists of seven subtests. We selected the total number of remembered words in the short-term memory (RW-ST) and the total number of words remembered in the long-term memory (RW-LT). The reliability studies of the Spanish version obtained internal consistency values between 0.94 and 0.80.

Wisconsin Card Sorting Test (WCST, Heaton, Chelune, Talley, Kay, & Curtiss, 1993). This evaluates the abstract reasoning capacity through the skill shown in conceptualizing categories and in changing cognitive strategies. We used the following items: number of classification categories completed, percentage of perseverance errors, percentage of errors not due to perseverance, and responses on a conceptual level. We used the scale of the Spanish version of the test published by TEA in 2010.

Stroop Test (Golden, 2010). For correction, we used the scale of the Spanish version and we took into account the interference score, which measures cognitive control (Friedman & Miyake, 2004).

Procedure

While being unaware of the study's objective, those clinically responsible for the patients carried out the evaluations in two sessions of approximately 50 minutes each. We obtained written, informed consent from the subjects themselves and, in the case of incapacitation, from the legal tutors. The work complied with the ethical norms of the Declaration of Helsinki of 1975 with the revision in force at the time.

Data analysis

We carried out the analyses using the SPSS 21 program, to be precise: descriptive statistics, supposed normality contrast with the Kolmogorov-Smirnov test, and the supposed randomization contrast with the Rachas test. We used Spearman's correlation tests for when one of the variables was not normally distributed, and Pearson's test for variables that were close to normal distributions. We carried out a linear regression analysis in several steps to examine the degree of relationship between the clinical variables, social skills and neuro-cognitive measurements, and cognitive insight on the one hand; and between the said variables and the measurements of the said social skills on the other. We used bilateral probability tests with a significance level of 5 %.

Results

The descriptive statistics of the scores from the questionnaires are set out in Table 2. The Kolmogorov-Smirnov test indicated that all the variables were distributed in accordance with the normal curve. The Rachas test showed that all the variables, except the subscale of self-care from the LSP, were distributed in accordance with the randomization criteria. In this case, we carried out the correlation analysis using Spearman's test and all the others with Pearson's test.

We found significant correlations of a negative type between self-certainty and the study level variables (r = -.486; p < .05) and the WAIS vocabulary test (r = -.531; p < .05). Though we also found high, but not significant, correlations between the item "difficulties with abstract thought" of the PANSS and self-certainty (r = .415; p = .055), the same correlations were significant with Spearman's test (r_s = .452; p = .035). Furthermore, we found no significant correlations between the index "stereotyped thought" of the PANSS and the Composite Index (r = -.373; p = .087).

As for functioning, we found significant correlations of a negative type between the total score of the LSP and self-certainty, as well as high but not significant correlations between the indices of the LSP "interpersonal social behavior" (r = -.392; p = .071), and "impersonal social behavior" (r = -.362; p = .098) with the scale of self-certainty.

The results of the regression analysis in steps showed that the predictive model of the self-certainty variable was the score of the WAIS vocabulary scale, which explained 28.2% of the variance [F (1.98) = 7.858; p = .011]. In addition, we also found a high tolerance and a low VIF that could indicate a lack of collinearity (see Table 3). As far as the results of the total LSP are concerned, the predictive variables were "stereotyped thought" and the WAIS vocabulary score, which together amount to 58.1% of the variance of the total LSP [F(1. 98) = 13.149; p <.000]. The collinearity statistics indicate a lack of collinearity (see Table 4).

Table 2
Descriptive statistics, mean and standard deviation. Questionnaires and Scales

Questionnaire	Scale	M	SD
BCIS	Self-reflectiveness (SR)	14.41	4.82
	Self-certainty (SC)	9.32	3.50
	Composite index (CI)	5.09	5.77
PANSS	Emotional numbness	2.5	1.30
	Emotional withdrawal	2.77	1.12
	Poor contact	2.05	0.99
	Social withdrawal	2.73	1.20
	Difficulties with abstract thought	2.50	1.63
	Spontaneity	2.09	0.97
	Stereotyped thought	2.27	0.98
	Total Positive Subscale	16.45	8.36
	Total Negative Subscale	16.91	5.33
LSP	Self-care	32.68	4.84
	Interpersonal social behavior	33.59	4.27
	Communication – social contact	12.6	1.77
	Impersonal social behavior	21.55	2.06
	Independent life	16	4.23
	Total LSP	121.55	15.22
WAIS-IV	Direct digits	6.73	1.96
	Inverse digits	5.91	1.67
	Vocabulary	26.82	12.02
STROOP	Interference	–5.8	10.45
TAVEC	Short-term Free Memory	8.23	3.19
	Long-term Free Memory	8.14	3.77
WCST	Complete categories	2.23	2.22
	% perseverance errors	50.18	33.40
	% non-perseverance errors	17.45	12.54
	Responses of conceptual level	33.82	26.04

Table 3
Linear regression analysis. Partial regression coefficients. DV: Self-certainty (SC)

Model		Non-standard coefficients		Typified coefficients		Statistics of collinearity	
	IV	B	SE	β	t	T	VIF
1	(Constant)	13.462	1.614		8.342***		
	WAIS Vocabulary	-.155	.055	-.531	-2.803*	1.00	1.00

R^2: Coefficient of determination = .282
*Note: ***p≤.001; * p≤.05; T = Tolerance; VIF: Variance inflation factor*

Table 4
Linear regression analysis. Partial regression coefficients. DV: Total LSP

Model		Non-standard coefficients		Typified coefficients		Statistics of collinearity	
	IV	B	SE	β	t	T	VIF
1	(Constant)	144.121	6.538		22.043***		
	Stereotyped thought	-9.933	2.649	-.642	-3.749**	1.00	1.00
2	(Constant)	126.286	8.602		14.681***		
	Stereotyped thought	-8.388	2.364	-.543	-3.547**	.944	1.060
	WAIS Vocabulary	.534	.194	.422	2.757*	.944	1.060

Model 1 R^2: Coefficient of determination =.413; Model 2, *R^2= .581*
*Note: ***p≤.001; ** p ≤ .01; *p≤.05; T: Tolerance; VIF: Variance inflation factor*

Discussion and Conclusions

The objective of this work was to analyze the neuropsychological and clinical correlations of cognitive insight in a sample of patients with schizophrenia and to evaluate what impacts this has on their day to day functioning. From the data collected, we have not been able to confirm the relationship between cognitive insight and the analyzed cognitive variables, memory and executive functioning. This is in line with the conclusions of earlier studies (Nair et al., 2014).

The most unexpected finding has been the significant correlation of a negative type for the self-certainty score with the level of studies and with the WAIS vocabulary test, a finding also confirmed by the regression analysis. Del Río, García-Casal, Ortiz, Ordoñez-Camblor, & Armesto-Formoso (2013), a Spanish study, used the vocabulary test as an indicator of the level of premorbid intelligence in persons with schizophrenia. From this, it is possible to suggest that there is a relationship between a high, general cognitive level and a low level of self-certainty, as some recent works have pointed out (Nair et al., 2014; Orfei et al., 2010). Using a similar sample in our environment, González-Blanch et al. (2014) found the same results. In fact, in the regression model, premorbid intelligence explained a high percentage of the variance in self-certainty. For this reason, it is possible to suggest that a greater level of premorbid intelligence, complemented by the level of studies, could predispose people to recognize errors and to be willing to accept inconsistencies, variables that apparently do not influence the degree of self-reflectiveness.

As for the second hypothesis, we have found no relation between negative symptomatology and cognitive insight. This is in line with what, for instance, Giusti et al. (2013) or O'Connor et al. (2013) found in samples with similar levels of symptomatology to ours. Despite the negative correlation found between some items of the negative subscale of the PANSS related with abstract and stereotyped thought and the index of self-certainty and the composite index of the BCIS, the scarce specificity of the said items and the results of the WCST do not support the hypothesis of Riggs (2012), in the sense that the rigidity of thought would influence the capacity to accept one's own certainties.

As for the influence of cognitive insight on patients' daily functions, the significant relation of a negative type between the level of self-certainty and the total score of the LSP scale could indicate that those patients who show a greater flexibility and openness to the feedback corrector of their distorted thoughts are more capable of adapting to the demands of their environment and of demonstrating a better global day to day functioning. The results obtained in the regression analysis point in this direction, in particular the participation of the item "stereotyped thought" of the PANSS in the explanation of the total LSP score. In the analysis of the different subscales of the LSP, we have not found any associations between those that are more indicative of social skills and the indices of the BCIS. This goes against what some previous works have found, for instance that of Giusti et al. (2013). Nevertheless, the imprecision and ambiguity of the concept of life skills, as well as the scarcity of studies about this question, make the comparison of the results we have found difficult.

In our study, the only neurocognitive variable related to functions is the WAIS vocabulary test, which significantly correlates in a negative way with four of the six subindices of the LSP. The regression analysis clearly shows that the item of the PANSS "stereotyped thought" and the result of the WAIS vocabulary test together explain over half the variance of the total LSP. Some authors, such as Green, Kern, Braff, & Mintz, (2000), suggest that the cognitive measures are more closely related than the symptoms to functioning within the community, and that this association is stable over time. Jaramillo, Ruiz, & Fuentes, (2011) found just such an association in our environment using the LSP.

In general, our results demonstrate the scarce influence of cognitive insight on daily functions. The variables most closely associated with the said functions are negative symptomatology and premorbid intelligence. This is in line with other studies (e.g., Lin et al., 2013), which concluded that the said functioning was due to a synergic relation between the cognitive deficits and the negative symptoms.

The scarce influence that we found of the neuropsychological variables may be because the tests we used evaluate very specific cognitive capacities, while the social functions of the subjects could be more closely related to the global cognitive capacity, which is resistant to the process of deterioration (in this case, premorbid intelligence) than to any concrete capacity. The characteristics of our participants, mainly men of an advanced average age, may also condition the results.

In this sense, the studies that have found such differences in specific neurocognitive functions (e.g., Buchy et al., 2010; González-Blanch et al., 2014) used patients with a first episode of psychosis. In fact, some works (e.g., Sponheim et al., 2010) conclude that in chronic schizophrenia the cognitive deterioration

is generalized and more severe than in the samples of first episode psychosis; while reviews of studies on the cognitive state of people with schizophrenia in middle age and older (e.g., Irani, Kalkstein, Moberg, & Moberg, 2011) point to a greater presence of deficits in global cognition. Certain variables, such as age, being male, low educational level, the presence of more symptomatology, a greater institutionalization, and the duration of the disease, all contribute to this greater presence of deficits.

Among the limitations of the present study are, firstly, those concerning the number of participants and the fact that they are mainly from residential environments, as this could pose a threat to the external validity. The incorporation of a greater number of patients from the community at large would be desirable in future studies. Secondly, there are further limitations due to the measures used, as well as the use of self reporting. Lastly, we have not taken into account the possible effects of the impact of the measurements on the output of the cognitive tests, or the effects of other variables such as premorbid social adjustment, depressive symptoms, or the number of relapses. Therefore, future research should aim to overcome these limitations.

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