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Efficacy of a Social Cognition Training Program for Schizophrenic Patients: A Pilot Study

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Psychosocial functioning impairment is recognized as a core feature of schizophrenia. Numerous studies have assessed the process that may underlie this impairment. In the last years, one of these processes that has been studied more is social cognition, which has been proposed as a mediator variable between neurocognition and functional outcome. Social cognition includes the subdomains of emotion recognition and social perception, and in recent years several authors have developed diverse training programs in these areas.

The purpose of the present article is to assess the efficacy of the Social Cognition Training Program, a program that includes emotion recognition training and social perception training. The sample was made up of 14 outpatients with a diagnosis of schizophrenia according to CIE-10 criteria, randomly divided into two groups: experimental and control. All patients were assessed before and after the training program. Cognitive and psychopathological variables, social functioning, emotion recognition and social perception performance were assessed. Results suggest improvement in social perception and interpretation in the experimental group, in comparison with the control group, but not in emotion recognition. No significant correlations were obtained between social cognition training and other variables tested.

Keywords: schizophrenia, social cognition, social perception, emotion perception, psychosocial rehabilitation

El deterioro en el funcionamiento psicosocial es un rasgo característico de la esquizofrenia. Diferentes estudios han valorado los procesos que se relacionan con este deterioro, destacando el papel de la cognición social como variable mediadora entre la neurocognición y el desempeño funcional de los pacientes con esquizofrenia. Dentro de la cognición social, dos de las áreas más estudiadas han sido la percepción de emociones y la percepción social, desarrollándose diferentes programas de entrenamiento en estas áreas.

El presente artículo tiene como objetivo valorar la eficacia del Programa de Entrenamiento en Cognición Social, un programa que combina el entrenamiento en percepción de emociones y percepción social. La muestra estuvo compuesta por catorce pacientes, diagnosticados de esquizofrenia según criterios CIE-10, asignados de manera aleatoria a dos grupos: experimental y control. Todos los pacientes fueron valorados al inicio y al final del entrenamiento. Se evaluó el rendimiento en percepción de emociones y percepción social, así como variables cognitivas, psicopatológicas y de funcionamiento social. El grupo experimental obtuvo una mejora en percepción social en comparación con el grupo control, pero no en percepción de emociones. El entrenamiento en cognición social no tuvo ningún efecto significativo en las demás variables valoradas.

Palabras clave: esquizofrenia, cognición social, percepción social, percepción de emociones, rehabilitación psicosocial

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Impairment of psychosocial functioning is one of the core features of patients with schizophrenia. In recent years, interest to define the processes that may underlie this deterioration has increased, with the aim of developing programs to improve the functional performance of these patients.

One of the processes studied has been social cognition (Brüne, 2005; Green, Olivier, Crawley, Penn, & Silverstein, 2005), a cognitive function that includes areas such as emotion recognition, social perception, knowledge of social norms, attributional style, and theory of mind (Penn, Addington, & Pinkham, 2005). Ruíz, García, and Fuentes (2006), on the basis of previous definitions (Brothers, 1990; Ostrom, 1984), define social cognition as "the set of mental operations that underlie social interactions, and include the processes involved in perception, interpretation, and generation of responses when faced by others' intentions, dispositions and behaviors."

Patients with schizophrenia present a clear deficit in these areas (Addington, Saeedi, & Addington, 2006; Corrigan, 1997; Johnston, Stojanov, Devir, & Schall, 2005; Langdon, Colheart, Ward, & Catts, 2002). This deficit has been linked with their symptomatology (Kohler, Bilker, Hagendoorn, Gur, & Gur, 2000; Poole, Tobias, & Vinogradov, 2000; Sachs, Steger-Wuchse, Kryspin-Exner, Gur, & Katschnig, 2004; Shean, Murphy, & Meyer, 2005) and their cognitive performance (Bozikas, Kosmidis, Anezoulaki, Giannakou, & Karavatos, 2004; Corrigan, 1997; Sachs et al., 2004; Silver & Shlomo, 2001; Lancaster, Evans, Bond, & Lysaker, 2003). Likewise, social cognition has been proposed as a mediating variable between neurocognition and patients' psychosocial functioning (Brekke, Kay, Lee, & Green, 2005; Green & Nuechterlein, 1999; Hooker & Park, 2002; Sergi, Rassovsky, Nuechterlein, & Green, 2006; Vauth, Rüsch, Wirtz, & Corrigan, 2004). Both the emotion recognition and social perception have been related to social competence, the capacity to initiate and maintain social relations, and conversational skills (Brüne, 2005; Hooker & Park, 2002 .Poole et al., 2000).

With the aim of improving the social behavior of patients with schizophrenia, various authors have developed training programs in the areas that make up social cognition, mainly in emotion recognition and social perception. With regard to recognition and interpretation of emotions, the following programs have shown their efficacy: the Training Affect Recognition (TAR; Fromman, Streit, & Wölwer, 2003), the Emotional Training Program (ETP; Silver, Goodman, Knoll, & Isakov, 2004), and the Social Cognition and Interaction Training (SCIT; Penn et al., 2005). All three programs have the goal of learning to discriminate facial signs of emotions and to integrate them within the social context. Training in social perception is also included in the Integrated Psychological Therapy (IPT), a program developed by Roder, Brenner, Hodel, and Kienzle (1996). The IPT includes five subprograms of group training ordered hierarchically: cognitive differentiation, social perception, verbal communication, social skills, and problem-solving. Although IPT is designed to train all the subprograms sequentially, García, Fuentes, Ruiz, Gallach, and Roder (2003) have shown the efficacy of working specifically with the social perception module. This module has the aim of improving the interpretation of social situations and is developed by means of the analysis of slides in sessions of approximately 60 minutes.

The present article describes a pilot study of the efficacy of the Social Cognition Training Program (SCTP), which is made up of two phases in which the areas of emotion recognition and social perception are trained. Emotion recognition is dealt with in sessions designed by the authors, based on the above-mentioned programs. The second phase trains social perception using the specific IPT module. The assessment of these variables before and after the administration of the SCTP allows us to determine whether training in emotion recognition and social perception is related to an improvement in other cognitive functions, in symptomatology, and in variables of psychosocial functioning.

Method

Participants

The the sample is made up of 14 patients, diagnosed with schizophrenia according to the CIE-10 criteria (WHO, 1992) by their psychiatrists of reference of the Sistema Cántabro de Salud (Translation: Spanish Cantabrian Health System), and in pharmacological treatment with antipsychotics at the time of the study. All the patients attended a Psychosocial Rehabilitation Center of the Hospital Center Padre Menni of Santandar (Spain), where they carried out an individualized rehabilitation program that included diverse trainings depending on their specific needs. Specifically, the participants in the study were included in social skills and cognitive training programs.

The patients were randomly assigned to the experimental group or to the control group. The sociodemographic characteristics of both groups are specified in Table 1.

Assessment Instruments

The assessment of emotion recognition was carried out by means of a computerized test of facial emotion recognition designed for this purpose. The following emotions were included: happiness, sadness, surprise, anger, fear, and disgust. The test was made up of 30 color photographs (5 for each emotion), selected from the NimStim Face Stimulus Set, designed by the Research Network on Early Experience and Brain Development (Tottenham, 1998). The participants looked at the photographs one by one and took all the time they needed to choose a response option. Figure 1 shows an example of the presentation of the photographs and the response options. One point was given for a correct response, so the maximum score for each emotion could be 5. Social perception was appraised by means of the "Escala de Percepción Social" (translated: Social Perception Scale; EPS;

Table 1
Sociodemographic characteristics of the experimental and control groups

Variable	experimental group *M* (*SD*)	control group *M* (*SD*)	U	p
Age	33.29 (8.36)	41.43 (9.03)	11.00	.08
Sex				
Male	4	3		
Female	3	4		
Education				
Incomplete	2	0		
Primary	3	4		
1st degree professional. training	1	2		
High school	1	0		
Intermediate degree	0	1		
Years of education	13 (3.16)	12.71 (2.06)	21.50	.69
Living with:				
Alone	0	2		
Own family	0	1		
Original family	7	4		
Civil status				
Single	7	6		
Widowed	0	1		
Mean years of evolution	13.43	20.57	13.50	.15

García, 2003), which assesses through photographs the three aspects trained in the IPT program of social perception. These aspects are: collecting information, interpreting information, and allocating a title to the photograph.

To assess the attentional capacity, we used the subtest Dígitos Directos [Direct Digits] of the Integrative Program of Neuropsychological Exploration of the Test Barcelona (Peña-Casanova, 1990). Symptomatology was assessed by means of the Positive and Negative Syndrome Scale in Schizophrenia (PANSS) in the Spanish version of Peralta and Cuesta (1994). Lastly, psychosocial functioning was assessed by means of the disability scale of the World Health Organization (WHO-DAS-II, 1985), in the 36-item Spanish version, administered by clinicians (Vázquez-Barquero, Herrera, Vázquez, & Gaite, 2006). This instrument assesses six areas of functioning: comprehension and communication, the capacity to move, personal care, the capacity to relate to others, daily activities, and social participation.

Procedure

The above-mentioned tests were administered before beginning the sessions of the Social Cognition Training Program and after completing the program. Training the experimental group was carried out in two phases, with a total of 20 sessions, in two weekly 45-minute sessions. The goal of the first phase was for the patients to learn to identify

Figure 1. Example of the Emotion Recognition Test.

Table 2

Wilcoxon signed-rank test, comparison of pre- and post-treatment measures of experimental group and control group, and value of Cohen's d in the experimental group

	Control Group				
Variable	Pre-treatment *M* (*SD*)	Post-treatment *M* (*SD*)	*V*	*p*	
Emotions					
Joy	4.14 (0.90)	4.57 (0.53)	8	.50	
Sadness	4.14 (1.86)	3 (1.53)	4	1	
Anger	4.43 (0.53)	4 (0.82)	1	1	
Surprise	4.43 (0.79)	4.14 (1.21)	3	.50	
Fear	2.43 (1.27)	2 (0.58)	7	.32	
Disgust	2.43 (1.90)	3.43 (1.81)	4	1	
EPS					
Stimulus identification	25.80 (7.08)	27.07 (7.23)	9	.84	
Interpretation	27.66 (20.38)	51.19 (13.96)	6	.87	
Allocation of title	24.99 (11.78)	26.19 (17.63)	3.5	.75	
Attention direct digits	6 (1.00)	5.71 (0.76)	3	.50	
PANSS					
Positive symptomatology	12.57 (6.13)	9.29 (3.59)	10	.12	
Negative symptomatology	17.00 (4.32)	13.86 (3.53)	14	.12	
General psychopathology	28.86 (12.40)	20.29 (3.55)	14	.12	
Total score	58.43 (20.88)	43.43 (11.16)	20	.06	
WHODAS-II					
Comprehension and communication	14.71 (3.82)	12.14 (3.63)	26	.06	
Capacity to move	6.29 (1.38)	5.86 (1.86)	7	.62	
Personal care	7.00 (2.45)	5.86 (1.77)	15	.06	
Capacity to relate to others	18.43 (3.60)	16.14 (4.18)	17.5	.18	
Daily activities	14.86 (4.18)	12.00 (6.43)	16.5	.25	
Social participation	21.57 (3.82)	20.57 (4.58)	14	.56	
	Experimental Group				
Variable	Pre-treatment *M* (*SD*)	Post-treatment *M* (*SD*)	*V*	*p*	*d*
Emotions					
Joy	4.14 (0.90)	4.71 (0.49)	0	.25	1.78
Sadness	4.14 (1.86)	3.86 (1.86)	3	.50	–0.15
Anger	4.43 (0.53)	4.29 (0.76)	4	1	–0.18
Surprise	4.43 (0.79)	4.43 (0.79)	1.5	1	1.00
Fear	2.43 (1.27)	2.57 (1.62)	6.5	1	1.09
Disgust	2.43 (1.90)	2.57 (2.15)	6.5	.93	1.06
SP scale					
Stimulus identification	25.80 (7.08)	33.47 (7.93)	6	.20	1.02
Interpretation	27.66 (20.38)	54.76 (20.33)	0	**.01**	1.33
Allocation of title	24.99 (11.78)	48.81 (7.49)	0	**.01**	2.41
Attention direct digits	5.14 (1.46)	5.71 (1.25)	2.5	.31	
PANSS					
Positive symptomatology	11.57 (4.79)	9.71 (4.19)	15	.06	
Negative symptomatology	17.14 (4.53)	13.29 (2.75)	14	.12	
General psychopathology	25.27 (10.15)	19.14 (2.04)	14	.12	
Total score	54.29 (16.03)	42.14 (6.89)	15	.06	
WHODAS-II					
Comprehension and communication	16.86 (5.11)	13.43 (3.31)	19.5	.09	
Capacity to move	6.29 (2.21)	5.29 (0.76)	6	.25	
Personal care	11.29 (4.42)	8.57 (4.47)	21	**.03**	
Capacity to relate to others	18.57 (4.08)	16.43 (1.81)	16	.28	
Daily activities	16.43 (5.19)	12.29 (5.50)	28	**.01**	
Social participation	19.86 (4.60)	23.29 (2.29)	2	.09	

The Table only includes the general scores of the PANSS; there were no significant differences in any specific item.

the six emotions considered basic: happiness, sadness, fear, surprise, anger, and disgust (Ekman, 1973, 1982, 1994). This phase had four sessions. In the first session, the purpose of the program and the concept of basic emotion were explained. In the second session, the facial traits that make up each emotion were analyzed. In the following two sessions, the patients performed exercises of emotion recognition by means of the analysis of different photographs from those that were used in the assessment test, and they were asked to express the emotions trained with facial gestures. The photographs employed in these two sessions were also selected from the NimStim Face Stimulus Set.

In the second phase, the social perception subprogram of the IPT was administered in a total of 16 sessions, in which 14 slides were used, as the first two slides were analyzed in 2 sessions. The degree of stimular and emotional complexity was progressively increased. Each training session was carried out in three phases: collecting information, interpretation and discussion, and allocating a title. In the information collection phase, the identification of the relevant stimuli that made up the slide was facilitated by all the group members. When interpreting, the patients had to offer their explanation of what had happened in the image and to analyze the responses given by the rest of the participants. Lastly, in the phase of allocating a title, each group member proposed a title that summarized the most relevant aspects of the image. The group had to appraise the diverse titles proposed and choose the one they thought was the most appropriate. If the final title chosen had no relation to the slide analyzed, the therapists suggested carrying out a new analysis of the image.

Both the experimental group and the control group members carried on with their regular activities in their respective rehabilitation programs, with the sole difference that the patients from the experimental group received training in social perception.

Results

Nonparametric tests were used to analyze the results. The differences between the experimental group and the control group in the variables age, years of education, and years of

Table 3
Wilcoxon-Mann-Whitney test, comparison of experimental group and control group in the emotion recognition and social perception tests before and after treatment, and value of Cohen's d in the post-treatment measures

	Before treatment			
Variable	Experimental group *M* (*SD*)	Control group *M* (*SD*)	*W*	*p*
Emotions				
Joy	4.14 (0.90)	4.57 (0.53)	18	.47
Sadness	4.14 (1.86)	3 (1.53)	35	.16
Anger	4.43 (0.53)	4 (0.82)	32	.44
Surprise	4.43 (0.79)	4.14 (1.21)	26.5	.87
Fear	2.43 (1.27)	2 (0.58)	33.5	.22
Disgust	2.43 (1.90)	3.43 (1.81)	15.5	.27
SP scale				
Stimulus identification	25.80 (7.08)	27.07 (7.23)	21.5	.71
Interpretation	27.66 (20.38)	51.19 (13.96)	7	**.02**
Allocation of title	24.99 (11.78)	26.19 (17.63)	24	1

	After treatment				
Variable	Experimental group *M* (*SD*)	Control group *M* (*SD*)	*W*	*p*	*d*
Emotions					
Joy	4.71 (0.49)	4 (1.29)	31	.33	1.72
Sadness	3.86 (1.86)	2.86 (1.57)	33.5	.24	1.58
Anger	4.29 (0.76)	4.14 (1.07)	25	1	1.16
Surprise	4.43 (0.79)	4.43 (0.79)	24.5	1	1.00
Fear	2.57 (1.62)	2.86 (1.77)	22	.81	-0.17
Disgust	2.57 (2.15)	3.43 (1.62)	18	.41	-0.45
SP scale					
Stimulus identification	33.47 (7.93)	28.57 (9.72)	34	.24	1.55
Interpretation	54.76 (20.33)	48.81 (12.19)	28	.69	1.35
Allocation of title	48.81 (7.49)	28.57 (20.33)	42	**.02**	1.32

the evolution of the illness were assessed by means of Mann-Whitneys' *U*. To appraise the within-group differences in the pre- and posttreatment measures, we used Wilcoxon's signed-rank test, calculating the exact probability values. Group differences before and after treatment were analyzed by means of the Wilcoxon-Mann-Whitney test, which also provides exact values of probability. Likewise, we calculated Cohen's *d* statistic to assess the effect size, both between the experimental and the control group, and between the pre- and posttreatment measures of the experimental group.

Within-subject differences

The Wilcoxon signed-rank test (see Table 2) indicated that the experimental group improved in the pre- and posttreatment measures of the social perception test, specifically, in the factors of interpretation ($V = 0$, $p = .01562$, $d = 1.331$) and title allocation ($V = 0$, $p = .01562$, $d = 2.413$), but not in the stimulus identification factor. A more detailed analysis of the results of this last factor revealed that, out of the 7 patients in the experimental group, 6 obtained a higher final score than their initial score, and only 1 patient had a lower final score. There were no significant differences in the emotion recognition test.

In the rest of the tests administered, the experimental group only obtained significant differences in the areas of personal care ($V = 21$, $p = .03125$) and daily activities ($V = 28$, $p = .01562$) of the WHO-DAS-II. No differences were obtained in the attention test or in the PANSS scale.

Regarding the control group, no significant differences were obtained in any of the pre- and posttreatment measures (see Table 2).

Differences between the experimental group and the control group

The Wilcoxon-Mann-Whitney test revealed significant differences between the experimental and the control group in the social perception scale before and after treatment (see Table 3). Specifically, the control group obtained higher scores in the percentage of appropriate interpretations at the pretreatment assessment ($W = 7$, $p = .02214$), whereas the experimental group obtained better results in the quality of the title at the posttreatment measurement ($W = 42$, $p = 0.02098$, $d = 1.321$).

There were no group differences in the emotion recognition test either before or after the administration of the program (see Table 3).

Discussion

The aim of the Social Cognition Training program was to integrate training in emotion recognition and in social perception within the same program. The results obtained indicate that the experimental group members improved their perception and interpretation of social situations, but not their emotion recognition. Social perception was trained using the IPT module, therefore, the positive results support the conclusion obtained by García et al. (2003) about the efficacy of the social perception subprogram administered independently from the remaining subprograms that make up the IPT. After training, the experimental group patients performed a more appropriate interpretation and allocated a better matching title than the control group patients. With regard to stimulus identification, the fact that 6 of the 7 patients achieved higher final scores indicates a tendency towards improvement also in this factor.

In the comparison of the experimental and control groups, we observed that the patients from the experimental group started out with lower scores in the interpretation factor than the patients from the control group, so the fact that there were no posttreatment differences seems to indicate that the experimental group did improve its performance, reaching the initial level of the control group, whereas the latter did not achieve any improvement.

With regard to the SCTP phase that trains emotion recognition, the lack of results could be related, in the first place, to the sample size. Another limitation could be the number of sessions that make up this phase, but Silver et al. (2004) have shown the effectiveness of short training programs in emotion recognition, and therefore, the administration of the SCTP module to a higher number of patients would contribute more data about its possible effectiveness.

With regard to improvement in other areas of social cognition training, the experimental group patients did not obtain significant differences either in attention or in the level of symptomatology. These results are in accordance with previous studies (García et al., 2003; Penn, Roberts, et al., 2005) that propose that isolated intervention in social cognition does not produce any improvement in other types of cognitive variables or in psychopathology.

In the experimental group, higher scores were obtained in the isolated factors of the WHO-DAS-II after the administration of the SCTP. However, this improvement could be related to the broader intervention in psychosocial rehabilitation that the patients from the experimental group were receiving. Moreover, the areas in which improvement was observed were personal care and daily activities, without noting any significant change in comprehension and communication, capacity to relate to others or social participation, areas in which previous research had found a relation with social cognition (Brüne, 2005; Hooker & Park, 2002; Poole et al., 2000).

Lastly, despite not reaching statistical significance, there was a difference in age and the years of evolution of the illness between the experimental and the control group, so it is possible that the differences observed between these groups are related to this. However, various authors have found no relation between these variables and the deficit in

emotion recognition and social perception in patients with schizophrenia (Bediou et al., 2005, 2007; Bozikas et al., 2004; Brüne, 2005; Kucharska-Pietura & Klimkowski, 2002; Sachs et al., 2004).

The most obvious limitation of this study is the sample size, hence, the aforementioned conclusions should be taken with precaution, and we are aware that future research with a larger number of cases to provide more conclusive data should be carried out. Likewise, as these were patients attending a psychosocial Rehabilitation Center, the data obtained should not be generalized to the entire population of people with schizophrenia.

References

Addington, J., Saeedi, H, & Addington, D. (2006). Influence of social perception and social knowledge on cognitive and social functioning in early psychosis. *British Journal of Psychiatry, 189,* 373-378.

Bediou, B., Krolak-Salmon, P., Saoud, M., Henaff, M. A., Burt, M., Dalery, J., & D'Amato, T. (2005). Facial expression and sex recognition in schizophrenia and depression. *Canadian Journal of Psychiatry, 50,* 269-274.

Bediou, B., Asri, F., Brunelin, J., Krolak-Salmon, P., D'Amato, T., Saoud, M., & Tazi, I. (2007). Emotion recognition and genetic vulnerability to schizophrenia. *British Journal of Psychiatry, 191,* 126-130.

Bozikas, V. P., Kosmidis, M. H., Anezoulaki, D., Giannakou, M., & Karavatos, A. (2004). Relationship of affect recognition with psychopathology and cognitive performance in schizophrenia. *Journal of the International Neuropsychological Society, 10,* 549-558, 2004.

Brekke, J. S., Kay, D., Lee, K., & Green, M. F. (2005). Biosocial pathways to functional outcome in schizophrenia: A path analytic model. *International Congress Schizophrenia Research,* Colorado Springs, CO.

Brothers, L. (1990). The social brain: a project for integrating primate behaviour and neurophysiology in new domain. *Concepts in Neuroscience, 1,* 27-61.

Brüne, M. (2005). Emotion recognition, theory of mind, and social behavior in schizophrenia. *Psychiatric Research, 133,* 135-147.

Corrigan, P. W. (1997). The social perceptual deficits in schizophrenia. *Psychiatry, 60,* 309-326.

Ekman, P. (1973). *Darwin and facial expression: A century of research in review.* New York: Academic Press.

Ekman, P. (1982). *Emotion in the human face.* New York: Cambridge University Press.

Ekman, P. (1994). Are these basic emotions? In P. Ekman & R. J. Davidson (Eds.), *The nature of emotions: Fundamental questions* (pp.46-47). Oxford, UK: Oxford University Press.

Frommann, N., Streit, M. & Wölwer, W. (2003). Remediation of facial affect recognition impairments in patients with schizophrenia: A new training program. *Psychiatry Research, 117,* 281-284.

García, S. (2003). *Rehabilitación de enfermos mentales crónicos: Entrenamiento en percepción social.* Valencia, Spain: Universidad de Valencia.

García, S., Fuentes, I., Ruíz, J. C., Gallach, E., & Roder, V. (2003). Application of the IPT in a Spanish sample: Evaluation of the "social perception subprogramme". *International Journal of Psychology and Psychological Therapy, 3,* 299-310.

Green, M. F., & Nuechterlein, K. H. (1999). Should schizophrenia be treated as a neurocognitive disorder? *Schizophrenia Bulletin, 25,* 309-318.

Green, M. F., Olivier, B., Crawley, J. N., Penn, D. L., & Silverstein, S. (2005). Social cognition in schizophrenia: Recommendations from the measurement and treatment research to improve cognition in schizophrenia new approaches conference. *Schizophrenia Bulletin, 31,* 882-887.

Hooker, C., & Park, S. (2002). Emotion processing and its relationship to social functioning in schizophrenia patients. *Psychiatry Research, 112,* 41-50.

Johnston, P., Stojanov, W., Devir, H., & Schall, U. (2005). Functional MRI of facial emotion recognition deficits in schizophrenia and their electrophysiological correlates. *European Journal of Neuroscience, 22,* 1221-1232.

Kohler, C. G., Bilker, W., Hagendoorn, M., Gur, R. C., & Gur, R. E. (2000). Emotion recognition deficit in schizophrenia: Association with symptomatology and cognition. *Biological Psychiatry, 48,* 127-136.

Kucharska-Pietura, K., & Klimkowski, M. (2002). Perception of facial affect in chronic schizophrenia and right brain damage. *Acta Neurobiologiae Experimentalis, 62,* 33-43.

Lancaster, R.S., Evans, J. D., Bond, G. R., & Lysaker, P. H. (2003). Social cognition and neurocognitive deficits in schizophrenia. *Journal of Nervous and Mental Disease, 191,* 295-299.

Langdon, R., Coltheart, M., Ward, P. B., & Catts, S. V. (2002). Disturbed communication in schizophrenia: The role of poor pragmatics and poor mind-reading. *Psychological Medicine, 32,* 1273-1284.

Ostrom, T. M. (1984). The sovereignty of social cognition. In R.S. Wyer & T. K. Skrull (Eds.), *Handbook of social cognition, Vol. 1* (pp. 1-37). Hillsdale, NJ: Erlbaum.

Penn, D. L., Addington, J., & Pinkham, A. (2005). Social cognitive impairments. In J. A. Lieberman, T. S. Stroup, D. O. Perkins (Eds.), *American Psychiatric Association textbook of schizophrenia* (pp.261-274). Washington, DC: American Psychiatric Publishing Press.

Penn, D., Roberts, D. L., Munt, E., Silverstein, E., Jones, N., & Sheitman, B. (2005). A pilot study of social cognition and interaction training (SCIT) for schizophrenia. *Schizophrenia Research, 80,* 357-359.

Peña-Casanova, J. (1990). *Programa integrado de exploración neuropsicológica*. Masson, Barcelona.

Peralta, V., & Cuesta M. J. (1994). Validación de la Escala de los Síndromes Positivo y Negativo (PANSS) en una muestra de esquizofrénicos españoles. *Actas Luso Españolas de Neurología, Psiquiatría y Ciencias Afines, 22,* 171-177.

Poole, J. H., Tobias, F., & Vinogradov, S. (2000). The functional relevance of affect recognition errors in schizophrenia. *Journal of the International Neuropsychological Society, 6,* 649-658.

Roder, V., Brenner, H. D., Hodel, B., & Kienzle, N. (1996). *Terapia integrada de la esquizofrenia*. Barcelona, Ariel.

Ruiz, J. C., García, S., & Fuentes, I. (2006). La relevancia de la cognición social en la esquizofrenia. *Apuntes de Psicología, 24,* 137-155.

Sachs, G., Steger-Wuchse, D., Kryspin-Exner, I., Gur, R. C., & Katschnig, H. (2004). Facial recognition deficits and cognition in schizophrenia. *Schizophrenia Research, 68,* 27-35.

Sergi, M. J., Rassovski, Y., Nuechterlein, K. H., & Green, M. F. (2006). Social perception as a mediator of the influence of early visual processing on functional status in schizophrenia. *American Journal of Psychiatry, 163,* 448-454.

Shean, G., Murphy, A., & Meyer, J. (2005). Social cognition and symptom dimensions. *Journal of Nervous and Mental Disease, 193,* 751-755.

Silver, H., & Shlomo, N. (2001). Perception of facial emotions in chronic schizophrenia does not correlate with negative symptoms but correlates with cognitive and motor dysfunction. *Schizophrenia Research, 52,* 265-273.

Silver, H., Goodman, C., Knoll, G., & Isakov, V. (2004). Brief emotion training improves recognition of facial emotions in chronic schizophrenia. A pilot study. *Psychiatry Research, 128,* 147-154.

Tottenham, N. (1998). *MacBrain Face Stimulus Set*. John D. and Catherine T. MacArthur Foundation Research Network on Early Experience and Brain Development.

Vauth, R., Rüsch, N., Wirtz, M., & Corrigan, P. W. (2004). Does social cognitive influence the relation between neurocognitive deficits and vocational functioning in schizophrenia? *Psychiatry Research, 128,* 155-165.

Vázquez-Barquero, J. L., Herrera, S., Vázquez, E., & Gaite, L. (2006). *Cuestionario para la Evaluación de Discapacidad de la Organización Mundial de la Salud. Versión española del World Health Organization Disability Assessment Schedule II. WHO-DAS II*. Ministerio de Trabajo y Asuntos Sociales, Madrid.

World Health Organization. (1985). *A procedure and schedule for assessment of disability in patients with severe psychiatric disorders. Disability Assessment Schedule DAS-II*. Geneva: Author.

World Health Organization. (1992). *The ICD-10 Classification of mental and behavioural disorders. Clinical descriptions and diagnostic guidelines* (10th revision). Geneva: Author. (Spanish translation: CIE-10. Trastornos Mentales del Comportamiento. Meditor, Madrid, 1992.)

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