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A 2-year longitudinal study on subjective experience of social cognition in young people with first episode psychosis.

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ABSTRACT

Introduction: Impairments in Social Cognition (SC) in First Episode Psychosis (FEP) were reported exclusively using neurocognitive tests. Aim of this study is (1) to assess subjective experience of SC in FEP adolescent and young adults compared to non-FEP help-seeking peers, (2) to investigate any significant association of SC with psychopathology and functioning in FEP individuals; and (3) to monitor longitudinally the stability of SC after a 2-year follow-up period.

Methods: Participants (141 FEP and 98 non-FEP), aged 13-35 years, completed the Comprehensive Assessment of At-Risk Mental States (CAARMS) and the GEOPTe scale of SC for psychosis. Within the FEP group, a multiple linear regression analysis (with GEOPTe total scores as independent variables and CAARMS dimension subscores as dependent variables) was also performed.

Results: In comparison with non-FEP, FEP patients showed significantly higher GEOPTe SC scores. After both 12 and 24 months of follow-up, FEP subjects had a significant decrease in severity on GEOPTe SC subscore. In the FEP group, GEOPTe total scores showed significant positive correlations with negative symptoms and general psychopathology. Regression analysis results showed a significant contribution of subjective SC in predicting depression. Conclusions – SC deficits are prominent in FEP patients, where at baseline seems to be associated with negative symptoms and to predict clinical depression.

Keywords – Social Cognition, Emotion Recognition, Cognitive Functions, First Episode Psychosis, Early Psychosis.

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RESUMEN

Introducción: En la literatura, se detectaron deficiencias en la Cognición Social (CS) en Primer Episodio de Psicosis (PEP) utilizando exclusivamente pruebas neurocognitivas. Los objetivos de este estudio son: (1) evaluar la experiencia subjetiva de la CS en adolescentes y adultos jóvenes con PEP en comparación con pacientes sin PEP; (2) investigar posibles asociaciones significativas de la CS con psicopatología y funcionamiento en pacientes con PEP; (3) monitorear longitudinalmente la estabilidad de la CS después de un periodo de 2 años de follow-up.

Métodos: Los participantes (141 con PEP y 98 sin PEP), de 13 a 35 años, completaron la CAARMS («Comprehensive Assessment of At-Risk Mental States») y la escala GEOPTe de la CS para la psicosis. En el grupo de pacientes con PEP, también se realizó un análisis de regresión lineal múltiple con las puntuaciones totales de la escala GEOPTe como variables independientes y las dimensiones de la CAARMS como variables dependientes.

Resultados: En comparación con los pacientes sin PEP, los participantes con PEP mostraron puntuaciones totales de la escala GEOPTe significativamente más altas. Después 12 y 24 meses de follow-up, los pacientes con PEP mostraron una disminución significativa en la gravedad de la subescala «Cognición Social» de la GEOPTe. En el grupo de pacientes con PEP, las puntuaciones totales de la escala GEOPTe mostraron correlaciones positivas significativas con las dimensiones «Síntomas Negativos» y «Psicopatología General» de la CAARMS. Los resultados del análisis de regresión mostraron una contribución significativa de la CS subjetiva en la predicción de la depresión. **Conclusiones** – Las deficiencias de CS son prominentes en los pacientes con PEP, donde en la evaluación inicial parece estar asociado con síntomas negativos y predecir la dimensión depresiva.

Palabras Clave – Cognición Social, Reconocimiento de Emociones, Funciones Cognitivas, Primer Episodio de Psicosis, Psicosis Temprana.

INTRODUCTION

Social cognition (SC) is a set of neurocognitive functions that underline social interactions¹. In the last decade, empirical evidence has reported that significant impairment in SC is a common feature in patients with schizophrenia, in both early and advanced phases of illness². Specifically, socio-cognitive deficits have been consistently associated to poor community functioning, including work and social performance³.

The pragmatic relevance of SC in the real world has led to an increased research also in First Episode Psychosis (FEP), in which socio-cognitive alterations have been significantly linked to poor functional outcome and psychosocial adjustment^{4,5}. The advantage of studying this earlier phase of psychosis is that clinical components as severity of disorder, illness duration, aging, effects of long-term medications, chronic hospitalization, and other factors related to long-term intervention are not as applicable³. As a result, SC has become a crucial target for early intervention in psychosis, with recent, great efforts aiming to increase early functional recovery among FEP patients⁶.

However, the degree of overlap between SC and neurocognition has recently been an area of debate within the literature. In this respect, a meta-analysis of 52 studies comprising 2692 individuals with non-affective psychosis showed that SC was more strongly associated with community functioning than neurocognition⁷. Nevertheless, psychological evaluation on SC in FEP empirical research is still currently based on batteries of neurocognitive tests that are similar to those have been applied on patients with neurodegenerative disorders and that require a long time to be administered⁸. In addition to the fact that few mental health professionals routinely use these tests in their daily practice⁹, the application of this neurocognitive model has relevant limitations that should be adequately discussed. Since after thousands of investigation schizophrenia does not seem to be a degenerative disorder¹⁰, the results that have been found with these neuropsychological test batteries are probably not specific. In order to reduce this gap between research and clinical practice within the field of treatment and diagnosis of psychosis, Sanjuan et al. (2003)⁸ developed a new instrument for evaluating SC. The GEOPTE scale («Grupo Espanol para la Optimizacion y Tratamiento de la Esquizofrenia») (Figure 1) is an easy and quick self-report questionnaire aimed to assess the subjective experience of SC in relation to the subjective perception of basic cognitive deficits.

		No	A little	Normal	Enough	A lot
1	Is it difficult for you to pay attention?	1	2	3	4	5
2	Is it difficult for you to follow a conversation in which several people are participating?	1	2	3	4	5
3	Is it hard for you to learn new things?	1	2	3	4	5
4	Do you forget to do things asked of you, tasks, or errands?	1	2	3	4	5
5	When you have to speak to someone, do you have problems in expressing yourself?	1	2	3	4	5
6	Do you have problems understanding what a picture is about?	1	2	3	4	5
7	Is it difficult for you to understand the meaning of a conversation?	1	2	3	4	5
8	Is it hard for you to recognize the emotions of others (for example: sadness, happiness, rage)?	1	2	3	4	5
9	When you are in a group, do they usually tell you that you have misunderstood the attitudes, looks, or expressions of the others?	1	2	3	4	5
10	Do you feel very sensitive to looks, words, or expressions of others?	1	2	3	4	5
11	If you are alone at home and some problems arise (for example: an appliance breaks down), is it difficult for you to look for a solution?	1	2	3	4	5
12	Do you find it hard to maintain personal hygiene (to be clean and washed)?	1	2	3	4	5
13	Do you find it hard to make plans for the weekend?	1	2	3	4	5
14	Is it hard for you to make friends?	1	2	3	4	5
15	Are you generally unsatisfied with your sexual life?	1	2	3	4	5

Legend – GEOPTE = «Grupo Espanol para la Optimización y Tratamiento de la Esquizofrenia» (Spanish Group for the Optimization and Treatment of Schizophrenia).

Figure 1

The GEOPTE Scale of social cognition for psychosis⁸.

Furthermore, although research on SC in FEP patients has significantly been implemented in the past decade, another important knowledge gap concerns the longitudinal course of SC impairment in this young population. Specifically, a lack of clarity refers to when SC deficits occur in relation to psychotic disorder and to how socio-cognitive dysfunction progresses in the period of time before and after FEP³.

Starting from this background, *aims* of this study were:

- (1) to assess levels of subjective SC in a sample of FEP adolescents and young adults in comparison with help-seeking peers without psychotic disorders. Moreover, we compared baseline SC measures between FEP patients with schizophrenia spectrum disorders (SSD) and non-schizophrenia spectrum disorders (NSSD);
- (2) to explore any significant association of subjective SC with psychopathology, functioning, sociodemographic and clinical characteristics in the FEP total group;
- (3) to monitor longitudinally the stability of subjective SC in the FEP total sample after a 2-year follow-up period. Furthermore, along 2 years of follow-up, we examined any relevant association between SC measures and the specialized treatment components of an «early intervention in psychosis» program in the FEP total group.

To the best of our knowledge, no research using the GE-OPTE scale for examining the subjective experience of SC in a population of adolescent and young adult help-seekers with FEP has been reported in the literature to date.

METHODS

Setting

Data were collected within the «Reggio Emilia At-Risk Mental States» (ReARMS) program, an early detection/intervention infrastructure implemented since September 2012 in the Reggio Emilia Department of Mental Health (a catchment area of approximately 550.000 inhabitants, in the northern Italy)¹¹. The ReARMS program aims (a) to early detect adolescents and young adults (aged 13–35 years) with FEP and at Ultra-High Risk (UHR) for psychosis according to well-defined FEP/UHR diagnostic criteria¹², and (b) to provide evidence-based interventions that are proven to be effective in FEP/UHR individuals (i.e. intensive case management, individual cognitive-behavioral therapy, psychoeducational sessions for family members, and pharmacotherapy [as appropriated])^{13,14}. This study was therefore a retrospective research based on a communication of the results of an early intervention program.

Participants

Participants were all young help-seekers consecutively entering the ReARMS protocol between September 2012 and March 2019. Specifically, for the aim of this study all FEP patients included in the ReARMS program were compared with ReARMS individuals who were below the CAARMS threshold for both FEP and UHR mental states at baseline assessment. In the current research, we did not consider UHR individuals included in the ReARMS protocol in order to create a comparison group without participants in earlier phases of psychosis.

Therefore, inclusion criteria were:

- a) specialist help-seeking;
- (b) age between 13 and 35 years;
- (c) presence of FEP criteria at baseline assessment as defined in the «Comprehensive Assessment of At-Risk Mental States» (CAARMS) interview¹² with a Duration of Untreated Psychosis (DUP) < 2 years (according to the CAARMS diagnostic criteria, FEP threshold is defined by operationalized clear-cut levels of full-blown positive symptoms occurring for the first time for > 1 week, either daily or > 3 time a week with each symptom continuing for > 1 hour on each occasion¹²) or (d) participants who were below the CAARMS threshold for both FEP and UHR mental states at baseline assessment were considered as FEP negative cases (i.e. non-FEP).

Exclusion criteria were:

- (a) previous full-blown psychotic episodes, either affective and schizophrenic, as defined in the Diagnostic and Statistical Manual of Mental Disorders, IV Edition, Text Revised (DSM-IV-TR)¹⁵;
- (b) history of previous exposure to antipsychotic medication;
- (c) neurological disease (such as temporal lobe epilepsy), head injury or any other medical condition associated with psychiatric symptoms;
- (d) known mental retardation (i.e. Intelligence Quotient [IQ] < 70);
- (e) current substance dependence; and (f) insufficient fluency in the Italian language.

Specifically, in the ReARMS program, we considered previous exposure to antipsychotics (i.e. before ReARMS enroll-

ment) as an equivalent of past psychotic episode. Indeed, according to CAARMS-defined FEP criteria, the threshold of overt psychotic episode is essentially that at which antipsychotic therapy would probably be commenced in common clinical practice¹².

All subjects entering the ReARMS protocol and their parents (if minors) agreed to participate to the research and gave their written informed consent to the psychopathological assessment prior to their inclusion in the study. The psychopathological evaluation was composed by the CAARMS (approved Italian version [CAARMS-ITA])¹⁶ and the GEOPTE scale of SC for psychosis (approved Italian translation [i-GEOPTE])¹⁷. Relevant local ethical approvals were obtained for the study (AVEN Ethics Committee protocol n. 2019/0066667). The research has been also carried-out in accordance with the Code of Ethics of the World Medical Association (Declaration of Helsinki) for experimental protocols including humans.

Instruments

The CAARMS is a clinical interview developed to assess different aspects of psychosis psychopathology as well as functioning (via the integrated SOFAS [“Social and Occupational Functioning Assessment Scale”] instrument)¹². It consists of 27 items (each one rated in terms of intensity [0–6] and frequency/duration [0–6]), which can be clustered in 7 main dimensions: (a) «Positive Symptoms»; (b) «Cognitive Change, Attention and Concentration»; (c) «Emotional Disturbance»; (d) «Negative Symptoms»; (e) «Behavioral Change»; (f) «Motor/Physical Changes»; and (g) «General Psychopathology». The CAARMS «Positive Symptoms» subscale (which covers hallucinations, delusions, and thought disorders) determines both FEP and UHR diagnostic criteria. CAARMS interviews were conducted by trained psychiatrists and clinical psychologists. The CAARMS-ITA showed excellent inter-rater reliability^{18,19}.

The GEOPTE scale⁸ is a self-report questionnaire specifically developed to measure SC in psychosis (Figure 1). It consists of 15 items, each one rated on a 5-point Likert scale (from 1 = «no» to 5 = «a lot»). A total score was obtained by summing all item subscores. A higher score indicates a worse socio-cognitive performance. In the original validation study of the Spanish version of the GEOPTE scale⁸, an Exploratory Factor Analysis (EFA) identified two factors explaining 39% of the total variance. A first factor (including the first 7 items, in addition to items 11 and 12) was specifically related to basic cognitive functions (i.e. concentration, attention, learning, memory, understanding, ability to resolve problems, and abstraction). A second factor (composed of the remaining six items) referred to the core domains of SC

(i.e. interpretation of social signals, recognition of emotions, sensitivity to social signals, ability in relationships, and activity planning)⁸. In the current study, we used the authorized Italian translation of the GEOPTE scale (i-GEOPTE)¹⁷, which showed good psychometric properties in a clinical sample of Italian young help-seekers and confirmed the goodness of fit of the 2-factor model previously proposed by Sanjuan et al. (2003)^{8,20}.

Procedures

The axis-I diagnosis was made according to DSM-IV-TR criteria¹⁵ by two specialized ReARMS team members, using the Structured Clinical Interview for DSM-IV-TR Axis I Disorders²¹. After CAARMS interviews, participants were divided into two subgroups according to FEP/UHR criteria¹²: (a) FEP group and (b) non-FEP group (i.e. those participants who were under the CAARMS-defined threshold of both FEP and UHR diagnostic criteria). After SCID-I interviews, FEP patients were also grouped in the SSD or NSSD subsample. Specifically, FEP participants with schizophrenia and schizoaffective disorder were considered as SSD individuals on the basis that these nosographic categories have the schizophrenia criterion A as part of their definition in recognized diagnostic criteria¹⁵. In contrast, the NSSD group included all other psychosis diagnoses.

All the FEP help-seekers entered the ReARMS protocol were assigned to a multi-professional team including a psychiatrist, a clinical psychologist, and a case-manager for early rehabilitation, generally within 2–3 weeks. According to their symptoms, FEP patients were then provided with a 2-year comprehensive intervention package including (1) a multi-component psychosocial treatment (combining individual Cognitive-Behavioral Therapy [CBT], psychoeducational sessions for family members, and a recovery-oriented case management) and (2) a pharmacological therapy (as appropriate), according to current guidelines²². In this respect, second-generation antipsychotics were used as first-line medication treatment. Selective serotonin reuptake inhibitors and benzodiazepines were prescribed to treat depressive symptoms, anxiety, and insomnia.

In the present research, socio-demographic characteristics and baseline levels of SC were examined by evaluating between-group comparisons (i.e. FEP and non-FEP). Baseline SC measures were also compared between FEP patients with and without schizophrenia spectrum disorders (i.e. SSD and NSSD).

Within the FEP total group, we explored any significant association of baseline SC with clinical features, functioning, and psychopathology (e.g. positive, negative, disorganized, and depressive symptoms). After 12 and 24 months of fol-

low-up, we also examined any significant correlations between i-GEOPTe total scores and the specialized treatment components of the ReARMS intervention (i.e. daily antipsychotic dose, number of CBT sessions, number of psychoeducational sessions for family members, and number of case management sessions). Finally, we longitudinally monitored the stability of SC measures in FEP participants along the 2-year follow-up period.

Statistical analysis

Data were analyzed using the Statistical Package for Social Science (SPSS) 15.0 for Windows²³ and R version 3.5.3²⁴ with «EffSize» software package²⁵. All tests were two-tailed, with $\alpha = 0.05$. Non-parametric statistics were used, due to non-normality in all explorations (Kolmogorov-Smirnov test with Lilliefors significance correction: $p < 0.05$)²³. In between-group comparisons, categorical data were analyzed using Chi-square test. The Mann-Whitney U test with Holm-Bonferroni correction for multiple comparisons²⁶ was used to compare ordinal variables. Effect size of the between-group differences on all i-GEOPTe total scores was also calculated using Cliff's delta (δ) statistics²⁷. According to Romano et al. (2006)²⁸, we interpreted δ values as follows: < 0.147 «negligible». < 0.33 «small». < 0.474 «medium». > 0.474 «large».

In the FEP total sample, the Wilcoxon test for repeated measures was used to examine the stability of SC levels across the 2-year follow-up period. Effect size of the intra-group differences on all i-GEOPTe total scores was also computed using a correlation coefficient (r) based on a formula considering Z-scores ($r = Z/\sqrt{n}$)²⁹. According to Cohen's classification of effect sizes³⁰, we interpreted r values as follows: ≥ 0.2 «small». ≥ 0.5 «moderate». and ≥ 0.8 «large».

Within the FEP total group, correlation analyses of iGEOPTe total scores with CAARMS subscores, sociodemographic and clinical parameters were performed using Spearman's correlation coefficients with Holm-Bonferroni correction to revise p-value for multiple comparisons²⁶. At baseline, we also conducted a multiple linear regression analysis with i-GEOPTe total scores as independent variables and CAARMS dimension subscores as dependent variables. Finally, after 12 and 24 months of follow-up, we conducted a multiple linear regression analysis with i-GEOPTe total scores as dependent variables and the specialized treatment components of the ReARMS intervention (i.e. daily antipsychotic dose, number of CBT sessions, number of psychoeducational sessions for family members, and number of case management sessions) as independent variables.

RESULTS

Sample characteristics and i-GEOPTe scores

Over the course of the study, 239 subjects (139 [58.2%] males, 206 [86.2%] white Caucasian) consecutively attended an intake interview within the ReARMS program. Age ranged from 13 to 35 years (mean age = 22.27 ± 6.12 years), level of education from 7 to 18 years (mean level of education = 11.74 ± 2.45 years), and Duration of Untreated Illness (DUI, defined as the time interval [in weeks] between the onset of a relevant psychiatric symptom and the administration of the first pharmacological/psychological treatment)³¹ from 4 to 208 weeks (mean DUI = 83.77 ± 65.57 weeks). Table 1 shows i-GEOPTe total scores, demographic and clinical features of the total sample and the two subgroups, i.e. FEP ($n = 141$; 59.0% of the total sample) and non-FEP ($n = 98$; 41.0%).

Table 1		i-GEOPTe total scores, sociodemographic and clinical characteristics of the total sample			
Variable	Total sample (n=239)	Non-FEP (n=98)	FEP (n=141)	χ^2/Z	
Gender (males)	139 (58.2%)	47 (48,0%)	92 (65,2%)	7,10 ^b	
Ethnic group (Caucasian)	206 (86.2%)	84 (85,7%)	122 (86,5%)	0,03	
Mother tongue (Italian)	215 (90.0%)	92 (93,9%)	123 (87,2%)	2,82	
Age	22.27 ± 6.12	$20,95 \pm 6,31$	$23,18 \pm 5,82$	-3,22 ^a	
Education (in years)	11.74 ± 2.45	$11,60 \pm 2,46$	$11,84 \pm 2,45$	-1,01	
DUI (in weeks)	83.77 ± 65.57	$65,00 \pm 52,85$	$97,34 \pm 70,62$	-2,63 ^b	
i-GEOPTe					
Total score	33.88 ± 12.15	$29,53 \pm 11,37$	$36,90 \pm 11,78$	-4,99 ^a	
"Basic Cognitive Functions» subscore	19.32 ± 7.48	$16,78 \pm 7,31$	$21,09 \pm 7,10$	-5,05 ^a	
"Social Cognition» subscore	14.56 ± 5.43	$12,76 \pm 4,81$	$15,81 \pm 5,36$	-4,43 ^a	

Variable	FEP total sample (n=141)	SSD (n=73)	NSSD (n=68)	χ^2/Z
Gender (males)	92 (65,2%)	48 (65,8%)	44 (47,8%)	0,02
Ethnic group (Caucasian)	122 (86,5%)	63 (86,3%)	59 (86,8%)	0,01
Mother tongue (Italian)	123 (87,2%)	63 (86,3%)	60 (88,2%)	0,12
Age	23,18 \pm 5,82	23,21 \pm 5,50	23,16 \pm 6,19	-0,16
Education (in years)	11,84 \pm 2,45	11,92 \pm 2,50	11,76 \pm 2,42	-0,08
DUP (in weeks)	53,92 \pm 42,21	58,89 \pm 59,79	46,14 \pm 39,76	-1,89
i-GEOPTE				
Total score	36,90 \pm 11,78	38,18 \pm 11,57	35,53 \pm 11,93	-1,45
«Basic Cognitive Functions» subscore	21,09 \pm 7,10	21,23 \pm 6,93	20,94 \pm 7,32	-0,29
«Social Cognition» subscore	15,81 \pm 5,36	16,95 \pm 5,53	14,59 \pm 5,22	-2,44 ^c
Gender difference in the total sample (n = 239)	Males (n=139)	Females (n=100)	Z	
i-GEOPTE				
Total score	33,53 \pm 11,68	34,36 \pm 12,81	-1,70	
«Basic Cognitive Functions» subscore	19,31 \pm 7,36	19,34 \pm 7,68	-1,17	
«Social Cognition» subscore	14,22 \pm 5,07	15,02 \pm 5,88	-0,78	
Correlations in the total sample (n = 239)	i-GEOPTE Total score (ρ)	i-GEOPTE «Basic Cognitive Functions» subscore (ρ)	i-GEOPTE «Social Cognition» subscore (ρ)	
Age	-0,139	-0,166 ^c	-0,097	
Years of education	-0,056	-0,059	-0,043	
DUI (in weeks)	0,222 ^d	0,252 ^d	0,171 ^c	

Legend - Frequencies (percentages), mean \pm standard deviation, Chi-squared test (χ^2), Mann-Whitney U test (Z), and Spearman's rank correlation coefficient (ρ) values are reported. ap<0.001; bp<0.01; cp<0.05; dHolm-Bonferroni corrected p-value < 0.01; eHolm-Bonferroni corrected p-value < 0.05. i-GEOPTE = Italian version of the GEOPTE Scale of social cognition for psychosis; GEOPTE = «Grupo Español para la Optimización y Tratamiento de la Esquizofrenia» (Spanish Group for the Optimization and Treatment of Schizophrenia); FEP = First Episode Psychosis; non-FEP = patients without psychotic disorders (i.e. participants who were below CAARMS-defined diagnostic criteria for both FEP and Ultra-High Risk mental states); DUI = Duration of Untreated Illness; CAARMS = Comprehensive Assessment of At-Risk Mental States; SSD = Schizophrenia Spectrum Disorders; NSSD = Non-Schizophrenia Spectrum Disorders; DUP = Duration of Untreated Psychosis (defined as the interval time [in weeks] between the onset of a full-blown psychotic symptom and the first pharmacological treatment).

The FEP sample consisted of patients with DSM-IV-TR schizophrenia (n = 66; 46.8% of FEP individuals), affective (bipolar or major depressive) psychosis (n = 34; 24.1%), psychotic disorder not otherwise specified (n = 28; 19.8%), schizoaffective disorder (n = 7; 4.9%), and brief psychotic disorder (n = 6; 4.4%). Therefore, within the FEP total group, 73 (51.8%) individuals were included in the SSD subsample for being affected by DSM-IV-TR schizophrenia or schizoaffective disorder. The other 68 FEP patients (48.2%) were included in the NSSD subgroup.

Non-FEP subjects (i.e. those participants who were under the CAARMS-defined diagnostic criteria for both FEP and UHR) were diagnosed with DSM-IV-TR non-schizotypal personality disorder (n = 37; 37.7% of non-FEP individuals), depressive disorders (n = 30; 30.7%), anxiety disorders (n = 26; 26.5%), and eating disorders (n = 5; 5.1%).

In comparison with non-FEP, FEP individuals showed a preponderance of males, a significantly higher age at entry, and a longer DUI (Table 1). No between-group difference in terms of ethnic group, mother tongue, and years of education was found. No sociodemographic and clinical differences between SSD and NSSD patients were also observed.

In the total sample, mean i-GEOPTE total score was 33.88 \pm 12.15, i-GEOPTE «Basic Cognitive Functions» subscore was 19.32 \pm 7.48, and i-GEOPTE «Social Cognition» subscore was 14.56 \pm 5.43 (Table 1). Moreover, age at entry showed a statistically significant negative correlation with i-GEOPTE «Basic Cognitive Functions» subscore (Table 1). However, no significant correlation was found between age and i-GEOPTE «Social Cognition» subscore. Finally, DUI had significant positive correlations with i-GEOPTE total score, «Basic Cognitive Functions» subscore, and «Social Cognition» subscore. All effect sizes of these significant correlations were small, ranging from 0.172 to 0.241.

i-GEOPTe scores in FEP patients

In comparison with non-FEP, FEP patients showed a significantly higher i-GEOPTe total scores, as well as greater «Basic Cognitive Functions» and «Social Cognition» subscores (Table 1). Effect sizes for these between-group differences were all medium values, ranging from 0.337 to 0.383. Moreover, SSD participants had higher i-GEOPTe «Social Cognition» subscores than NSSD individuals. The effect size of this difference was small ($\delta = 0.206$).

As of December 2018, 104 FEP patients (73.8% of the baseline FEP total sample) completed the 1-year follow-up period (37 did not yet achieve the 1-year assessment time). Moreover, 60 subjects (42.6% of the baseline FEP total group) also concluded the 2-year follow-up period. Among the 44 FEP participants that did not complete the 2 years of follow-up, 25 did not yet reach the 2-year assessment time, 10 dropped out the ReARMS protocol, and 8 moved out of the catchment area and could not be contacted for the follow-up assessment.

Within the FEP total group, the median of CBT sessions was 15 (interquartile range = 2.5 - 20) at 1 year and 23 (interquartile range = 12 - 33.75) at 2 years. The median

of psychoeducational sessions for family members was 6 (interquartile range = 4 - 10.75) at 1 year and 9 (interquartile range = 7 - 15.75) at 2 years. Finally, the median of case management sessions was 8 (interquartile range = 6 - 18) at 1 year and 19 (interquartile range = 15 - 49.75) at 2 years.

At baseline, 129 (91.5%) out of 141 FEP participants used antipsychotic medications (mean equivalent dose of chlorpromazine = 215.44 ± 176.85 mg daily). After 1 year of follow-up, antipsychotics were still prescribed to 87 FEP individuals (i.e. 83.7% of those who reached the 1-year assessment time), with a mean equivalent dose of chlorpromazine equal to 180.53 ± 173.34 mg daily. After 2 years of follow-up, 45 FEP participants (i.e. 75.0% of those who achieved the 2-year assessment time) continued to take antipsychotic medications (mean equivalent dose of chlorpromazine = 203.35 ± 240.51 mg daily).

With respect to the stability of SC measures, a statistically significant decrease in severity of all i-GEOPTe total scores both after 1 and 2 years of follow-up was found (Table 2). All effect sizes for these differences were small, ranging from -0.296 to -0.352.

Table 2 i-GEOPTe total scores across the 2-year follow-up period in the FEP total group (n = 141).

	Evaluación de referencia (T0)	Evaluación de un año de follow-up (T1)	Evaluación de 2 años de follow-up (T2)	Z (T0vsT1)	Z (T0vsT2)	Z (T1vsT2)
i-GEOPTe						
Total score	36,90 ± 11,78	29,09 ± 10,28	26,25 ± 11,26	-3,59 ^a	-3,70 ^a	-2,47 ^c
«Basic Cognitive Functions» subscore	21,09 ± 7,10	16,85 ± 6,15	15,25 ± 7,01	-3,30 ^b	-3,78 ^a	-2,21 ^c
«Social Cognition» subscore	15,81 ± 5,36	12,25 ± 4,78	11,00 ± 4,92	-3,45 ^b	-3,38 ^b	-2,15 ^c

Legend - i-GEOPTe = Italian version of the GEOPTe Scale of social cognition for psychosis; GEOPTe = «Grupo Español para la Optimización y Tratamiento de la Esquizofrenia» (Spanish Group for the Optimization and Treatment of Schizophrenia); FEP = First Episode Psychosis; T0 = i-GEOPTe scores at baseline; T1 = i-GEOPTe scores after 1-year follow-up period; T2 = i-GEOPTe scores after 2-year follow-up period; mean ± standard deviation and Wilcoxon test (Z) values are reported; aHolm-Bonferroni corrected p-value < 0.001; bHolm-Bonferroni corrected p-value < 0.01; cHolm-Bonferroni corrected p-value < 0.05.

Both i-GEOPTe total score and «Basic Cognitive Functions» subscore showed significant positive correlations with CAARMS «Cognitive Change», «Emotional Disturbance», «Negative Symptoms», «Motor/Physical Changes», and «General Psychopathology» dimension scores (specifically with CAARMS «Subjective Cognitive Change», «Sub-

jective Emotional Disturbance», «Observed Blunted Affect», «Alogia», «Avolition/Apathy», «Anhedonia», «Subjective Motor Change», «Depression», and «Suicidality-Self-Harm» item subscores) (Table 3). Moreover, i-GEOPTe «Social Cognition» subscale scores showed significant positive correlations with CAARMS «Emotional Disturbance»,

«Negative Symptoms». «Motor/Physical Changes». and «General Psychopathology» dimension scores (specifically with CAARMS «Observed Blunted Affect». «Avolition/Apathy». «Anhedonia». «Subjective Motor Change». «De-

pression». and «Suicidality/Self-Harm» item subscores). No association of i-GEOPTE total scores with SOFAS and CAARMS «Positive Symptoms» and «Behavioral Change» dimension subscores were found.

Table 3

Las correlaciones de Spearman entre las puntuaciones iniciales de i-GEOPTE y CAARMS en el grupo total de FEP (n = 141)

Variables	i-GEOPTE total score (ρ)	i-GEOPTE «Basic Cognitive Functions» subscore (ρ)	i-GEOPTE «Social Cognition» subscore (ρ)	Variables	i-GEOPTE total score (ρ)	i-GEOPTE «Basic Cognitive Functions» subscore (ρ)	i-GEOPTE «Social Cognition» subscore (ρ)
CAARMS				<i>Behavioral Change</i>	0,167	0,200	0,107
<i>Positive Symptoms</i>	0,005	0,043	-0,033	Social Isolation	0,174	0,190	0,124
Unusual Thought Content	-0,084	-0,089	-0,075	Impaired Role Functioning	0,172	0,178	0,128
Non-Bizarre Ideas	-0,225	-0,247	-0,181	Disorganized /Odd/ Stigmatizing Behavior	0,071	0,088	0,060
Perceptual Abnormalities	0,105	0,146	0,057	Aggressive/Dangerous Behavior	-0,051	0,000	-0,090
Disorganized Speech	0,162	0,223	0,078	<i>Motor/Physical Changes</i>	0,316 ^a	0,342 ^a	0,254 ^c
<i>Cognitive Change</i>	0,249 ^c	0,316 ^a	0,145	Subjective Motor Change	0,289 ^c	0,274 ^c	0,285 ^c
Subjective Cognitive Change	0,316 ^a	0,367 ^a	0,225	Objective Motor Change	0,303 ^a	0,317 ^a	0,242
Objective Cognitive Change	0,117	0,173	0,038	Subjective Impaired Bodily Sensation	0,232	0,258	0,186
<i>Emotional Disturbance</i>	0,330 ^a	0,329 ^a	0,268 ^b	Subjective Impaired Autonomic Functioning	0,120	0,165	0,053
Subjective Emotional Disturbance	0,272 ^c	0,274 ^c	0,229	Obsessive-Compulsive Symptoms	0,075	0,091	0,039
Observed Blunted Affect	0,374 ^a	0,349 ^a	0,330 ^a	Dissociative Symptoms	0,136	0,172	0,083
Observed Inappropriate Affect	0,065	0,089	0,012	Subjective Impaired Tolerance to Normal Stress	0,160	0,204	0,080
<i>Negative Symptoms</i>	0,422 ^a	0,414 ^a	0,360 ^a	<i>SOFAS</i>	-0,087	-0,066	-0,082
Alogia	0,288 ^c	0,320 ^a	0,217				
Avolition/Apathy	0,325 ^a	0,286 ^c	0,314 ^a				
Anhedonia	0,423 ^a	0,412 ^a	0,361 ^a				
<i>General Psychopathology</i>	0,373 ^a	0,370 ^a	0,318 ^a				
Mania	-0,124	-0,131	-0,094				
Depression	0,378 ^a	0,331 ^a	0,356 ^a				
Suicidality/Self-Harm	0,303 ^a	0,279 ^c	0,271 ^c				
Mood Swings/Lability	0,199	0,180	0,201				
Anxiety	0,025	0,189	0,165				

Legend – i-GEOPTE = Italian version of the GEOPTE Scale of social cognition for psychosis; GEOPTE = «Grupo Español para la Optimización y Tratamiento de la Esquizofrenia» (Spanish Group for the Optimization and Treatment of Schizophrenia), CAARMS = Comprehensive Assessment of At-Risk Mental States; SOFAS = Social and Occupational Functioning Assessment Scale; FEP = First Episode Psychosis; ^aHolm-Bonferroni corrected p-value < 0.001; ^bHolm-Bonferroni corrected p-value < 0.01; ^cHolm-Bonferroni corrected p-value < 0.05. Spearman's rank correlation coefficient (ρ) values are reported.

In the current study, a significant negative correlation between the number of psychoeducational sessions for family members delivered during the first year of intervention and i-GEOPTe «Social Cognition» subscores at 1 year of fol-

low-up was reported (Table 4). A positive correlation between baseline equivalent dose of chlorpromazine and i-GEOPTe «Social Cognition» subscale scores was also found ($\rho = 0.309$; Holm-Bonferroni corrected p value = 0.016).

Table 4

Spearman's correlations of i-GEOPTe total score, chlorpromazine equivalent dose, number of CBT sessions, number of psychoeducational sessions for family members, and number of case management sessions across 2-year follow-up period in the FEP total group (n=141).

Variables	T1 i-GEOPTe total score (ρ)	T1 i-GEOPTe «Basic Cognitive Functions» subscore (ρ)	T1 i-GEOPTe «Social Cognition» subscore (ρ)
T1 equivalent dose of chlorpromazine (mg/day)	0,121	0,093	0,171
T1 number of CBT sessions	-0,132	-0,136	-0,114
T1 number of psychoeducational sessions for family members	-0,181	-0,128	-0,299 ^a
T1 number of case management sessions	0,130	0,149	0,079
Variables	T2 i-GEOPTe total score (ρ)	T2 i-GEOPTe «Basic Cognitive Functions» subscore (ρ)	T2 i-GEOPTe «Social Cognition» subscore (ρ)
T2 equivalent dose of chlorpromazine (mg/day)	0,287	0,293	0,298 ^a
T2 number of CBT sessions	-0,216	-0,228	-0,202
T2 number of psychoeducational sessions for family members	-0,068	-0,050	-0,113
T2 number of case management sessions	0,158	0,218	0,092

Legend - i-GEOPTe = Italian version of the GEOPTe Scale of social cognition for psychosis; GEOPTe = «Grupo Español para la Optimización y Tratamiento de la Esquizofrenia» (Spanish Group for the Optimization and Treatment of Schizophrenia); FEP = First Episode Psychosis; CAARMS = Comprehensive Assessment of At-Risk Mental States; T1 = 1-year follow-up assessment; T2= 2-year follow-up assessment; CBT = Cognitive Behavioral Therapy; Spearman's rank correlation coefficient (ρ) values are reported.; ^aHolm-Bonferroni corrected p-value < 0.05.

Regression analysis results (with i-GEOPTe total scores as independent variables and CAARMS subscores as dependent variables) within the FEP total group at baseline are shown in the Table 5. In details, i-GEOPTe «Basic Cognitive Functions» subscore was the main parameter with a significant contribution in the prediction of CAARMS psychopathology. Specifically, it had a significant positive association with CAARMS «Cognitive Change» (regression model: $R^2 = 0.114$, $F = 78.844$, $p = 0.000$), «Emotional

Disturbance» ($R^2 = 0.097$, $F = 7.325$, $p = 0.001$), «Negative Symptoms» ($R^2 = 0.173$, $F = 14.308$, $p = 0.000$), and «General Psychopathology» ($R^2 = 0.129$, $F = 10.145$, $p = 0.000$) dimension scores, as well as with CAARMS «Anhedonia» item subscore ($R^2 = 0.182$, $F = 15.266$, $p = 0.000$). Differently, i-GEOPTe «Social Cognition» score showed a statistically relevant positive association exclusively with CAARMS «Depression» item subscore ($R^2 = 0.153$, $F = 12.328$, $p = 0.000$).

Tabla 5		Multiple linear regression of CAARMS subscores by i-GEOPTe total scores within the total FEP total group at baseline (n=141).						
CAARMS Cognitive Change		B	SE	95 % CI para B		β	p	R² = 0,114
				Lower	Upper			
Constant		3,948	0,689	2,585	5,311	-	0,000	
i-GEOPTe								
"Basic Cognitive Functions» subscore		0,174	0,044	0,087	0,262	0,475	0,000	
"Social Cognition» subscore		-0,111	0,058	-0,225	0,003	-0,234	0,056	
Perturbación Emocional		B	SE	95 % CI para B		β	p	R² = 0,097
				Lower	Upper			
Constant		3,279	1,088	1,127	5,430	-	0,003	
i-GEOPTe								
"Basic Cognitive Functions» subscore		0,157	0,070	0,018	0,296	0,273	0,027	
"Social Cognition» subscore		0,036	0,091	-0,144	0,215	0,048	0,696	
"Observed Blunted Affect» item		B	SE	95 % CI para B		β	p	R² = 0,128
				Lower	Upper			
Constant		0,796	0,483	-0,158	1,750	-	0,101	
i-GEOPTe								
"Basic Cognitive Functions» subscore		0,047	0,031	-0,015	0,108	0,181	0,134	
"Social Cognition» subscore		0,068	0,040	-0,012	0,147	0,202	0,095	
Negative Symptoms		B	SE	95 % CI para B		β	p	R² = 0,173
				Lower	Upper			
Constante		3,347	1,110	1,151	5,542	-	0,003	
i-GEOPTe								
«Funciones cognitivas básicas»		0,187	0,072	0,046	0,329	0,306	0,010	
«Cognición social»		0,106	0,093	-0,078	0,289	0,133	0,257	
"Avolition/Apathy» item		B	SE	95% CI para B		β	p	R² = 0,100
				Lower	Upper			
Constant		1,526	0,472	0,594	2,459	-	0,002	
i-GEOPTe								
"Basic Cognitive Functions» subscore		0,035	0,030	-0,025	0,095	0,141	0,250	
"Social Cognition» subscore		0,063	0,039	-0,014	0,141	0,197	0,110	
"Anhedonia» item		B	SE	95% CI para B		β	p	R² = 0,182
				Lower	Upper			
Constante		1,170	0,442	0,296	2,044	-	0,009	
i-GEOPTe								
«Funciones cognitivas básicas»		0,069	0,029	0,013	0,126	0,283	0,016	
«Cognición social»		0,054	0,037	-0,019	0,127	0,172	0,143	
Motor/Physical Changes		B	SE	95 % CI para B		β	p	R² = 0,096
				Lower	Upper			
Constant		-1,946	2,010	-5,919	2,028	-	0,335	
i-GEOPTe								
"Basic Cognitive Functions» subscore		0,198	0,130	-0,058	0,455	0,187	0,128	
"Social Cognition» subscore		0,197	0,168	-0,135	0,528	0,144	0,243	
"Subjective Motor Change» item		B	SE	95 % CI para B		β	p	R² = 0,115
				Lower	Upper			
Constante		-0,408	0,405	-1,209	0,392	-	0,315	
i-GEOPTe								
«Funciones cognitivas básicas»		0,045	0,026	-0,007	0,096	0,207	0,090	
«Cognición social»		0,044	0,034	-0,023	0,110	0,156	0,200	
General Psychopathology		B	SE	95 % CI para B		β	p	R² = 0,129
				Lower	Upper			
Constant		9,237	1,639	5,997	12,477	-	0,000	
i-GEOPTe								
"Basic Cognitive Functions» subscore		0,268	0,106	0,059	0,477	0,304	0,013	
"Social Cognition» subscore		0,079	0,137	-0,191	0,350	0,070	0,563	
"Depression» item		B	SE	95 % CI para B		β	p	R² = 0,153
				Lower	Upper			
Constant		1,410	0,411	0,597	2,223	-	0,001	
i-GEOPTe								
"Basic Cognitive Functions» subscore		0,034	0,027	-0,018	0,087	0,153	0,199	
"Social Cognition» subscore		0,076	0,034	0,008	0,144	0,263	0,028	
"Suicidality/Self-Harm» item		B	SE	95 % CI para B		β	p	R² = 0,080
				Lower	Upper			
Constant		0,093	0,469	-0,835	1,021	-	0,843	
i-GEOPTe								
"Basic Cognitive Functions» subscore		0,047	0,030	-0,013	0,107	0,192	0,122	
"Social Cognition» subscore		0,035	0,039	-0,043	0,112	0,109	0,378	

Legend - CAARMS = Comprehensive Assessment of At-Risk Mental States; FEP = First Episode Psychosis; i-GEOPTe = Italian version of the GEOPTe Scale of social cognition for psychosis; «Grupo Español para la Optimización y Tratamiento de la Esquizofrenia» (Spanish Group for the Optimization and Treatment of Schizophrenia). B = regression coefficient, SE = standard error, 95% CI = 95% Confident Intervals for B, β = standardized regression coefficient; p = statistical significance, and R² = R-squared or coefficient of determination.

Finally, after 1 year of follow-up, the number of psychoeducational sessions for family members (as independent variable) had a significant negative association with i-GEOPTe «Social Cognition» score (considered as dependent variable) (regression model: $R^2 = 0.143$, $F = 4.430$, $p =$

0.008) (Table 6). Furthermore, after 2 years of follow-up, equivalent dose of chlorpromazine showed a statistically relevant positive association with i-GEOPTe «Social Cognition» subscore ($R^2 = 0.160$, $F = 4.960$, $p = 0.004$).

Table 6

Multiple linear regression of i-GEOPTe total scores by equivalent dose of chlorpromazine, number of CBT sessions, number of psychoeducational sessions for family members, and number of case management sessions across the 2-year follow-up period within the FEP total group (n=141).

T1 i-GEOPTe Total score	B	SE	95 % CI para B		β	p	$R^2 = 0,047$
			Inferior	Superior			
Constant	30,558	2,350	25,881	35,235	-	0,000	
T1 equivalent dose of chlorpromazine (mg/day)	0,351	0,334	-0,315	1,016	0,127	0,298	
T1 number of CBT sessions	-0,058	0,126	-0,308	0,192	-0,057	0,646	
T1 number of psychoeducational sessions for family members	-0,273	0,204	-0,678	0,132	-0,171	0,184	
T1 number of case management sessions	-0,010	0,061	-0,131	0,111	-0,018	0,873	
T1 i-GEOPTe "Basic Cognitive Functions" subscore	B	SE	95 % CI para B		β	p	$R^2 = 0,026$
			Inferior	Superior			
Constant	17,708	1,421	14,879	2,536	-	0,000	
T1 equivalent dose of chlorpromazine (mg/day)	0,113	0,202	-0,290	0,515	0,068	0,579	
T1 number of CBT sessions	-0,046	0,076	-0,198	0,105	-0,077	0,544	
T1 number of psychoeducational sessions for family members	-0,101	0,123	-0,346	0,144	-0,106	0,416	
T1 number of case management sessions	0,003	0,037	-0,070	0,076	0,009	0,938	
T1 i-GEOPTe "Social Cognition" subscore	B	SE	95 % CI para B		β	p	$R^2 = 0,143$
			Inferior	Superior			
Constant	12,850	1,078	10,705	14,996	-	0,000	
T1 equivalent dose of chlorpromazine (mg/day)	0,238	0,153	-0,067	0,543	0,185	0,125	
T1 number of CBT sessions	-0,012	0,058	-0,126	0,103	-0,025	0,840	
T1 number of psychoeducational sessions for family members	-0,172	0,093	-0,358	0,014	-0,232	0,047	
T1 number of case management sessions	-0,013	0,028	-0,068	0,043	-0,051	0,652	
T2 i-GEOPTe Total score	B	SE	95 % CI para B		β	p	$R^2 = 0,120$
			Inferior	Superior			
Constant	27,528	3,358	20,755	34,300	-	0,000	
T1 equivalent dose of chlorpromazine (mg/day)	0,571	0,374	-0,183	1,326	0,266	0,134	
T1 number of CBT sessions	-0,179	0,117	-0,414	0,057	-0,253	0,133	
T1 number of psychoeducational sessions for family members	0,135	0,224	-0,318	0,587	0,108	0,552	
T1 number of case management sessions	-0,020	0,068	-0,157	0,117	-0,056	0,771	
T2 i-GEOPTe "Basic Cognitive Functions" subscore	B	SE	95 % CI para B		β	p	$R^2 = 0,085$
			Inferior	Superior			
Constant	16,099	2,134	11,795	20,403	-	0,000	
T1 equivalent dose of chlorpromazine (mg/day)	0,215	0,238	-0,265	0,694	0,160	0,371	
T1 number of CBT sessions	-0,098	0,074	-0,248	0,052	-0,222	0,194	
T1 number of psychoeducational sessions for family members	0,044	0,143	-0,243	0,332	0,057	0,758	
T1 number of case management sessions	0,009	0,043	-0,078	0,096	0,040	0,838	
T2 i-GEOPTe "Social Cognition" subscore	B	SE	95 % CI para B		β	p	$R^2 = 0,160$
			Inferior	Superior			
Constant	11,429	1,434	8,537	14,321	-	0,000	
T1 equivalent dose of chlorpromazine (mg/day)	0,357	0,160	0,034	0,679	0,379	0,031	
T1 number of CBT sessions	-0,081	0,050	-0,181	0,020	-0,261	0,113	
T1 number of psychoeducational sessions for family members	0,090	0,096	-0,103	0,284	0,166	0,352	
T1 number of case management sessions	-0,029	0,029	-0,087	0,030	-0,185	0,327	

Legend - i-GEOPTe = Italian version of the GEOPTe Scale of social cognition for psychosis; «Grupo Español para la Optimización y Tratamiento de la Esquizofrenia» (Spanish Group for the Optimization and Treatment of Schizophrenia); CBT = Cognitive-Behavioral Therapy; FEP = First Episode Psychosis; T1 = 1-year follow-up assessment; T2 = 2-year follow-up assessment. B = unstandardized regression coefficient, SE = standard error, 95% CI = 95% Confident Intervals for B, β = standardized regression coefficient, p = statistical significance, and R^2 = R-squared or coefficient of determination.

DISCUSSION

Main aim of the current research was to assess subjective levels of SC in a sample of FEP adolescents and young adults compared to non-FEP help-seeking peers. In comparison with non-FEP, FEP participants showed more relevant socio-cognitive deficits. This finding is substantially in line with what reported in several studies on SC in early psychosis using neuropsychological test batteries³. According to Raballo (2017)³², this evidence supports a clinical feature which is familiar to any professionals dealing with the field of early detection in psychosis: i.e. FEP individuals spend considerably more time on inference of others' mental states (e.g. emotional recognition) than healthy controls. This is generally interpreted as the effect of compensatory mechanisms buffering the (more or less mutually reinforcing) decline in socio-cognitive and/or neurocognitive proficiencies³³.

In addition to alterations in SC domains as measured using neurocognitive tests, our results further suggest a broader impairment also involving the subjective experience of SC, already in rising phases of psychosis. These self-perceived deficits in socio-cognitive functions could represent an early clinical feature that marks the onset of the first full-blown psychotic episode and probably manifests their presence already in the at-risk mental states for psychosis³⁴. In this respect, similarly to FEP patients, UHR individuals repeatedly showed higher levels of SC impairment than healthy controls^{20,35}.

Social cognition in FEP patients

With respect to the stability of subjective experience of SC, a significant decrease in severity of i-GEOPTe «Social Cognition» subscores both after 1 and 2 years of follow-up was observed. The ReARMS intervention package presumably contributed in decreasing socio-cognitive impairment across time in our FEP participants. Specifically, a significant negative correlation between the number of psychoeducational sessions for family members delivered during the first year of intervention and i-GEOPTe «Social Cognition» subscore at 1-year follow-up assessment was notably found. Moreover, after 1-year follow-up period, our regression analysis results showed that the number of psychoeducational sessions for family members has a protective role in the prediction of i-GEOPTe «Social Cognition» subscore. Therefore, a family psychoeducation model specifically adapted and tailored for FEP populations seems to be useful in decreasing subjective SC deficits. However, this relevant association has not been replicated after 2 years of follow-up. As the ReARMS protocol states that the majority of psychoeducational sessions must be offered within the first year of intervention (only with booster sessions delivered in the following year)^{11,38}, a

prolonged family intervention should be considered in order to more stably reduce subjective socio-cognitive deficits in young people with FEP.

In contrast, our regression analysis results suggest that baseline dose of antipsychotics and a long-term (2-year) maintenance therapy with antipsychotics seems to be significantly associated to a worsening in subjective socio-cognitive functions. This self-perceived SC impairment could be partially due to the side effect profile of antipsychotic medication (e.g. slowness of thoughts and movements, affective flattening) and to the subjective fear that these effects may be seen by others (with consequent increase of the personal and social stigma)..

Further aim of the present research was to investigate any significant association of subjective SC deficits with psychopathology and functioning in FEP patients. In this respect, subjective socio-cognitive impairment (as measured using i-GEOPTe «Social Cognition» subscale score) showed the following pattern of positive correlations:

- (a) with *negative symptoms* (including emotional disturbance and blunted affect): according to Raballo (2017)³², anomalies of the social-self and a distortion in inter-subjective attunement could confer lifetime liability to the development of negative symptomatology. Indeed, a FEP individual with socio-cognitive deficits (for example, involving a loss of the natural immersion in the social world or an unusual salience of fragmented aspects of non-verbal communication) is more likely to structure dysfunctional coping strategies (e.g. avoidance), as well as negative symptoms (e.g. social anhedonia due to the felt uneasiness in interpersonal interaction, avolition/apathy as dysfunctional daily situational-affective coping within the innate drive towards others)³⁶. This finding is substantially concordant with what reported in several studies using neurocognitive test batteries for measuring the neuropsychological domains of SC^{3,39}.
- (b) with *general psychopathology* (in particular with depression and suicidality/self-harm): this result can be interpreted in the light of a general decrease in the ability to vitally engage with environmental, especially when the daily, intuitive browsing through the interpersonal space becomes no longer fluid and unobtrusive, when an exaggerated sense of unnaturalness and fatigue in social context further aggravates the distress related to interpersonal interactions³². These self-perceived socio-cognitive anomalies seem to have an unfavorable impact on emotional life of FEP individuals and must be accurately evaluated during the baseline assessment, also in relation to depression and suicidal ideation⁴⁰. Indeed, in the present study, the subjective experience of SC deficits in FEP

subjects (as measured using i-GEOPTe «Social Cognition» subscale) significantly contributed to the prediction of baseline depression severity.

(c) with *motor/physical changes*: this peculiar CAARMS dimension is essentially composed of subtle, subjective experienced motor and physical disturbances including in Huber's Basic Symptoms¹², which are considered as an immediate symptomatic expression of the neurobiological substrate underlying schizophrenia⁴¹. In our study, the self-perceived decline in SC appears to be related with an altered sense of agency involving motor/physical deficits (e.g. subjective experience of dys-coordination, motor lags and/or bradykinesia). In this regards, recent neuroscientific research in the framework of psychosis risk syndrome confers plausibility to the hypothesis of motor impairment as a direct manifestation of a latent pathophysiological mechanism causally involved in the neurodevelopment of psychotic risk, especially in schizophrenia spectrum disorders⁴². Therefore, at a neurophysiological level, SC deficits and impairments in specific motor circuits (such as corollary discharge and/or sensorimotor integration) could share similar neurobiological systems (e.g., functional and/or structural alterations in cortical-mesolimbic projections or in other areas of the motor system)⁴³. In this regards, Bertrand et al. (2008)⁴⁴ found that social cognitive impairment in FEP were significantly correlated with reduced gray-matter density in the left middle frontal gyrus and other regions within the mirror neuron system network (i.e. right supplementary motor cortex, left superior temporal gyrus, and left inferior parietal lobule).

Inconsistently with what reported in the literature, we found no significant association of socio-cognitive deficits with positive symptoms. In contrast, other authors showed relevant relationships between positive symptomatology and SC performance as measured using neurocognitive test batteries³.

Finally, despite evidence that SC alterations in FEP individuals have been consistently linked to poor functioning⁴⁵, our results failed to find relevant associations between SO-FAS and i-GEOPTe total scores. According to Silberstein et al. (2018)⁴⁶, these findings suggest that patient judgments regarding their socio-cognitive ability has a minimal correlation to their functional outcomes as rated by mental health professionals.

Limitations

In the current research, some methodological limitations should be acknowledged. First, a possible weakness is that the GEOPTe scale was specifically developed to assess subjective

experience of social cognition (and related basic cognitive functions)⁸. This does not allow a direct comparison with results of previous studies on SC using specific neurocognitive tasks for emotional recognizing, theory of mind, social perception, and attributional style.

Secondly, the age range of our participants is a bit problematic. Indeed, evidence from the developmental perspective has pointed out that the consolidation of some socio-cognitive processes takes place at later stages in life (i.e. between 20-25 years old)⁴⁷. Therefore, our findings should be replicated in larger clinical samples of FEP adolescents (i.e. aged < 25 years). However, in the current study, no significant correlation between age at entry and i-GEOPTe «Social Cognition» subscore was found (Table 1).

Another weakness of this study is that findings on i-GEOPTe total scores were not checked for IQ. In this respect, there is evidence for SC (as measured with neurocognitive tests) to be significantly influenced by IQ⁴⁸. Thus, further research involving specific measures on IQ as covariate are needed. However, an IQ < 70 was an exclusion criterion for ReARMS enrolment¹¹.

Finally, our results are not able to differentiate whether impairments in socio-cognitive functions are a trait factor for psychosis, a specific risk factor, or a combination of the two. Indeed, in the present research, correlation and regression analysis results were mainly cross-sectional and did not address such issue. Thus, further longitudinal research (also in a longer interval time) is needed.

CONCLUSIONS

Deficits in SC are relevant in adolescents and young adults with first episode psychosis. Severity in SC impairment appears to be specifically associated with negative symptoms and depression.

In the current research, subjective experience of socio-cognitive alterations in FEP patients decreases over time. This SC decline seems to be positively associated with the number of psychoeducational sessions for family members delivered in the first year of intervention. Thus, tailored and targeted interventions on SC in young people with FEP within specialized, evidence-based models for early intervention in psychosis are recommended (also in order to contrast depression and negative symptoms). Moreover, as empirical evidence found that socio-cognitive functions are more impaired in the later phase of psychosis³, FEP stage may be the most optimal time to intervene with targeted SC training to prevent further SC decline.

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CONFLICT OF INTEREST

The authors declare that they have no conflict of interest.

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