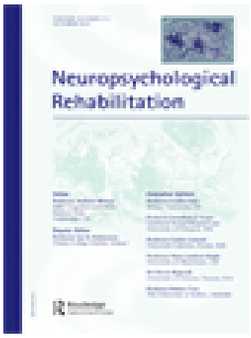

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Cognitive remediation to improve the vocational outcomes of people with severe mental illness

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ABSTRACT

The present study investigates the effects of cognitive remediation (CR) training with Individual Placement and Support (IPS) in people suffering from severe mental illness in European population (Spanish). Sixty-five participants (83% with schizophrenia or bipolar disorder) were recruited from community mental health teams. Fifty-seven met the criteria and agreed to participate in the study. The conditions of cognitive rehabilitation were assigned randomly with support employment CR + IPS (n = 28) and IPS alone (n = 29). Two groups were followed at 8 and 12 months after the baseline. Participants in the CR + IPS group improved more than the IPS only group during the follow-up period in measures of cognitive functioning (significantly higher in executive functions, verbal learning and memory) and obtained higher employment percentages during the follow-up period, including people who got a job after 8 months (52.2% versus 29.2%, p = .023) and after 1 year (60.9% versus 37.5%, p = .025), as well as, in the weekly hours worked (37.2 versus 26.7 h, p = .023). Retention in the CR + IPS program was high (82.14%). The calculated global cognitive score showed that the evolution over time differed significantly between groups (p < .001).

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Cognitive therapy; rehabilitation; psychosis; schizophrenia; employment

Introduction

In the history of serious mental illness, employment has been considered a key factor in the recovery process (Bond, 2004; Bond & Drake, 2014; Drake, Bond, & Becker, 2012). Despite willingness to work, competitive employment rates for people with severe mental illness (SMI) rarely exceed 10%–20% (Boardman, Grove, Perkins, & Shepherd, 2003; Burns et al., 2009).

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One of the most supported and known employment strategies is individual placement and support (IPS) (Bond et al., 2001). Much scientific literature has been published on the effects of interventions with the IPS methodology. The empirical evidence shows that the use of IPS methodology obtains greater results than other traditional vocational rehabilitation strategies (first training and then placing) (Becker & Drake, 2003; Bond, Drake, & Becker, 2008; Bond, Drake, & Becker, 2012; Campbell, Bond, & Drake, 2011; Crowther, Marshall, Bond, & Huxley, 2001). The IPS team is integrated with community mental health teams, holding frequent meetings with psychiatrists with the aim of competitive employment with individual and rapid search jobs, and the follow-up has no time limit (Drake, Bond, & Becker, 2013). However, many participants have difficulties in achieving their vocational objectives, a third part works very little or nothing, and many experience short periods of work with unsatisfactory results (Marshall et al., 2014).

There are many factors that explain these difficulties at work. For many years, an important theoretical problem that has dominated the field of employment of people with severe mental illness has been cognitive deterioration (Elvevag & Goldberg, 2000; Kahn & Keefe, 2013). Cognitive dysfunction seems to contribute to having worse employment outcomes (McGurk & Mueser, 2004). This issue has grown in importance with an intervention approach that combines supportive employment plus cognitive functioning with positive employment outcomes (Bell, Bryson, Greig, Corcoran, & Wexler, 2001; Bell, Bryson, Greig, Fiszdon, & Wexler, 2005; Bell, Fiszdon, Greig, Wexler, & Bryson, 2007; Lindenmayer et al., 2008; McGurk, Mueser, & Pascaris, 2005; McGurk, Mueser, DeRosa, & Wolfe, 2009; McGurk, Mueser, Feldman, & Pascaris, 2007) even in people with a history of work failure (McGurk et al., 2009; Vauth et al., 2005).

In particular, people with schizophrenia in the course of their illness usually have limitations in functioning for both daily life skills and occupational skills (Liberman, 2012). One of the variables that hinder the social functioning of people with schizophrenia is the neurocognitive deficit. Green (1998) in an exhaustive review found that despite the variation between the studies in the selection of neurocognitive measures, some consistent findings emerged. The most relevant was that verbal memory was associated with all types of functional outcome: improvement in communication, sociability, coexistence, family relationships, enjoyment of free time and leisure. Monitoring and supervision was related to the resolution of social problems and the acquisition of skills. Strategic planning, organized searching, utilizing environmental feedback to shift cognitive sets (Wisconsin Card Sorting Test) predicted the functioning of the community but not the resolution of social problems to meet basic needs. Negative symptoms were associated with the resolution of social problems but not with the acquisition of skills. In particular, the psychotic symptoms were not significantly associated with the outcome measures in any of the studies reviewed.

Cognitive rehabilitation can produce modest improvements in cognitive functioning and these improvements can translate into functional gains in the domains of social functioning, self-care and work even in people with job failure (McGurk et al., 2015, 2016). McGurk et al. (2005) found that employment outcomes of more than 1 year showed that clients who received cognitive remediation were more likely to work (69.6% versus 4.8%, respectively), had more jobs, worked more hours (34.48 versus 2.58 h/month) and earned more wages than clients with supported employment alone. The Cogpack program (Marker, 1987–2012) has been used in several investigations to study the impact of cognitive rehabilitation on employment outcomes (McGurk et al., 2005, 2015, 2016; McGurk, Mueser, et al., 2007). This programme includes 64 tests and training programmes with 537 different task sets, which can be configured with different levels of difficulty.

Europe differs from the United States in labour practice and social assistance systems (Boyce, Secker, Floyd, Schneider, & Slade, 2008; Rinaldi et al., 2004; Van Erp et al., 2007) with high unemployment rates and high levels of social protection. However, it has been found in reviews of the literature that training in specific cognitive skills is effective to improve cognition, but not necessarily to improve work functioning (McGurk, Twamley, Sitzer, McHugo, & Mueser, 2007).

In Spain, the philosophy of rehabilitation resources is inspired by the recovery and by building a network for people with severe mental disorders, integrated and with a continuous part of care (Rodríguez-Pulido, 2010). Despite the good results of employment with the IPS team, we have people who present labour difficulties for their achievement (Rodríguez-Pulido et al., 2018). The aim of this study is to determine whether a supported employment programme along with cognitive rehabilitation could improve employability and job outcomes in people with severe mental illness with more than two years in mental health units and previous job failure. Our starting hypothesis is that the IPS strategy combined with cognitive rehabilitation will improve cognition (verbal learning, memory, attention, psychomotor speed and executive performance) and the results of competitive work. That improvement could be attributed to the immediate opportunity to implement in real contexts the learning obtained and in the integrated follow-up of the employment teams with the community mental health teams.

Method

This work was developed in the island of Tenerife (Spain) within a public service specialized in labour integration of people with disabilities in which an IPS team was set up in 2005. The study was carried out in collaboration with the units of community mental health of the island. These units carry out the control of people with serious mental illnesses including pharmacological treatment and

psychosocial programming. All research procedures were approved by the Medicine Committee of Canary Health Services.

The follow-up period for the data collection was set between 2013 and 2014. Employment specialists belong to a public institution specialized in work disability.

Study groups

Psychiatrists who belonged to community mental health units referred people to the study. Participants had to: (1) comply with the state definitions of severe mental illness (SMI), which includes an ICD-10 (World Health Organization, 1992) diagnosis of F20–29 (schizophrenia, schizotypal, delusional and other non-mood psychotic disorders) and F31–F32.3 (major mood affective disorders); (2) have previous difficulties to maintain a competitive job; (3) currently want a competitive job and (4) accept the job search starts soon after a person expresses interest in working, employment specialists systematically develop relationships with employers based upon their client's preferences and with a continuous job support.

A total of 65 participants met the inclusion criteria, but only 57 signed written informed consent and completed the baseline. All of them were assigned to a single IPS team consisting of a supervisor and five employment technicians who served a defined geographical area according to the care coverage of the community mental health teams.

The trained clinical interviewers evaluated the neurocognition at the beginning of the study and a post-intervention evaluation after 8 and 12 months. The study participants were not paid for completing the evaluations. Competitive work during the 6 months prior to enrolment in the study was collected at the beginning of the study to compare the results of employment 12 months later.

The assignment of participants to the group that in addition to IPS had cognitive remediation was carried out randomly using a computer program (Microsoft Excel 2010). In this way, the group with only IPS was constituted by 29 participants and the group with CR + IPS by 28. Of these patients, 5 in each of the groups did not complete the study for different reasons (loss of contact, illness, hospitalization, death, retirement and move to another city), with the final sample consisting of 47 participants, 24 in the IPS group and 23 in the CR + IPS (Figure 1). The baseline results of the patients who completed the study ($N = 47$) were compared with the patients who did not complete it ($N = 10$), and no significant differences were found in cognitive variables or symptomatology.

At the beginning of the study, we explained to the group with CR + IPS that the total rehabilitation sessions were 32 and that they required 60 min to complete each of them. Cognitive exercises were performed with a computer using

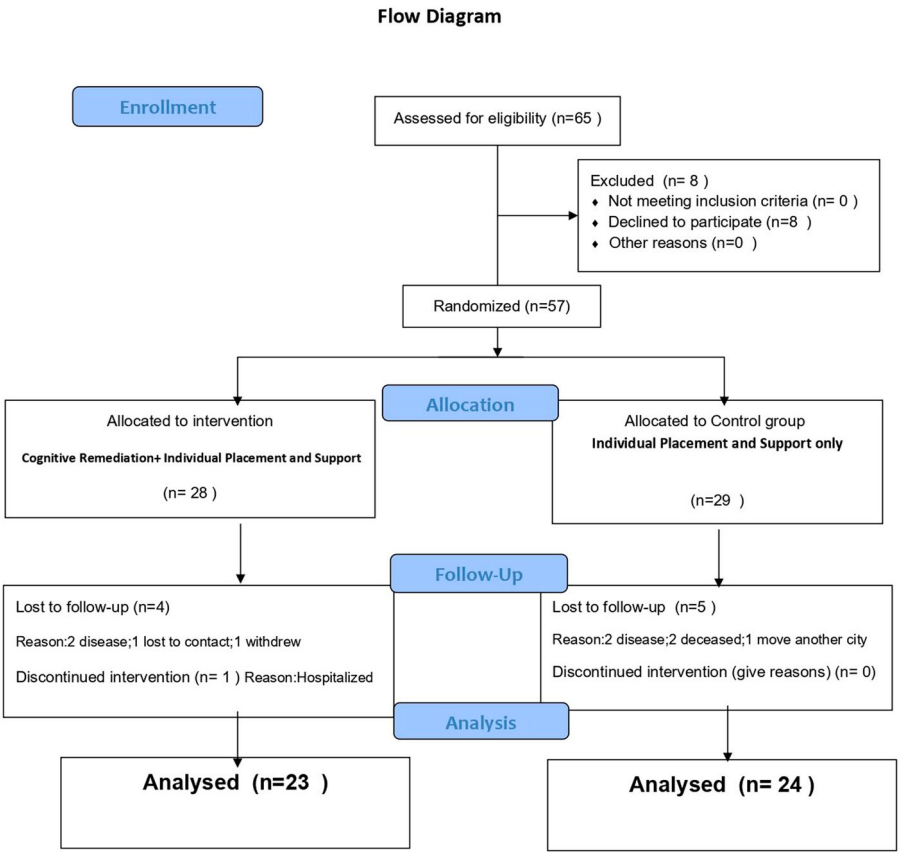

Figure 1 Flow chart of study groups.

the Cogpack program (Marker, 1987–2012, version 8.3). The participants completed between 1 and 2 sessions per week. The tests were individualized with training exercises and with different levels of difficulty.

An evaluation of the fidelity of the IPS program was carried out in 2015 through the Supported Employment Fidelity Scale (Bond, Becker, Drake, & Vogler, 1997) by an independent psychologist of the study. The observer knew the operation of the IPS methodology. Users of services, IPS workers and psychiatrists were interviewed and the structure of the programme was evaluated in three main domains: staffing, organization and services. This scale contains 15 elements, each with 5 options. The final score in this study was 66 (maximum of 75 points) classified as good implementation.

To not pollute the results of the investigation the employment results were collected weekly by research assistants (two psychologists) during the follow-up period. They were all unaware of which group the study participants belonged to. The employment rates are calculated as the percentage of participants over the total of each group that obtains at least one job in the study period fixed (8-months and 12-months). The hours worked weekly and the

salary per hour worked are calculated as the average of the hours worked weekly and the average salary per hour (salary weekly among hours worked weekly), respectively, for the participants who get a job. The average number of jobs per individual is calculated as the total number of total jobs achieved among the number of participants in each group.

Intervention

The sessions with the participants were individualized with different options of the Cogpack program, adapting the levels according to the evaluation of the obtained results, making changes and adding tasks according to their individual evolution. The clinical intervention was supervised by the Director of the Insular Psychosocial Rehabilitation Plan and performed and evaluated by neuropsychologists. The tasks were selected individually, based on the results obtained with the measurement of the battery of reference tests plus the results of the first six sessions that were taken as a general practice of cognitive exercises.

The five IPS team technicians, in addition to seeking competitive employment (Bond, 1998) to these 47 people who completed this study, provided this service to other clients, not exceeding, in any case, the maximum of 25 clients per technician.

In Tenerife, specialized mental health care is made up of Community Mental Health Teams and the Assertive Community Treatment Team. An IPS team technician is part of the Assertive Community Team. The rest of the IPS team members and the Community Mental Health Teams through the Individualized Rehabilitation Plan make the decisions to resolve the needs of people with severe mental disorder. These Mental Health services are public and are protected by the Local Health Administration.

The cognitive rehabilitation group attended cognitive rehabilitation sessions with the Cogpack program every week for 4 months (32 sessions). The majority of participants performed two rehabilitation sessions of one hour per week. The software provided scores that reflected the accuracy, speed and performance of each exercise. An individual record was made of each session to reinforce the improvement in the execution of the exercises. Once the execution of the different levels of the exercises carried out during the first six sessions was completed, the battery of tasks to be realized was adapted for each participant. Depending on the degree of difficulty they were able to carry out in those first weeks, tasks with a greater or lesser degree of complexity were configured. As people improved, the difficulty in them increased and the evolution achieved was reinforced.

If a participant in the rehabilitation group got a job, he continued to receive cognitive intervention adapting it outside of the assigned work schedule. They tried to maintain participation in the study unless they voluntarily wanted to leave. For the subsequent evaluations of the participants who obtained a job,

the schedules were adapted so that they would always be carried out after working hours.

The employment specialists kept track of the entire search process. They met with all the participants to plan the job search according to their work preferences and objectives. If a participant of the cognitive rehabilitation group got a job, the employment specialist would follow the evolution that he had within the company. Support and follow-up (by phone/in person) was made with the participant, his family and interlocutor in the company. Periodically, the interlocutor in the company was contacted and the evolution of the participants in the work was analysed. If any work problem (absenteeism, behaviour, …) appeared, the interlocutor in the company communicated it, and the vocational team intervened.

Diagnostic and background information

Psychiatric diagnoses and background information such as educational level and other demographic characteristics were obtained from study participants and from interviews made by the community mental health team. The employment history with the information from the previous job was carried out by the research assistants. The distribution of psychiatric diagnoses did not vary significantly between the two groups studied ($p = .344$).

To rule out a cognitive impairment of the participants, the MEC35 test (Lobo et al., 1999) was used. It is a Spanish version of the mini-mental status test. Its items explore five cognitive areas: orientation, fixation, concentration and calculation, and memory and language.

Short-term memory was measured with Digit Span Memory Test (DSMT) (forward and backward) (Wechsler, 1981) (Wechsler Adult Intelligence Scale-R); psychomotor speed with Trail Making Test (Reitan, 1958) (Part A); executive performance with the Wisconsin card sorting test (categories and perseverative error) (Grant & Berg, 1948) and Trail Making Test (Reitan, 1958) (Part B); information processing speed with the Digit Symbol Substitution Test (DSST) from Wechsler Adult Intelligence Scale-R (Wechsler, 1981); and verbal learning and memory (delayed recall) with the Rey Auditory Verbal Learning Test *(*Rey, 1987) (RAVLT). Additionally, a global measure of all these scales was provided, calculated as the average of the standardized scores (Trail Making Test part A and B, and perseverative error in Wisconsin card sorting test were introduced with a negative sign to consider that these scales improve when the score is lower). Symptoms were evaluated at the beginning and at the end of the study in both samples by PANSS (Kay, Opler, & Fiszbein, 1987) (Positive and Negative Syndrome Scale). For people with schizophrenia PANSS was administered in all its subscales, while for the rest of the sample, the general psychopathology scale was administered. All these scales were evaluated by a clinical evaluator trainer who did not know the group to which the participants belonged.

Statistical analysis

Demographic characteristics, diagnoses, work history, initial cognitive functioning and initial psychopathology between both groups were compared using *T*-tests and Mann–Whitney U-tests for continuous variables and Chi-square tests for categorical variables. A two-way ANOVA with repeated measures in one factor (RM-ANOVA) (Verma, 2015) was used to study the changes in the evolution of cognitive functionality and the results of work in the two groups during the period of time considered (the linear effect evaluates the differences between groups in the baseline period and after 12 months and the quadratic effect evaluates the differences between groups after 8 months with the average of baseline and after 12 months) with the exception of the employment rates, where a logistic regression was used to model if at least one job was obtained. In this model, group, time and the interaction between them are included as factors. The sizes of the Cohen effect (Cohen, 1988), d ($d < 0.4$, small, $0.4 < d < 0.8$ moderate, $0.8 < d < 1.2$, large and $d > 1.2$ enormous) have been calculated. The Pearson correlation coefficient was used to evaluate the relationship between the scales used to measure cognitive improvements and the results of the employment variables, hours worked weekly and the hour worked per hour. The level of significance was set at 0.05 for all analyses and the Bonferroni adjustment was made.

Results

The characteristics of the participants are summarized in Table 1. The distribution of demographic, diagnostic and cognitive measures at the beginning of the study did not differ significantly between the two study groups, CR + IPS and IPS-only. The sample is mainly made up of men, singles, between 36 and 45 years, with elementary studies and without substance abuse. Mainly were people with schizophrenia and personality disorder (83% F20–29 and 17% F31–F32.3). There are also no significant differences between drug use disorder and health problems. On average, participants received 2.0 antipsychotics per day (sd = 0.98), mostly, 76%, atypical or new generation. The average doses of the main drugs used have been: Risperidane 6.2 mg/day (sd = 2.1); Olanzapine 18.8 mg/day (sd = 2.4); Clozapine 447.6 mg/day (sd = 150.1) and Amisalpride 836.7 mg/day (sd 249.7). In the case of patients with bipolar disorders, at least they received a mood stabilizer with a new generation antipsychotic.

Twenty-one of the 23 participants (91.3%) who were finally in the CR + IPS group completed six or more Cogpack training sessions and were classified as "exposed to treatment" (Figure 1). Participants exposed to treatment completed an average of 21.05 (sd = 11.1) sessions and median of 25.5 ($P_{25} = 12.8$ and $P_{75} = 32$).

The groups were initially equivalent and the results of the RM-ANOVA in all the cognitive evaluations at 8 and 12 months are summarized in Table 2.

Table 1. Sociodemographic differences in Group CR + IPS and group IPS-only.

	CR + IPS (*N* = 23)		IPS only (*N* = 24)		*p*
	N	%	*N*	%	
Gender					.680
Male	15	65	17	71	
Female	8	35	7	29	
Marital status					.555
Single	22	96	20	83	
Married	1	4	4	17	
Age					.185
18–35	9	39	7	29	
36–45	12	52	11	46	
46–65	2	9	6	25	
Diagnosis					.344
Schizophrenia	17	74	18	75	
Bipolar disorder	2	9	5	21	
Personality disorder	3	13	1	4	
Depression	1	4	–	–	
Educational level completed					.881
Elementary School	14	61	15	63	
School certificate	8	35	8	33	
High school	1	4	1	4	
Current substance use disorder					.083
Currently Yes	2	9	–	–	
Currently No	21	91	21	88	
Past	–	–	3	12	
Health problems					.474
Diabetes	1	4	–	–	
Hepatitis C	–	–	1	4	
Others (Obesity and respiratory problems)	3	13	5	21	
No	19	83	18	75	
Number of hospitalizations					.347
0–1	7	30	4	17	
2–5	2	9	5	21	
>5	14	61	15	62	
PANNS*					
Positive Scale	10.17 (4.26)		12.25 (6.78)		.217
Negative Scale	12.74 (9.29)		14.37 (9.30)		.549
Psychopathology	27.65 (14.61)		29.75 (11.12)		.581

CR: Cognitive Remediation; IPS: individual placement and support; PANNS: Positive and Negative Syndrome Scale.
*Data show means (standard deviations).

Table 2 showed a significantly greater improvement in the Digit span backward test ($p = .032$; with linear effect: $p = .024$ and quadratic effect: $p = .484$), WCST ($p = .038$; with linear effect: $p = .048$ and quadratic effect: $p = .626$) and verbal learning ($p < .001$; with linear effect: $p < .001$ and quadratic effect: $p = .022$) than users in only IPS. Figure 2 shows the great evolution in verbal learning between the baseline and after 8 months in the CR + IPS group, and how this difference is maintained after 12 months, making both its linear and quadratic effect significant.

The size of the Cohen effect in the two groups considered is also included in Table 2. We found four cognitive variables analysed with a moderate or large effect size in favour of the treatment group: digit span backward 1 year ($d = 0.648$), digit span forward 1 year ($d = 0.726$), verbal learning 8 months ($d = 1.194$) and 1 year ($d = 1.668$), delayed recall 8 months ($d = 0.649$) and 1 year (d

Table 2. Results on assessment of the cognitive variables at baseline, 8 months and one year after treatment.

Instrument	Time	CR + IPS Mean (SD)	IPS only Mean (SD)	*p* Group	*p* Time	*p* Interaction	Cohen effect* Size (d)	Cohen effect* SE (d)
MEC 35								
	Baseline	31.09 (3.63)	31.46 (3.51)	.973	0.044	0.805	−0.104	0.289
	8 months	32.22 (1.88)	32.17 (1.58)				0.029	0.292
	1 year	32.43 (1.53)	32.17 (1.86)				0.157	0.295
TMT								
A	Baseline	39.96 (11.82)	43.79 (15.42)	.221	0.023	0.775	−0.278	0.286
	8 months	38.29 (11.53)	42.64 (14.90)				−0.325	0.285
	1 year	36.08 (10.79)	41.36 (14.78)				−0.407	0.283
B	Baseline	114.09 (73.51)	128.55 (69.41)	.172	0.001	0.542	−0.202	0.287
	8 months	88.20 (50.00)	116.69 (59.41)				−0.518	0.280
	1 year	85.17 (46.76)	109.35 (59.45)				−0.452	0.282
DSMT								
Fordward	Baseline	5.83 (1.03)	5.71 (1.00)	.153	0.046	0.090	0.116	0.294
	8 months	6.09 (1.08)	5.71 (1.08)				0.350	0.300
	1 year	6.43 (1.20)	5.71 (1.04)				0.648	0.306
Backward	Baseline	3.96 (1.11)	3.79 (1.35)	.143	0.009	0.032	0.133	0.295
	8 months	4.04 (1.15)	3.67 (1.17)				0.326	0.299
	1 year	4.65 (1.23)	3.79 (1.14)				0.726	0.308
DSST								
	Baseline	40.61 (13.81)	37.33 (12.44)	.645	0.663	0.357	0.249	0.297
	8 months	39.63 (10.72)	39.54 (12.40)				0.008	0.292
	1 year	40.52 (8.12)	39.50 (11.97)				0.100	0.294
WCST								
Categories	Baseline	4.74 (1.66)	5.04 (1.43)	.891	<0.001	0.038	−0.196	0.287
	8 months	5.48 (1.08)	5.58 (0.83)				−0.109	0.289
	1 year	5.78 (0.85)	5.50 (1.06)				0.293	0.298
% Perseverative Error	Baseline	32.13 (18.46)	24.85 (16.58)	.271	<0.001	0.427	0.415	0.301
	8 months	24.93 (13.30)	21.86 (11.08)				0.252	0.297
	1 year	20.29 (14.65)	18.65 (10.08)				0.131	0.295
RAVLT								
Verbal learning (Total recall for 5 trials)	Baseline	36.91 (11.15)	36.00 (8.32)	.001	<0.001	<0.001	0.093	0.294
	8 months	46.22 (8.38)	36.33 (8.19)				1.194	0.318
	1year	48.65 (5.77)	36.29 (8.70)				1.668	0.329

Delayed recall	Baseline	8.00 (4.84)	6.50 (2.90)	.035	0.041	0.563	0.379	0.300
	8 months	9.09 (3.80)	6.92 (2.84)				0.649	0.306
	1 year	9.39 (3.61)	6.96 (2.93)				0.742	0.308
Overall score (average of standarized data)	Baseline	0.038 (0.491)	−0.036 (0.558)	.059	0.996	<0.001	0.141	0.295
	8 months	0.145 (0.443)	−0.138 (0.538)				0.573	0.305
	1year	0.233 (0.461)	−0.223 (0.551)				0.896	0.312

CR: Cognitive Remediation; IPS: individual placement and support; MEC: Spanish version Mini-Mental; TMT: Trail Making Test; DSMT: Digit Span Memory Test; WCST: Wisconsin Cards Sorting Test; DSST: Digit Symbol Substitution Test; RAVLT: Rey Auditory Verbal Learning Test; SD: Standard deviation; SE: Standard error.
*Cohen effect between groups by time.

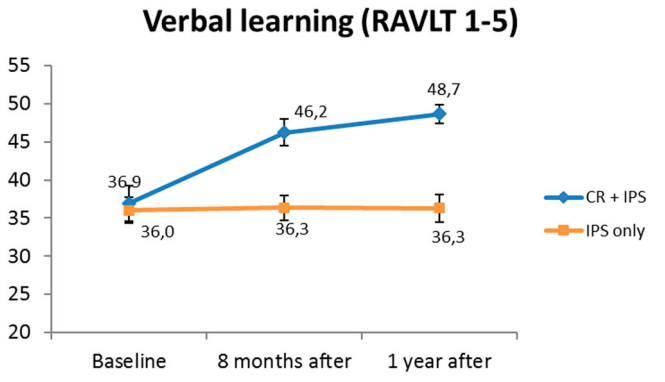

Figure 2. Score in the verbal learning item (RAVLT 1-5) (The bars represent a standard error). Note: CR: cognitive remediation; IPS: individual placement and support).

= 0.742). Delayed recall after 8 showed a large effect maintained. At baseline, no significant differences were found in any of the cognitive variables analysed. Using the overall cognition score, measured as an average of the standardized data, it is observed that the evolution over time between the groups differs significantly ($p < .001$).

For the participants with schizophrenia (17 in CR + IPS and 18 in only IPS) the information of the cognitive evaluation was shown in Table 3. The verbal learning subscale in RAVLT continues being the one that produces the greatest differences between both groups, with significant differences at 8 months ($d = 1.299$) and 1 year ($d = 1.689$) of follow-up. The overall cognition score also shows differences in evolution with the time between both groups ($p = .002$), with scores close to significance at the year of follow-up ($d = 0.627$ with se = 0.357).

The number of competitive jobs and the hours worked were analysed between the two groups 6 months before the intervention, and 8 and 12 months later to compare the evolution in the results (Figures 3 and 4).

Six months earlier, the group of cognitive remediation, although without significant differences, obtained worse scores in number of competitive jobs than the group with only IPS (0.22 vs 0.31). However, during the follow-up period after the intervention, the group with cognitive rehabilitation programme improved the results (higher percentage of people working and more weekly hours worked by those who get work). The group with only supported employment tends to have worse employment outcomes over time. On the other hand, 6 months before, both groups did not present statistical differences in the hours worked per week but one year later, the CR + IPS group had more hours worked weekly, than the group with only IPS (37.2 vs 26.71, $p = .023$).

The results of the work of the two groups studied during the 8 and 12 months of follow-up are shown in Table 4. Cumulative work rates were analysed. More clients in the CR + IPS group worked at 8 and 12 months (52.2% and 60.9%,

Table 3. Results on schizophrenic participants ($N = 35$) of the cognitive variables at baseline, 8 months and one year after treatment.

Instrument	Time	CR + IPS Mean (SD)	IPS only Mean (SD)	*p*			Cohen effect*	
				Group	Time	Interaction	Size(d)	SE(d)
MEC 35								
	Baseline	30.65 (4.03)	30.89 (3.85)	.769	0.022	0.967	−0.061	0.336
	8 months	31.88 (1.93)	32.11 (1.78)				−0.123	0.334
	1 year	32.24 (1.60)	32.33 (1.85)				−0.057	0.336
TMT								
A	Baseline	43.36 (11.12)	40.67 (13.07)	.784	0.093	0.767	0.221	0.345
	8 months	40.64 (10.26)	40.23 (13.61)				0.034	0.339
	1 year	38.78 (10.46)	38.82 (13.68)				−0.04	0.338
B	Baseline	123.51 (80.99)	131.05 (69.52)	.296	0.002	0.354	−0.100	0.335
	8 months	87.62 (51.97)	118.59 (56.15)				−0.572	0.321
	1 year	88.64 (50.20)	109.52 (55.61)				−0.394	0.326
DSMT								
Fordward	Baseline	5.94 (1.09)	5.67 (1.03)	.278	0.134	0.473	0.259	0.346
	8 months	6.12 (1.27)	5.78 (1.17)				0.279	0.347
	1 year	6.35 (1.22)	5.78 (1.11)				0.493	0.353
Backward	Baseline	3.94 (1.20)	3.94 (1.43)	.544	0.055	0.063	−0.002	0.338
	8 months	3.88 (1.17)	3.83 (1.25)				0.041	0.339
	1 year	4.53 (1.01)	3.89 (1.18)				0.582	0.356
DSST								
	Baseline	38.53 (13.54)	37.94 (12.38)	.949	0.150	0.861	0.045	0.340
	8 months	40.32 (11.65)	41.06 (12.09)				−0.062	0.336
	1 year	39.88 (8.56)	40.44 (11.66)				−0.055	0.337
WCST								
Categories	Baseline	4.29 (1.72)	4.94 (1.59)	.647	<0.001	0.033	−0.393	0.326
	8 months	5.29 (1.21)	5.50 (0.92)				−0.192	0.332
	1 year	5.71 (0.99)	5.39 (1.20)				0.289	0.347
% Perseverative Error	Baseline	37.32 (18.29)	24.97 (17.26)	.080	<0.001	0.188	0.695	0.359
	8 months	27.32 (14.41)	20.59 (10.85)				0.530	0.354
	1 year	21.93 (16.61)	17.97 (9.90)				0.292	0.347
RAVLT								
Verbal learning (Total recall for 5 trials)	Baseline	36.82 (9.80)	35.78 (9.07)	.002	<0.001	<0.001	0.111	0.342

(*Continued*)

Table 3. Continued.

Instrument	Time	CR + IPS Mean (SD)	IPS only Mean (SD)	*p* Group	*p* Time	*p* Interaction	Cohen effect* Size(d)	Cohen effect* SE(d)
	8 months	47.12 (8.05)	36.00 (9.00)				1.299	0.378
	1year	49.35 (5.93)	35.94 (9.45)				1.689	0.389
Delayed recall	Baseline	7.18 (3.17)	6.50 (3.19)	.133	0.002	0.143	0.213	0.345
	8 months	9.18 (3.63)	7.05 (3.10)				0.631	0.357
	1 year	9.00 (3.37)	7.11 (3.20)				0.575	0.356
Overall score (average of standarized data)	Baseline	−0.098 (0.460)	−0.029 (0.592)	.400	0.534	0.002	−0.129	0.334
	8 months	0.076 (0.483)	−0.091 (0.548)				0.324	0.348
	1year	0.146 (0.450)	−0.177 (0.568)				0.627	0.357

CR: Cognitive Remediation; IPS: individual placement and support; MEC: Spanish version Mini-Mental; TMT: Trail Making Test; DSMT: Digit Span Memory Test; WCST: Wisconsin Cards Sorting Test; DSST: Digit Symbol Substitution Test; RAVLT: Rey Auditory Verbal Learning Test; SD: Standard deviation; SE: Standard error.
*Cohen effect between groups by time.

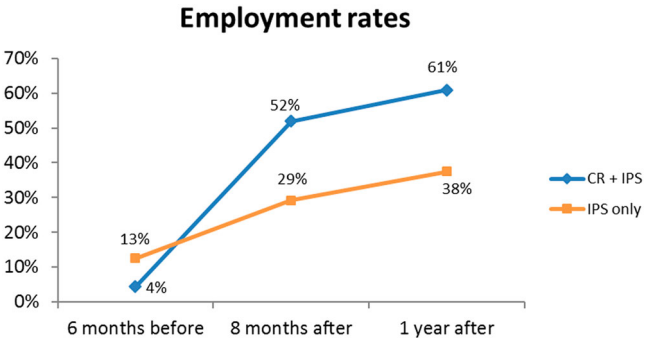

Figure 3. Percentage of individuals who obtain at least one job in the follow-up.
Note: CR: cognitive remediation; IPS: individual placement and support.

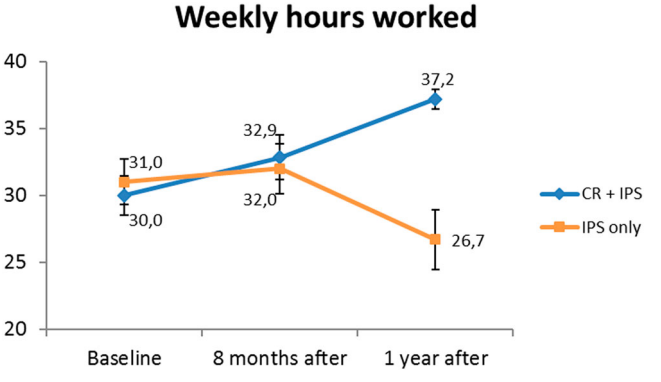

Figure 4. Average number of weekly hours worked of people who get a job.
Note: CR: cognitive remediation; IPS: individual placement and support.

respectively) than IPS (29.2% and 37.5%, $p = .023$ and $p = .025$, respectively) with the evolution in time being similar in both groups ($p = .998$). In addition, in the year of follow-up, the average number of jobs per user was 0.52 (sd 0.66) in the CR + IPS group versus 0.29 (sd 0.49) in the IPS alone, not showing significant statistical differences ($p = .239$). Of all the variables of cognitive evaluation, only the improvement in TMT-A per year was significantly correlated with the hours worked weekly ($r = 0.650$, $p = .005$).

Throughout the entire study, the symptomatology was measured in both groups. In addition, the number of relapses and hospitalizations that each participant had during the study period was controlled. Table 1 shows the initial differences related to the symptomatology variable, not being significant in any of the three measured components, positive scale (CR + IPS: 10.17 (sd 4.26), IPS alone 12.25 (sd 6.78), $p = .217$), negative scale (CR + IPS: 12.74 (sd 9.29), IPS alone 14.37 (sd 9.30), $p = .549$), and psychopathology (CR + IPS: 27.65 (sd 14.61), IPS alone 29.75 (sd 11.12), $p = .581$). This behavior was maintained throughout the

Table 4. Employment outcomes by group (CR + IPS vs IPS-Only) at 8 month and one year follow-up.

	8 Months				1 Year			
	CR + IPS ($N = 23$)	IPS only ($N = 24$)	Mann–Whitney U-test	p	CR + IPS ($N = 23$)	IPS only ($N = 24$)	Mann-Whitney U-test	p
Number average of jobs per individual	0.39 (0.66)	0.17 (0.38)	234.0	.225	0.52 (0.66)	0.29 (0.46)	229.5	.239
Hours worked (weekly)	32.86 (8.09)	32.00 (9.24)	13.000	.842	37.2 (3.42)	26.71 (10.95)	12.500	.023
Hourly wage	5.04 (0.53)	4.93 (0.54)	9.000	.412	5.45 (0.52)	4.89 (1.23)	18.500	.109

CR: Cognitive Remediation; IPS: individual placement and support.
The data show means (standard deviations).

other two periods of time measured, although a significant reduction was observed over time in the three components ($p = .037$, $p = .038$ and $p = .043$, respectively) although without differences significant between both groups.

Discussion

The present study aims to investigate the synergistic effects of cognitive rehabilitation (CR) with the IPS strategy in the achievement of competitive employment, for people living in Tenerife who suffer from schizophrenia, schizoaffective disorder and bipolar disorder with a history of work failures. While the CR + IPS group demonstrated sustained improvements in vocational and neurocognitive outcomes, it is also evident in this study that cognitive remediation facilitates more improvements in certain domains beyond the gains associated with the IPS program alone. Participants in the cognitive remediation programme demonstrated significant improvements in several areas of cognitive functioning, including verbal learning and memory and executive functioning. The improvements in these areas of operation and their magnitude are consistent with other studies of vocational rehabilitation and cognitive correction using Cogpack software (McGurk et al., 2005, 2015, 2016). Lindenmayer et al. (2008) found that 51% of their sample obtained employment during the 12-month follow-up, compared to 35% of the 31 initially unemployed patients in the control group, which was not a statistically significant difference. Patients who received cognitive remediation worked significantly more weeks than patients in the control group and showed a tendency to work longer hours and earn more wages after one year of follow-up. In that study, patients assigned to cognitive remediation demonstrated significantly greater improvements in overall cognitive performance, learning and memory, and psychomotor speed than patients who received the usual services. Therefore, the effects of cognitive remediation on cognitive functioning with the help of Cogpack were similar between the two samples of inpatients and outpatients.

The specific domains of cognitive performance that were improved among patients who received cognitive remediation included attention and psychomotor speed and learning, with a statistically significant trend ($p = .05$) for general cognitive performance, while the effects were not found for the executive functioning or memory. Cook et al. (2005), in a multicenter study presented the cumulative results for 24 months and found that the participants in the experimental group (359/648 [55%]) were more likely than those in the comparison programmes (210/625 [34%]) of achieving competitive employment ($p < .001$), with greater benefits in the rest of the vocational results. In an exhaustive review (Green, 1996), it was identified that verbal memory and vigilance appear to be necessary for an adequate functional outcome. Deficiencies in these areas can prevent patients from achieving optimal adaptation and, therefore, act as "neurocognitive factors that limit the frequency".

These findings, along with other research on Cogpack, demonstrate the strength of this cognitive recovery package in consumers with schizophrenia and other serious mental illnesses. The results are also consistent with cognitive improvements (Bell et al., 2001; Fiszdon, Cardenas, Bryson, & Bell, 2005). In addition to the best verbal learning, memory and executive functioning, performance was improved in working memory measures, but not sustained attention.

The gains obtained at 8 months of the follow-up period were further improved during the 12-month follow-up period. It seems that the follow-up during the time of the study improved the cognitive results. These results may suggest that areas of cognitive skills are likely to improve as long as they are practiced specifically, and the longer rehabilitation can also produce better results even without further rehabilitation (McGurk et al., 2007).

Currently, there is still uncertainty regarding which techniques should be used (Van der Gaag, Kern, van den Bosch, & Liberman, 2002) and whether the results are beneficial, both in terms of sustained effects overtime on cognition and improvements in performance. In our research, we found a large effect size on memory and verbal learning variables. The hours that were used to do the cognitive rehabilitation are an aspect that could influence the results. McGurk et al. (2007) found that hours of cognitive training were related to improvements in verbal learning and memory when randomized cognitive rehabilitation studies with 1151 patients were analysed. It was suggested that this domain may be more sensitive to the method of increasing time to cognitive rehabilitation. Most of the participants in the rehabilitation group felt much more agile doing the exercises and this resulted in greater motivation and a longer duration in the sessions. Perhaps, for this reason, the results were so good in memory and the mastery of verbal learning, which is associated with the hours of cognitive rehabilitation in some studies.

The fidelity to the IPS model was classified as good with a score of 66 points. However, it is far from the maximum score of 75 points on this scale. A good implementation of the IPS could lead to an increase in the results shown in the obtained work rates (McGurk et al., 2005).

There is still no consensus on how techniques (Wykes & Van der Gaag, 2001) should be used to improve the functioning of cognition. Reports of combinations of cognitive remediation with other interventions (supported employment programme, psychosocial intervention) have increased in the literature. A CR trial (CRT) with adequate power should be performed using the same experimental configuration to investigate the results of vocational rehabilitation.

Several meta-analyses have been conducted on the effectiveness of cognitive rehabilitation and have shown a moderate to large effect size on cognitive outcomes (Grynszpan et al., 2011; Krabbendam & Aleman, 2003; Kuipers et al., 2002; Kurtz, Moberg, Gur, & Gur, 2001; McGrath & Hayes, 2000). However, partly because of heterogeneity and difficulties in generalizing cognitive improvements in other areas, it is difficult to determine the most accurate and

effective method of cognitive intervention (Wykes & Huddy, 2009). There is available evidence that the combination of cognitive rehabilitation techniques with another type of treatment, such as being linked to a strategy to get a job, is effective (Kurtz & Nichols, 2007; Popescu & Miclutia, 2009).

Recent findings suggest that cognitive functioning contributes to competitive work outcomes even in people with psychiatric disorders who have relatively intact cognitive abilities with optimal treatment and vocational support conditions (McGurk et al., 2018).

In our country, the benefits and services of dependence are officially regulated by a scale that grants different degrees of dependence (I–III) depending on the severity and the caregivers. These works could establish levels of personal autonomy according to the cognitive competences, which would mean an advance compared to the current system where the motor component has a greater importance.

Several important limitations must be considered. It is possible to use the MATRICS Consensus Cognitive Battery (MCCB) standard to measure cognitive changes in schizophrenia and bipolar disorders (Nuechterlein et al., 2008). Although it has some relationship with occupational functioning, Lystad et al. (2016), already indicate that this relationship is not a simple task.

The most important limitation lies in the fact that there is great variability in cognitive rehabilitation studies (method, measurements, sample sizes, time tracking) so it is difficult to draw firm conclusions. In particular, this study, in addition to the small size of the groups studied, can be severely limited by the selection bias introduced due to the high rate (17%) of rejections. However, this rejection rate was similar in both groups.

The data were collected in 2013 and only the different measures of the cognitive domains based on the previous McGurk literature have been examined (McGurk et al., 2005, 2007). Another aspect to keep in mind is that with a small sample size, caution should be exercised, since the findings may not be transferable to predict vocational outcomes.

Finally, we need more time and more studies to explore these results and their relationship. More research is also needed to determine better interventions to help get a job or keep a competitive job for people with severe mental illness. Additional research could explore whether after follow-up with more rehabilitation (five additional sessions) it could produce better employment outcomes later.

Other factors such as motivation, self-efficacy and self-confidence of participants with individual cognitive sessions may also have contributed to better outcomes in the CR + IPS group. It is suggested that the association of these factors can be investigated in future studies. It remains to further investigate cognitive rehabilitation in non-vocational outcomes because the information is unclear.

The effects of Cogpack on sustained attention have not yet been reported, but they are of interest due to the importance of this ability in the functioning of the community. It is also recommended to perform more research in the area of psychomotor speed where we did not find significant differences ($p = .775$).

Conclusion

Employment with an IPS strategy support together with the support of the community mental health team is effective and therefore people with severe mental illness are able to get a job with a salary according to the labour market. The combination of IPS and cognitive remediation can help achieve this goal. At one year of follow-up, the group of supported employment (IPS) plus cognitive rehabilitation got more jobs and worked more hours than the group with only the IPS strategy with significant differences. Thus, it is worthwhile to continue investing to improve and explore all the variables of IPS interventions in the future and to evaluate if these findings in Spanish population are maintained in European populations.

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Disclosure statement

No potential conflict of interest was reported by the authors.

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