The Effects of the Combination of Cognitive Training and Supported Employment on Improving Clinical and Working Outcomes for People with Schizophrenia in Japan

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Abstract: <u>Background</u>: In Japan, Job assistance for SMI have been not active. Compared with mental retardation, employment rate of SMI was low. The needs of the effective job assistance for SMI are growing. The purpose of this study was to determine the effectiveness of the combination approach of Cognitive Remediation (CR) and Supported Employment (SE) in clinical outcomes, including cognitive functioning and psychiatric symptoms besides vocational outcomes. <u>Methods</u>: The participants diagnosed with schizophrenia or schizoaffective disorder were assigned to CR+SE group (n=52) and SE group (n=57). CR comprised computer based trainings using COGPACK and group works. SE was individualized vocational support provided by employment specialists. Outcome measures included cognitive functioning, psychiatric symptoms, social functioning, performance of tasks as clinical outcomes, employment rate, duration of employment, and earned wage as vocational outcome. <u>Results</u>: CR+SE group displayed significantly better psychiatric symptoms (F=3.490, p<.10), interpersonal relations (F=11.695, p<.01), and social and cognitive functioning including verbal memory (F=9.439, p<.01), digit sequencing (F=5.544, p<.05), token motor tasks (F=6.685, p<.05), and overall cognitive functioning (F=8.136, p<.01). We did not find any significant difference between two groups in terms of employment rate and earned wage. <u>Discussions</u>: This is the first controlled study to determine the effectiveness of CR on vocational outcomes in Japan. The results showed that CR and SE programs were feasible in Japan and that CR using COGPACK had favorable effects on cognitive functioning, psychiatric symptoms, and social functioning, which is consistent with previous researches.

Keyword: Schizophrenia, cognitive remediation, supported employment, cognitive impairment, COGPACK.

1. INTRODUCTION

Recently, the outcomes of the vocational rehabilitation for the people with mental illness have been changing. Preceding research reported that the employment rate of the people with schizophrenia is approximately 20% [1, 2] while the most recent report of Japanese government reported that the employment rate of the people with mental illness is 17.3%. These rates are much lower compared to the employment rates of people with a physical disability (43.0%) or mental retardation (52.6%) in Japan. Overall, 62.3 % of the unemployed people with mental illness want to have job while 50.7% of the unemployment people who have mental illness and intent to get job actually take action to be employed. These facts indicate the shortage of vocational support for people with mental illness [3].

To improve these outcomes, Japanese government has decided on legal reforms related to vocational support offered to individuals with mental illness including schizophrenia. One reform involves raising the statutory employment rate of people with disabilities. Because of this reform, all employers are obliged to employ people with disabilities at a rate equal to or above the statutory employment rate. Another reform involves making it obligatory to employ people with mental illness. This legal reform is to be implemented and enforced in 2018. To make these reforms meaningful, it is important to develop and enrich the vocational support in clinical practices.

It have mentioned that psychopathological symptoms, neuro-cognition, social cognition, motivation and the interaction of these factors were related to vocational outcome of person with severe mental illness [4, 5]. The intervention study about deinstitutionalization based on the perspective that the interaction of factors mentioned above was important to working of person with severe mental illness has also implemented [6]. In recent years, it have been attracted attention that the influence of neuro-cognition to vocational outcome of person with severe mental illness [7, 8] and the relevant support program in this respect.

Cognitive Remediation (CR) has been receiving increasing attention as a support program that improves vocational

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outcomes. CR aims to bring beneficial change to the disordered cognitive functioning, which is closely related to vocational outcomes.

Various cognitive rehabilitation therapies have been developed [9, 10] and evaluated using different outcome measures. Some researches use outcome indicators such as neuroimaging, biochemical measurements, or biological evidences [11, 12] while other researches use vocational outcomes [13-17].

Most cognitive rehabilitation studies that utilized vocational outcome measures have common features [13, 16, 17]:

1. They use computer software for training of cognitive functioning;

2. Additionally provide evidence-based supported employment (SE) programs or similar individualized vocational supports;

3. Implement group sessions intended to bridge the gap between the cognitive functioning and vocational support.

The results of these studies indicated that the combination approach of CR and SE is more effective than is a solely provided SE program in terms of not only cognitive functioning, such as verbal memory and executive function, but also vocational outcome, such as employment rate and earned wage.

In this study, we adopted the combination approach of CR and SE based on Thinking Skills for Work Program developed by McGurk *et al.*, which has well-developed software and manuals [17]. The purpose of this study is to determine the effectiveness of CR and SE program in clinical outcomes, which include cognitive functioning and psychiatric symptoms besides vocational outcomes, such as employment rate.

2. METHODS

2.1. Participants

The study participants were recruited in ten hospital day-care centers and one community welfare agency in Japan. The hospitals include two university hospitals, one public hospital, and seven private hospitals. All of them have already provided or prepared to provide the vocational services for the people with mental illness.

The inclusion criteria of this study are listed below:

- Diagnosed with schizophrenia or schizoaffective disorder (F20 or F25 of ICD-10 [18])

- Aged 20 to 45 year old

- Outpatient (inpatient was excluded)

- Have experience of admission to a high school or Full Scale IQ of WAIS-III (Wechsler Adult Intelligence Scale) of 70 and more

- Have any competitive work experience with full- or part-time job and have intention to find employment at the time of entry

We included the people who met all of the criteria and excluded the people who have mental retardation, dementia, substance related disorder, or organic mental disorder.

2.2. Interventions

2.2.1. Cognitive Remediation (CR)

CR was provided using Japanese version of COGPACK, which was developed by German software company Marker Software for people with mental illness to improve their cognitive functioning [19]. COGPACK includes computer-based cognitive exercises in areas of attention, concentration, psychomotor speed, learning, memory, and executive functions from a standardized curriculum.

Each session lasted approximately 60 minutes and included game exercises for practicing each of these areas of cognition. Participants received two sessions per week for a total of 12 weeks. In addition to these sessions, participants completed verbal exercises concurrently in order to bridge a gap between the cognitive functioning and social functioning. Each verbal session lasted also 60 minutes, with one session per week for a total of 12 weeks. The weekly group discussions focused on the importance of cognitive skills, on performing activities of daily living, and on the development of compensatory strategies for managing persistent cognitive problems.

We used the implementation manual of "Thinking Skills for Work" [17] as a reference. Japanese version of COGPACK was translated from German version for this study with the permission of the authors for the academic use.

2.2.2. Supported Employment (SE)

A supported employment protocol was developed for this study based on the pioneering initiatives of supported employment in Japan and Individual Placement and Support (IPS), which is evidence based vocational support program widely disseminated in the United States or other countries [20, 21].

This study used two features of supported employment program. First, the care managers play a central role consistently provided the vocational care from the assessment to follow-along supports (e.g., counseling, transportation, or intervening with an employer). Second, the job placement is tailored to the client's preferences and interests, and as many services are offered in the client's community as possible. The training before placement is also provided if needed.

In this study, the supported employment program had employment specialists who joined multidisciplinary and inter-agency case management teams. All team members provided services to the clients based on a team approach. The team provided individualized and comprehensive supports, including support for daily living, besides vocational supports. The program was based on a place-then-train philosophy, emphasizing individualized job placement in social inclusive work followed by on-the-job training (if needed) and ongoing support from a vocational specialist to help clients keep their jobs.

2.2.3. Preparation Activity for Work

Before the start of vocational support program, the lectures about the job seeking were provided to both SE group and CR+SE Group. The contents of lectures provided the information about the accessible public services related to job seeking, about writing a resume, and about practical

training for a job interview. All of these contents are provided within a usual vocational support; therefore, these lectures were provided to both groups as Treatment as Usual (TAU).

The lectures consisted of four sessions, each session conducted once a week for 60 minutes. The lectures were provided immediately after T1 in SE group. On the other hand, they were provided after T2 in CR+SE group. The participants were allowed to seek jobs during the lecture period.

Vocational supports were provided for one year, between T1 and T3 for SE group and between T2 and T4 for CR+SE group (see Fig. **1**). The vocational supports for CR+SE group during CR period were limited to the relationship building and counseling in the agency. Hence, the practical training in community setting and proactive job seeking were not implemented because we thought that it is important for participants to pay exclusive attention to the CR program and for the program to prevent the participants' from losing interest in CR and dropping out from the program. The participants were informed about the nature of the program, and they consented that the proactive job seeking would not begin during CR program. To keep coherence in terms of providing CR and SE program, all service providers who participated in the study attended the workshop about these programs.

The medication prescription was not controlled by the research, and it was left up to participants' outpatient primary doctors. We did not recommend changing medication significantly during research period; however, it changed at the primary doctors' discretion depending on the clinical need, such as strong adverse effect of drug or aggravation of symptoms.

2.3. Design

The study design was a prospective controlled study. The participants were assigned into two groups, the SE group and the SE+CR. The assignment was based exclusively on the order of the entry. During the first six month of the recruiting period, all participants were assigned into SE group while other participants were assigned into SE+CR group. To avoid allocation bias, no other factors except the order of the entry were considered.

The intervention in SE group began earlier than in CR+SE group in all agencies. Because most service providers who participated in the study did not have experience with SE and CR, we thought it would be difficult to provide CR and SE programs simultaneously at the beginning of this research.

The participants in each group were recruited about one month before the start of the intervention. To reduce the bias in participants' motivation owing to the difference of information they provided during recruit, all of the information about the interventions for both groups were given to the all participants.

The participants provided written informed consent, agreeing with the research contents and ethical considerations, including their privacy rights and the procedure. The recruitment continued until five people assigned to each group or the recruit period ended.

We did not adopt randomized controlled trail (RCT) design for the following reasons:

1. If we adopted the RCT without a waitlist, it would be difficult for the agencies to provide the unfamiliar services to both groups at the same time because of workforce shortage.

2. If we adopted the RCT with waitlist, the participants on the waitlist who had enthusiasm for a rapid job seeking would be dropped out from the research.

For these reasons, RCT was unsuited for our research.

2.4. Outcome Measures

Outcomes included the following items:

2.4.1. Vocational Outcomes

Competitive employment was operationally defined as a job paying at least minimum wage (as established in Japanese law), offering five and more work hours per week, allowing anyone to apply for it, and not being controlled by a service agency. The outcome measures included competitive employment rate, total days employed, total earnings, and the rate and days of disability employment which is obligated for companies to hire the people with disability by Japanese law. Moreover, we assessed the use of internship programs and vocational Rehabilitation Programs in facilities by a person with a disability.

2.4.2. Psychiatric Symptoms

Positive and Negative Syndrome Scale (PANSS) [22] was used to assess psychiatric symptoms. The positive scale, negative scale, and general psychopathology scale were used in the analysis. Thirty items describing different symptoms were rated on a scale from 1 to 7, with the higher score indicating more severe symptoms.

2.4.3. Social Functioning

Life Assessment Scale for Mentally Ill (LASMI) [23] was used to evaluate the social functioning. The LASMI was developed to assess an individual's disabilities in daily life. It contains 40 items in five categories, including daily living (12 items), interpersonal relations (13 items), work (10 items), endurance and stability (2 items), and self-recognition (3 items). The items were rated on a 5-point scale (0–4), and the sum of all categories in LASMI was used as an index of disability. In this study, we used 23 items in the categories of interpersonal relations and work because we expected that CR and SE would change the responses to their items.

2.4.4. IQ

Japanese Adult Reading Test (JART) [24, 25] was used to evaluate the IQ. JART is the Japanese version of the NART (The National Adult Reading Test) [26] that uses 50 Japanese irregular words, all of which are Kanji (ideographic script) compound words. JART is a valid scale for evaluating premorbid IQ based on reading performance.

2.4.5. Cognitive Functioning

Schizophrenia Japanese Version (BACS-J) [27] and the Neuropsychological Assessment Battery (NAB) Maze Test

[28] were used to evaluate cognitive functioning. BACS-J has six sub domains, verbal memory, digit sequencing, verbal fluency, token motor, symbol coding, and tower of London. We used Z score and composite score of BACS-J to conduct the analysis. In terms of NAB Maze Test, we used the total score derived from the correct response rate and the time to solve.

2.4.6. Performance of Tasks

Digit-Checking Task and Napkin-Folding task in Makuhari Work Sample (MWS) [29] were used to assess the performance of tasks. MWS consists of 13 tasks that were developed to investigate the challenges in vocational skills. In the digit-checking task, the participants have to find different digits between two otherwise similar sample accounting documents, just like in the "Spot the difference" game. This task is used to evaluate the performance related attention and vigilance. In the napkin-folding task, after the participants watch the movie about napkin folding, they have to fold napkin the same way as shown in the movie they watched. This task is related to working memory. We used the correct response rate and the time to solve in the analysis. Even though the domains that these two tasks evaluated overlapped with BASC-J, we added these tasks into our test battery to evaluate the performance of tasks in a more real vocational situation.

2.4.7. Basic Characteristics

Beside these variables, we collected the basic characteristics, such as age, disease duration, and the average daily dose. The doses were established for each antipsychotic medication and converted to the relative potency equivalent of 100 mg of chlorpromazine. Doses equivalent to 100 mg/day of chlorpromazine were 2 mg/day for risperidone and 5 mg/day for olanzapine. The equivalencies of other antipsychotic medications were based on information published in the literature [30].

2.5. Data Collection and Evaluation

The schedule of the data collection and evaluation for each group was as follows:

- T1 (baseline): immediately after the entry,

- T2: four months after T1,
- T3: one year after T1.
- T4: one year after T2

At T1, the information about 1) psychiatric symptoms, 2) social functioning, 3) IQ, 4) cognitive functioning, 5) performance of tasks, and 6) basic characteristics were collected through the interviews. At T2, the collected data were 1) psychiatric symptoms, 2) social functioning, 3) cognitive functioning, 4) performance of tasks, and 5) dose. The data about the vocational outcome were collected on an ongoing basis for one year (between T1 and T3 in SE group; between T2 and T4 in CR+SE group) (see Fig. **1**).

2.6. Statistical Analysis

We conducted t-test to examine group equivalence at T1. In order to compare the clinical outcomes at T2 between two groups, two-way ANOVA was used. In terms of the variables that showed significant differences between two groups at T1, the scores of each variable at T1 were used as controls for the covariance. To examine the vocational outcomes between SE group at T3 and CR+SE group at T4, univariate tests of significance were conducted using chi-square tests for discrete data along with t-tests for continuous data and group differences in terms of cumulative measures of employment. Statistical calculations were performed using SPSS version 21.0J.

3. RESULTS

3.1. Participant Characteristics

Of the 109 participants who agreed to participate in the research, 57 (Average age= 35.84, SD=6.48) and 52 (Average age= 33.13, SD=6.96) were assigned into SE group and CR+SE group, respectively. Prior to T2, eight participants (14.0%) in the SE group and two participants (3.8%) in the CR+SE group declined to participate in the research. Overall, 47 participants (82.5%) in SE group and 47 participants (90.4%) in CR+SE group were followed up until the end of research period. The results showed no significant difference in the retention rate between two groups (chi square=1.440). The main reason for declining the participation was the lack
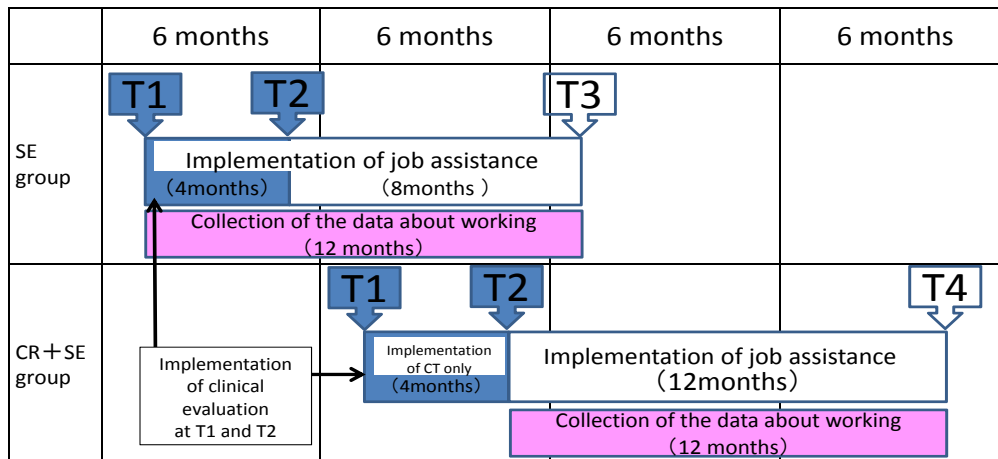

Fig. (1). Study design and time of assessment.

of interested in competitive employment. No participant dropped out from the research because of the re-admission to the hospital, significant change in the medication, or symptoms relapse.

3.2. Baseline Comparisons

Table **1** shows the results of t-test, showing significant differences between the two groups in the basic characteristics and outcome measures at T1. Significant differences were found in the score of negative symptoms (t = -1.932, p<.10), general psychopathology (t = -2.869, p<.01), total score (t = -2.414, p<.05) of PANSS, and Interpersonal relations domain score of LASMI (t = -2.070, p<.05) All of these differences indicated more severe symptoms or lower functioning in CR+SE group than SE group. In terms of the other variables, we found significant difference only in age (t = 2.103, p<.05).

3.3. Clinical Outcomes

We conducted ANOVA of time and group as independent variables and outcome variables as dependent variables, controlling for the age, total score of PANSS, and interpersonal relations domain score of LASMI as covariates. Although there were significant differences between two groups at T1 in negative symptoms and general psychopathology of PANSS, we did not use these variables as covariates because they correlated significantly with total score of PANSS.

Table **2** shows the results of the change in dosage, psychiatric symptoms, and social functioning .We found significant time by group interaction on total score of PANSS (F = 3.490, p<.10), in interpersonal relations domain of

LASMI (F = 11.695, p<.01), and in working domain of LASMI (F = 3.103, p<.10). Table **3** shows the results of cognitive functioning measured by BACS-J. We found significant time by group interaction on verbal memory (F = 9.439, p<.01), digit sequencing (F = 5.544, p<.05), token motor (F = 6.685, p<.05), and composite scores (F = 8.136, p<.01). All of these changes were favorable for CR + SE group.

3.4. Employment Outcomes

Table **4** shows the results of the chi square test conducted to compare the frequency of obtaining competitive employment, disability employment, internship programs for person with a disability, and vocational rehabilitation programs between two groups. Significantly more individuals in SE group used the internship programs for person with a disability compared to individuals in CR+SE group (Chi square = 7.162, p<.01). Table **5** compares the two groups on the number of days employed and the total income. We found no significant difference between two groups.

4. DISCUSSIONS

4.1. The Feasibility of CR and SE in Japan

The retention rate of the participants in this study was 86.3%, which was relatively high compared to the retention rates of 72.5% to 91.0% reported in previous studies [13, 14, 16]. The main reason for dropping out was decreased motivation to obtain employment. No participants dropped out because of relapse of the symptoms or readmission to the hospital. This suggested the implementation of SE did not have any adverse effects on the user of SE program. Furthermore, the results indicating no significant difference in dropout rate between SE group and CR+SE group suggest

Table 1.   Socio-demographic and clinical characteristics of participants (n = 109).

	CR+SE			SE			T
	N	**Mean**	**S.D.**	**N**	**Mean**	**S.D.**	
Age	52	33.13	6.96	57	35.84	6.48	2.103[*]
Illness Duration (months)	47	116.57	74.44	56	139.93	73.41	1.598
Antipsychotics medication (mg/day)[a]	51	647.56	1001.18	56	449.51	374.34	-1.379
Psychiatric Symptoms (PANSS)							
Positive scale	52	14.40	5.25	57	13.30	5.59	-1.062
Negative scale	52	18.33	5.85	57	16.18	5.77	-1.932[†]
General Psychopathology scale	52	34.83	9.16	57	29.53	10.04	-2.869[**]
Total Score	52	67.56	17.02	57	59.00	19.73	-2.414[*]
Social Functions (LASMI [b])							
Interpersonal relations	52	18.27	8.79	57	15.09	7.64	-2.070[*]
Working related behavior	52	15.02	6.86	57	13.89	6.55	-0.898
Estimated Premorbid Intelligence (JART[c])	52	102.70	9.37	57	99.82	10.93	-1.464

** p<.01，* p<.05，† p<.10
a: CPZ equivalent dose b:LASMI:Life Assessment scale for the Mentally Ill c:JART:Japanese Adult Reading Test (b and c are available only in Japanese)

Table 2.   Change in dosage, psychiatric symptoms, and social functions from baseline (T1) to the 4th month (T2).

(n=99)		CR+SE (n=50)		SE (n=49)		F		
		Mean	S.D.	Mean	S.D.	Time (T)	Group (G)	T × G
Antipsychotics medication (mg/day)[a]	pre	646.51	1011.32	423.42	295.42	0.346	0.935	0.158
	post	709.62	1070.67	427.30	293.21			
PANSS(Psychiatric Symptoms)								
Positive scale	pre	14.44	5.33	12.76	5.05	0.238	2.531	0.845
	post	13.52	5.24	12.61	5.57			
Negative scale	pre	18.50	5.73	15.51	5.70	0.116	0.080	0.815
	post	17.20	5.21	14.94	6.05			
General Psychopathology scale	pre	34.86	9.20	28.69	9.90	0.160	0.240	2.416
	post	31.86	9.26	28.41	10.70			
Total Score	pre	67.80	16.96	56.96	18.87	1.976	2.306	3.490[†]
	post	62.58	17.13	55.96	20.90			
LASMI[b] (Social Functions)								
Interpersonal relations	pre	18.50	8.88	15.00	7.46	0.596	0.107	11.695[**]
	post	14.40	8.24	14.71	7.38			
Working related behavior	pre	15.04	6.99	13.63	6.35	3.374[†]	7.437[*]	3.103[†]
	post	12.42	5.46	13.13	5.17			

** p<.01，* p<.05，† p<.10
a: CPZ equivalent dose b:LASMI:Life Assessment scale for the Mentally Ill c:JART:Japanese Adult Reading Test (b and c are available only in Japanese)

that the participants did not experience an increased burden by adding CR program. Therefore, we thought these results indicated CR and SE are feasible in Japan.

4.2. Improvement Effects of CR on Cognitive Functioning and Performance of Tasks

The significant improvement of verbal memories and speed of processing tasks in CR+SE group indicated that CR had favorable effect on these functioning tasks. The composite score, which is the average Z score of BACS-J subscales that indicates overall cognitive functioning, improved significantly in CR+SE group. This would mean that CR could raise the level of overall cognitive functioning. The research by McGurk *et al.*, which was the model for our research, demonstrated that CR improved the verbal memories, executive functioning, and overall cognitive functioning by pre-post comparison [14]. Using the randomized controlled trial of participants with comorbidity, they also demonstrated that CR improved the performance on tasks in addition to verbal memories and executive functioning [9]. Vauth *et al.* reported the effectiveness of CR using COGPACK on the attention and verbal memories [13]. Lindenmayer *et al.* showed the improvement of verbal memories and overall cognitive functioning [31]. As just described, most research on CR using COGPACK showed increased level of overall cognitive functioning and improved verbal memories. The

results of this study support these preceding studies. Moreover, this study emphasizes the close relationships between verbal memories and social functioning related to employment. The combination of CR using COGPACK and vocational support would be beneficial in Japan.

However, we did not find significant difference between the two groups in terms of the performance of tasks, which seems to be related to the cognitive functioning. At a glance, this result seems to indicate that bridging a gap between the cognitive functioning and vocational functioning was not effective. However, because the correct response rates of tasks at T1 were high in both two groups, it would be reasonable to assume that the ceiling effect caused this result. In other words, the tasks of job performance we used in this research were too easy for the participants to evaluate the capacity sensitively. It would be beneficial to assess the clients in vocational care by using not only the structured psychometric measures, but also the assessment tool for the performance of practical tasks. The choice of tools and the way to implement the test would be an issue in the future.

4.3. Improvement Effects of CR on Psychiatric Symptoms and Social Functioning

In CR+SE group, the interpersonal communication and executive functioning improved significantly in addition to the improvements in negative symptom and general

Table 3.   **Change in cognitive function and performance on a task from baseline (T1) to the 4th month (T2).**

(n=99)		CR+SE group (n=50)		SE (n=49)		F		
		Mean	S.D.	Mean	S.D.	Time (T)	Group (G)	T × G
BACS-J[d]								
Verbal Memory	pre	0.06	1.04	0.05	0.94	1.206	2.153	9.439[*]
	post	0.54	1.06	0.15	0.85			
Digit Sequencing	pre	0.04	1.03	0.03	1.03	1.796	2.655	5.544[*]
	post	0.27	1.03	-0.01	1.03			
Verbal Fluency	pre	0.11	1.04	-0.06	1.04	4.912[*]	3.966[*]	1.421
	post	0.49	1.09	0.13	1.09			
Token Motor	pre	-0.07	1.01	0.09	0.99	6.336[*]	1.107	6.685[*]
	post	0.47	0.92	0.20	0.88			
Symbol Coding	pre	-0.03	0.99	0.01	1.08	2.174	1.714	2.136
	post	0.25	1.06	0.11	1.08			
Tower of London	pre	0.14	1.05	-0.16	1.00	0.102	6.423[*]	0.319
	post	0.36	0.85	0.16	0.86			
Composite Scores	pre	0.06	0.67	-0.02	0.65	9.488[*]	6.136[*]	8.136[*]
	post	0.40	0.68	0.12	0.68			
NAB Maze Test[e]	pre	17.31	6.31	16.20	6.51	0.002	0.337	0.994
	post	18.08	6.41	17.41	6.40			
MWS Digit-Checking Task[f]								
The number of correct answers	pre	20.43	2.48	19.81	3.06	9.588[**]	9.154[**]	0.021
	post	21.29	1.97	20.54	2.46			
Average time to answer	pre	94.42	51.25	104.90	64.54	0.699	2.046	0.588
	post	78.50	25.35	87.80	53.89			
MWS Napkin-Folding task[g]								
The number of correct answers	pre	3.90	1.34	3.57	1.47	0.393	3.071[†]	0.693
	post	4.08	1.31	3.90	1.29			
Average time to answer	pre	47.23	29.22	42.17	19.67	2.923[†]	0.010	1.058
	post	36.38	19.84	36.03	15.01			

** p<.01， * p<.05， † p<.10

psychopathology. The review papers, including the meta-analysis of 26 RCTs by McGurk *et al.* [15], Medalia *et al.* [32], and Kurtz [33], described that CR does not strongly affect the reduction in psychiatric symptoms. The improvement in social activity appeared to reduce the psychiatric symptoms in this research. Thus, it is possible that the improvement in interpersonal communication and executive functioning resulted from the improvement in the neurocognitive functioning as a foundation of social functioning. Moreover, the bridging group could be an effective component of CR. In the bridging group, the participants discussed

how to play the game in computer training program or how to apply what they learned in the training to their actual life. Through this process, they would have created the relationships similar to a peer support because they taught and helped each other. This peer support type of relationship could have increased the social functioning.

4.4. Effects on Vocational Outcomes

In terms of vocational outcomes, the preceding research mentioned above, such as McGurk *et al.* [14], Vauth *et al.* [13], and Lindenmayer *et al.* [31], demonstrated

Table 4.   Occurrence frequency of obtaining employment and using employment assistance programs over 1 year.

	CR+SE		SE		X^2
	N	**%**	**N**	**%**	
Competitive Employment	7	15.2	7	14.9	0.002
Disability Employment	12	25.5	9	19.1	0.552
Internship Programs for Person with a Disability (in a community)	1	2.1	9	19.1	7.162[**]
Vocational Rehabilitation Programs (in facilities)	45	95.7	44	93.6	0.211

** $p < .01$

Table 5.   Number of days for obtaining employment and using employment assistance programs and total wage over 1 year.

	CR+SE group			SE			F
	N	**Mean**	**S.D.**	**N**	**Mean**	**S.D.**	
Competitive Employment	47	18.53	(57.49)	47	20.06	(63.37)	0.937
Disability Employment	47	45.57	(91.66)	44	20.59	(65.61)	0.932
Internship Programs for Person with a Disability (in a community)	46	1.24	(8.40)	47	11.70	(32.62)	1.177
Vocational Rehabilitation Programs (in facilities)	45	302.40	(113.98)	44	271.68	(137.57)	1.835
Total wage income (yen)	43	232,639	344,783	44	187,032	362,943	1.097

that CR+SE group showed significantly more favorable results compared to SE only group regarding the employment rate, amount of employed time, and earned wage. On the other hand, we did not find a significant difference between two groups, except the rate of use of internship programs by a person with a disability in a community. SE group showed significantly higher rate of the use of internship program compared to CR+SE group (Chi square = 7.162, p<.05). These results could have emerged for several reasons. First, the employment specialists were unfamiliar with vocational support based on SE program. Second, the implementation of individualized care would be insufficient. SE program is not provided to groups inside facility; instead, it is an individualized care provided in a community setting. The rates of participants using vocational rehabilitation programs in facilities were high in both groups (96.3% for SE group, 95.7% for CR+SE group). In the programs offered in facility, most participants would have attended social skills training programs in groups. If these programs were provided with the individualized vocational supports, they would be effective on vocational outcomes. However, because much time and resources for care were used for the program in facilities, the implementation of individualized care became insufficient. Third, duration of follow up was too short to find significant outcomes. In Japan, it is still uncommon for people with mental illness to have a competitive job in community. In such circumstance, one year was too short for immature SE to achieve the results. It would be necessary for us to extend the follow up period, just as McGurk *et al.* who followed up participants from two to three years in their study.

The significant differences in the rate of the use of internship programs by a person with a disability in a community are discussed below.

4.5. Limitations

This study has several limitations.

First, since the recruitment and intervention period was different in two groups in order to reduce the burden of service providers, significant differences between the two groups emerged at baseline in terms of age, psychiatric symptoms, and social functioning. Though this research controlled for these variables statistically, it would be necessary to conduct stratified randomization, controlling for age or other basic characteristics in future research.

Second, the period of the evaluation of clinical outcomes was the fourth month from baseline in each group. It is controversial whether the first four months of SE group is appropriate for control period. Because SE was not provided for CR+SE group in the first four months. The desirable design was as bellow:

(a) SE was provided in the first four months for CR+SE group as same as SE group

(b) SE was not provided in the first four months for SE group as same as CR+SE group

However, (a) method considered the increase in participants' burden. On the other hand, dropouts were considered in (b) method because the participants had to wait for four months before the start of the intervention. Furthermore, this

method contradicts the IPS principle that the placement in worksite or community has to be done as soon as the provider contacts the clients. Therefore, despite the limitations regarding control group setting, we thought that the method we adopted was better than (a) or (b).

Third, the overall period of intervention differed between two groups. Because SE was not provided to CR+SE group during the CR period, the total duration of intervention in CR+SE group must have been longer than the intervention in SE group to make the SE period same in both two groups. It was possible to set one year from baseline as an overall intervention period in both groups. However, since we set the intervention time in CR+SE group as one year, including the CR program, there were only eight months of vocational support because SE was not provided in CR period, as mentioned before. It was too short for SE to achieve the results. In order to make the duration of the primary outcome interval the same in both groups, we resigned to different intervention periods.

Fourth, all of the participants who enrolled in first half of assignment period in each agency were assigned into SE group while the other half of participants was assigned to CR+SE group. If we changed the order of the assigned group randomly, we could have reduced the confounding bias. However, we gave up random assignment because of the low level of proficiency of service providers. In fact, the use rate of the internship programs by a person with a disability in a community was significantly higher in SE group (n = 9, 19.1%) compared to CR+SE group (n = 1, 2.1%). This result could be interpreted that the improvement in participants' functioning brought by CR program reduced the use of the sheltered internship programs. Moreover, place and train philosophy of IPS would have prevailed during the research period. To reduce the ambiguity of interpretation, the training opportunity should be created, and trained service providers should conduct future research.

CONCLUSIONS

Even though this study has several limitations, as mentioned above, this is the first controlled study to determine the effectiveness of CR on vocational outcomes in Japan. This study demonstrated the following findings

1) Programs using CR and SE are feasible in Japan.

2) CR using COGPACK improve cognitive functioning such as verbal memories, working memories, speed of processing tasks and overall cognitive functioning. These results are consistent with past studies.

3) CR using COGPACK also improve psychiatric symptoms and social functioning in interpersonal relationships.

4) We did not find any significant effect of CR on the vocational outcomes. As a reason of this result, the followings were able to be considered (a: The insufficiency of actual experiments of the employment specialists, b: The insufficiency in the implementation of individualized care, c: The shortage of follow-up period)

Mura *et al.* [34] reviewed the historical transition about the course and progressive hypothetical cognitive deficit of schizophrenia. They pointed out a growing interest in the influence of cognitive function on daily living skills or social function of people with schizophrenia and treatment programs that targeted improvement of cognitive deficit of them such as cognitive remediation. And Burns *et al.* [35] demonstrated that supported employment have an beneficial effects not only in working related outcome but in clinical and social function. These issues will be more and more important in Japanese mental health system.

The findings of the present research contribute to the vocational support for the people with mental illness in Japan. It is necessary to continue to refine and improve the research design as well as to seek more effective and efficient way of support.

CONFLICT OF INTEREST

The author(s) confirm that this article content has no conflicts of interest.

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