International journal of child development and mental health
ISSN 2286-7481 *Vol. 6 No. 1 January – June 2018 (42-54)*

The Development and Effectiveness of an Integrative Cognitive Rehabilitation Program for Persons with Schizophrenia

Ponthip Thammawong (M.N.S., APN)[1] , Kittisak Viboonma (MD, The Diploma of Thai Board of Psychiatry)[2]
Jerapun Suriyong (M.N.S., APN)[2], Thipkritta Pinkam (B.S)[2], Assoc.Prof. Dr. Patraporn Tungpunkom (PhD.)[3]
Assoc.Prof. Dr. Maethisa Pongsaksri (PhD.)[4]
[1]Rajanagarindra Institute of Child Development, Chiang Mai, [2]Suanprung Hospital, Chiang Mai
[3]Faculty of Nursing, Chiang Mai University, [4]Faculty of Associated Medical Sciences, Chiang Mai University
Corresponding author: beautynai@gmail.com

Abstract

This research and development study aimed to develop and test the effectiveness of an integrative cognitive rehabilitation program for persons with schizophrenia. The study consisted of four main steps. The first step was situation analysis of cognitive impairment and treatment for persons with schizophrenia. Relevant documents and focus group interviews with schizophrenic patients, caregivers, healthcare providers and experts were collected for the content analysis. These findings were used to establish a first draft program in the second step. Content validity was tested, with an Index of Item-Objective Congruence of 0.77. The second draft program was developed by adjusting the first draft, and then was pilot tested and adjusted again to become the third draft. In the third step, the third draft was tested for its effectiveness on cognition, attention, memory, executive functions, and personal and social performance in 32 persons with schizophrenia. Outcome measures were the Montreal Cognitive Assessment, the Attention Assessments, Thai Cognitive-Perceptual Test, the Loewenstien Occupational Therapy Cognitive Assessment, and the Personal and Social Performance Scale - Thai version. Data were analyzed using descriptive statistics, two-way ANOVA, paired t-test, Kruskal-Wallis, Dunn's test, and two-way repeated measures ANOVA. The last step involved evaluation of the third draft after effectiveness testing, and program adjustment for the final program. Theprogram comprised 15 daily, 60-minute group sessions. The experimental group had significantly higher post-intervention scores of cognition, auditory memory, and executive functions from the baseline; and had significantly higher executive functions than the control group. The experimental group had significantly higher scores of personal and social performance from the baseline to weeks 4 and 12 follow-up; and higher than the control group at weeks 4 and 12. The findings support the utility of a program in cognitive rehabilitation and relapse prevention for persons with schizophrenia .

Keywords : Integrative cognitive rehabilitation program, Persons with schizophrenia

Introduction

Schizophrenia is a chronic disease leading to patients' cognitive impairment. Several western studies (Pillet et al., 2015) and 98% (Keefe & Harvey, 2012) reported that 70-80 % of persons with schizophrenia had cognitive impairment. In Thailand, prevalence of cognitive deficit in schizophrenic patients visiting the outpatient department of Srinakarin Hospital, Khonkhan Province was 81.3% (Arunpongpaisal & Sangsirilak, 2013), and that of patients in

Suanprung Hospital was 90 % (Schizophrenia Patient Care Team of Suanprung Hospital, 2013). In addition, a study found that the mean score of executive function of schizophrenic patients admitted to Suansaranrom Hospital, Suratthani Province was lower than the normal score (Koomphai, 2015). Cognitive impairment involves declines in attention, memory, speech, and executive functions (Goldberg et al.,1993) which include organizing, prioritizing, memorizing, set shifting, and self - monitoring (West, Choi, & Travers, 2010). These lead to many behavior problems such as self - care deficit, ineffective problem solving, and particularly, difficulties in numerous psychosocial treatments (individual, group or other therapies) provided by psychiatric nurses, occupational therapists and clinical psychologists. Thus, cognitive rehabilitation might be an essential strategy in improving cognition in schizophrenia.

Over the last several decades, various strategies and techniques focusing on cognitive rehabilitation for persons with schizophrenia have been trialled. These included cognitive remediation therapy (CRT), neurocognitive enhancement therapy (NET), advanced training of attention, memory, and critical thinking (Krabbendam & Aleman, 2003; Wykes, Huddy, Cellard, McGurk, & Czobor, 2011). In terms of an integrative approach, evidence showed that a neuropsychological educational approach to rehabilitation (NEAR), focusing on repeated cognitive training along with a strategy - coaching approach, could improve patients' understanding of disease and self-care (McGurk, Twamley, Sitzer, McHugo, & Mueser, 2007); while CRT combined with functional skills training could enhance their cognition and functional skills (Bowie, McGurk, Mausbach, Patterson, & Harvey, 2012). As reviewed however, an integrative cognitive rehabilitation program based on a CRT, NET and NEAR approach has not been found. Such an integrative program would improve not only patients' cognition and social skills, but also program coaching strategy. The program also totally related to schizophrenic patients' needs (Velligan, Kern, & Gold, 2006). Therefore, this study was designed to develop an integrative cognitive rehabilitation program for persons with schizophrenia using the CRT, NET and NEAR approach as a conceptual framework. Conducting program development is the main role of advanced psychiatric nurses, who integrate empirical evidence, research results, psychiatric nursing knowledge, and multidisciplinary knowledge to establish innovation for care of patients requiring bio-psycho-social rehabilitation (Pliankerd, 2014). This program was group-based to encourage patients to share their experiences and opinions with others. A newly developed program of 15 sessions was considered to be the most effective number of sessions (Krabbendam & Aleman, 2003), and is also suitable for the duration of rehabilitation in hospital. It was expected that the program could prevent relapse, as well as enhance patients' effective coping mechanisms, self-care and quality of life. Moreover, knowledge derived from this program development might serve as a guideline in developing programs for promoting cognition in particular executive functions among children and teenagers, including the healthy and unhealthy populations. Healthcare providers should assess their executive function capacity and then integrate cognitive improvement activities into their daily life activities. This contributes to quality growth and development, a decrease in behavior problems, and mental illness prevention among the child population ultimately.

Objectives

1. To analyze situations of cognitive impairment and treatment for persons with schizophrenia admitted to Suanprung Hospital, Chiangmai.

2. To develop an integrative cognitive rehabilitation program for persons with schizophrenia.

3. To test the effectiveness of an integrative cognitive rehabilitation program for persons with schizophrenia on cognition, attention, memory, executive functions, and personal and social performance.

Methods

The study employed a research and development (R&D) design consisting of four main steps: 1) analyzing the situation of cognitive impairment and treatment for persons with schizophrenia; 2) establishing, piloting and adjusting the program; 3) testing the effectiveness of the program; and 4) evaluating and improving the program as shown in Figure 1. The procedures of conducting research and data collection were as follows:

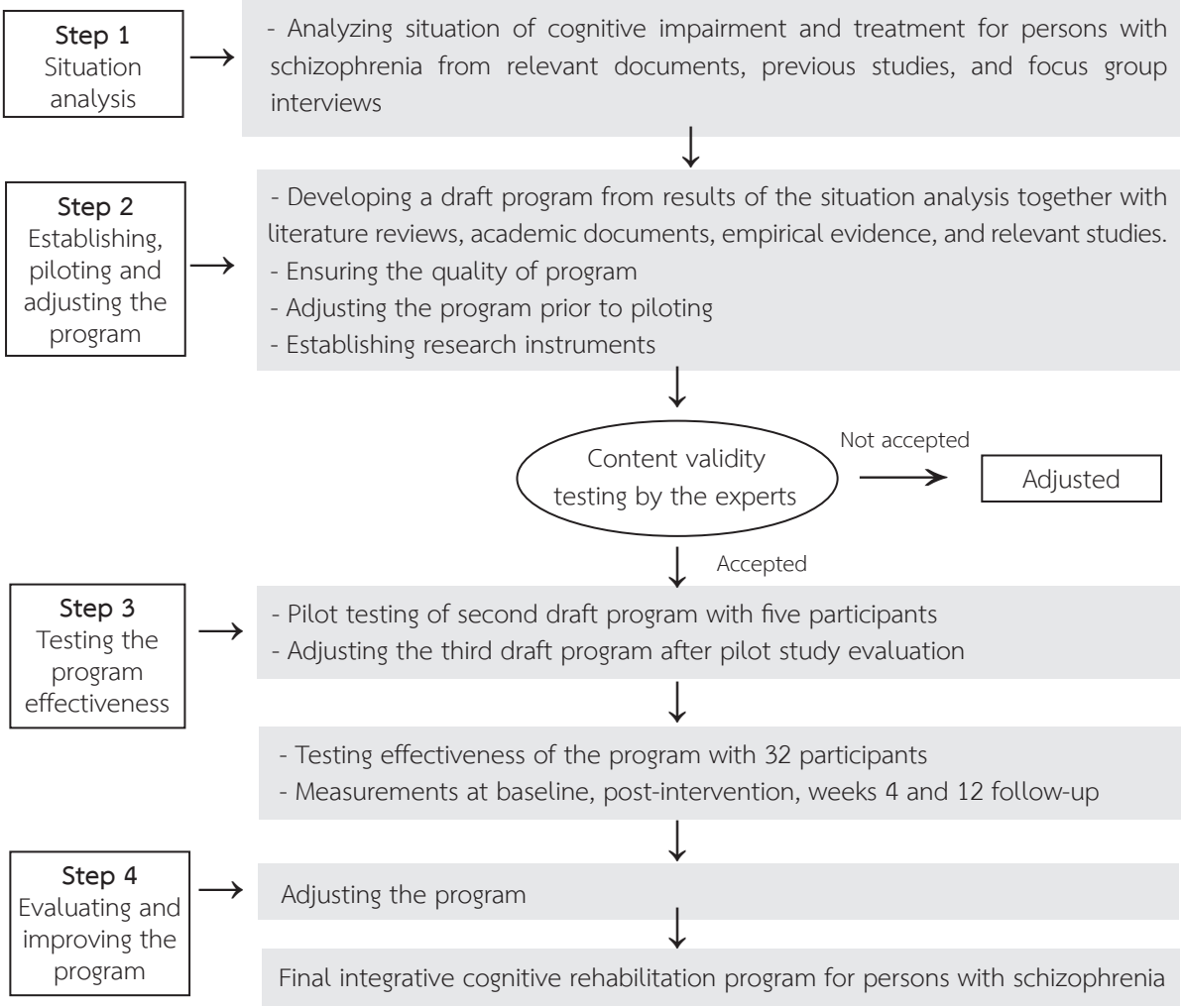

Figure 1: Procedure of developing the integrative cognitive rehabilitation program for persons with schizophrenia

Step 1: analyzing the situation of cognitive impairment and treatment for persons with schizophrenia admitted and discharged from hospital.

The situation was analyzed using relevant documents, previous studies, and focus group interviews There were four participant groups taking part in the focus group interviews: A.) six schizophrenic patients; B.) six caregivers; 3) six healthcareproviders comprising a psychiatrist, two psychiatric nurses, a psychologist, a social worker, and an occupational therapist; and 4) six psychiatry experts. All data was analyzed and summarized to outline a conceptual framework of the study.

Step 2: Developing the integrative cognitive rehabilitation program.

The first draft program was developed using results of the situation analysis together with literature reviews, academic documents, empirical evidence, and relevant studies. The procedures of first draft program development were as follows:

Outlining the structure of program contents including topics, objectives, and activities.

The CRT, NET, and NEAR approaches combined with the findings from four focus group interviews, were used to establish the program contents aiming to help persons with schizophrenia improve their cognition, self-care, emotion management, and problem solving in daily life, social skills, and effective communication. The first draft program consisted of 15 sessions: A.) establishing relationship skill; B.) observing warning signs for skill relapse; C.)compliance with treatment skill; D.) medication management skill; E.) coping and seeking social support skills; F.) self-care for daily living and chores skills; G.) cooking and cleaning skills; H.) safe food consumption and exercise skills; I.) planning and goal attainment skills; J.) emotion and stress management skills; K.) working and community participation skills; L.) communication and assertiveness skills; M.) daily expense planning skill; N.) time management skill; and O.) integrating all skills into real life.

Testing content validity of the program.

The first draft program was tested for content validity using five experts in schizophrenia treament, as well as the CRT, NET, and NEAR approaches (psychiatrist, nurse lecturer, occupational therapy lecturer, psychologist, and registered nurse). The experts rated items regarding how well they suited the established objectives and checked for clarity of language. The Index of Item-Objective Congruence (IOC) was 0.77. The first draft program was adjusted according to the experts' suggestions and then a valid second draft program was considered.

Piloting the program.

The pilot testing of a second draft program was conducted in fivepersons with schizophrenia whose characteristics were eligible for inclusion criteria. All of them stayed at Thanu psychiatric ward, Suanprung Hospital in August 2016. The purpose of the pilot study was to determine how best to deliver the program in a real situation in terms of accuracy and clarity of content, as well as appropriateness of teaching media. After adjustment, the third draft program was obtained for further effectiveness testing.

Step 3: Testing effectiveness of the program.

This step was undertaken by the principal researcher and co-researchers.

Participants and procedures:

The third draft program was tested in persons with schizophrenia admitted to the inpatient psychiatricward, Suanprung Hospital from April to May 2017. The inclusion criteria for the study were as follows:

A.) being diagnosed by a psychiatrist as havingschizophrenia following the ICD-10 and

no comorbidity of physical diseases; B.) being aged 18 - 60 years; C.) having scores lower than 18 on the Brief Psychiatric Symptoms Scale (BPRS); D.) no history of substance use; E.) understanding the Thai language; and F.) willing to participate in the study. These were based upon a previousstudy examining the effect of attention training on information processing in schizophrenia patients (Benedict et al., 1994). The mean and standard deviation for the outcome in the experimental group were 60.7 and 17.5; and those in the control group were 58.4 and 19.0. With a two-sided 0.05 significance level (type 1 error) and the minimum acceptable power level of 0.80 A sample size of 14 participants per group would be required. Anticipating a dropout rate of 10 % (Grove, Burn, & Gray, 2013), 16 participants would need to be recruited in each group or a total of 32 participants.

Potential participants who met the inclusion criteria were recruited to the study. All 32 consenting participants were allocated to either the experimental group or the control group using simple random sampling. The two groups were tested for homogeneity of their demographic characteristics. There was no significant difference between the experimental and control groups for the mean of each variable ($p > .05$). Participants in the experimental group were divided into two groups with eight participants in each group. Each group received the third draft program which was comprised of 15 daily, 60-minute sessions. Participants in the control group received the usual treatment of ward inpatients for two weeks. The treatments provided included: A.) psycho-education aiming to increase patients' knowledge about their illness, medication, follow-up visit, and referral; and B.) group activity therapy such as a social skills group and an occupational therapy group.

Outcome measures:

Four outcome measures (cognition, attention, memory, and executive functions) were collected prior to commencing the program (baseline measurement) and then immediately on completion of the program by the following:

- *The Montreal Cognitive Assessment (MoCA).* The MoCA was used to measure participants' cognitive function.
- *The Attention Assessments.* The measures consist of trial making test part A, trial making test part B, and total timetest.
- *Thai Cognitive-Perceptual Test (Thai-CPT),* part 4 (memory part). The Thai-CPT part 4 consists of auditory memory with the Thai alphabet (CPT1), visual memory with the Thai alphabet (CPT2), auditory memory with objects (CPT3), visual memory with objects (CPT4), and memory with photos of everyday life (CPT5).
- *The Loewenstien Occupational Therapy Cognitive Assessment (LOTCA),* thinking operation area. The LOTCA was used to measure executive functions of participants. It includes categorization (CA), unstructured riska object classification (RocUn), structured riska object classification (RocS), pictorial sequence A (PS1), pictorial sequence B (PS2), geometrical sequence (GS), and logic thinking (LQ).
- *The Personal and Social Performance Scale-Thai version (Thai-PSP).* The Thai-PSP was administered prior to commencing the program and then at weeks 4 and 12 after program completion.
- *The procedure of testing the effectiveness of the program,* as detailed above, is illustrated by Figure 2.

Data analysis:

Prior to data analysis, a Kolmogorov-Smirnov test was used to test the normality of distributed scores of outcomes. A detailed data analysis was as follows:

- Demographic data was analysed using descriptive statistics including frequency, percentage, mean, standard deviation. Chi-square test or Fisher's

exact test or independent t-test were used to examine differences in demographic data between the experimental and control groups.

- A two-way ANOVA was used to examine differences in the mean scores for cognition, attention, memory (CPT1 and CPT2), and executive functions (CA, RocUn, RocS, PS2, and LQ) between the experimental and control groups. A paired t-Test was used to examine differences in the mean scores for cognition, attention, memory (CPT1 and CPT2), and executive functions (CA, RocUn, RocS, PS2, and LQ), within the experimental and control groups. A Kruskal-Wallis One-way ANOVA was used to examine differences in the mean scores for memory (CPT3, CPT4, and CPT5) and executive functions (PS1 and GS) between the experimental and control groups. A Dunn's Test was used to examine differences in the mean scores for memory (CPT3, CPT4, and CPT5) and executive functions (PS1 and GS), within the experimental and control groups.
- A two-way repeated measures ANOVA was used to examine differences between the experimental and control groups for change over time in mean scores of personal and social performance (PSP)

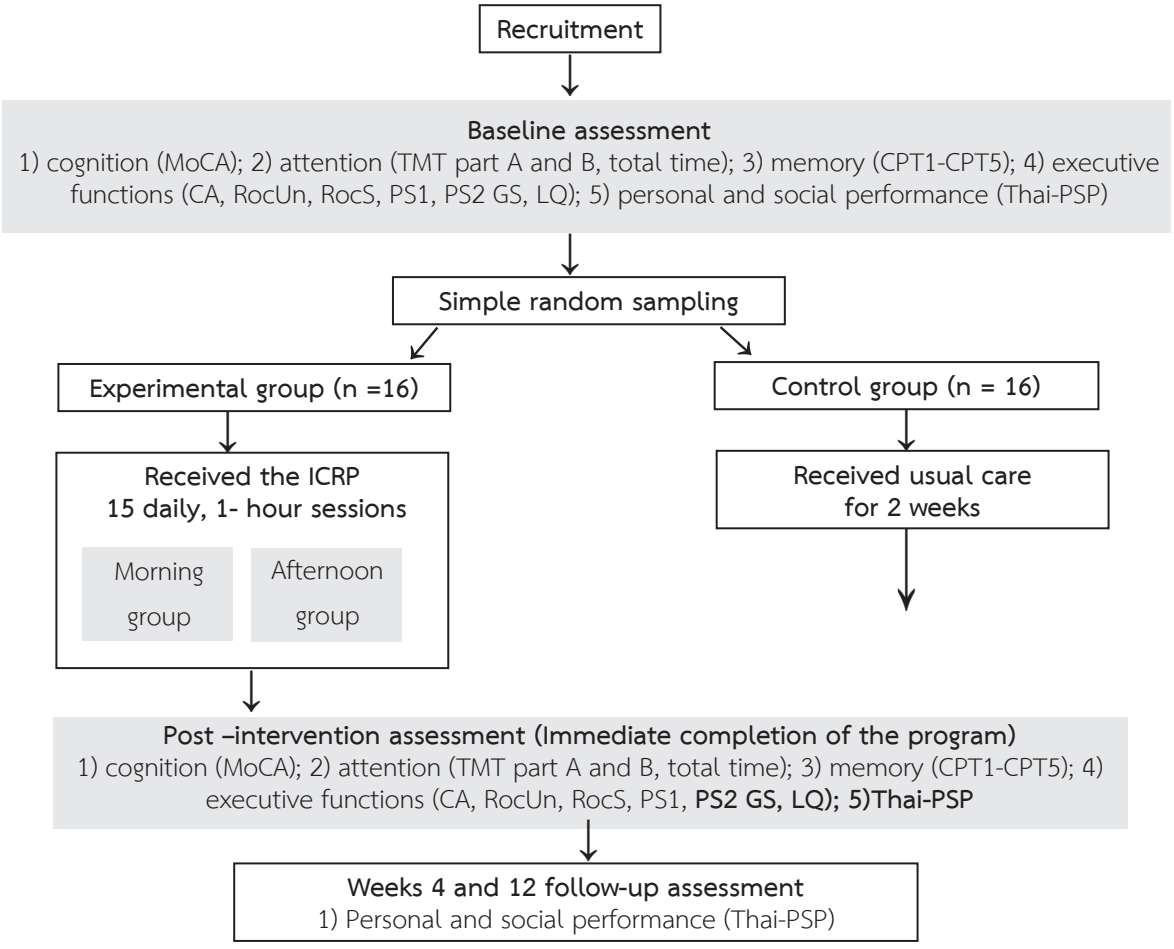

Figure 2: The procedure of testing the effectiveness of the program

Step 4: Evaluating and improving the program. This was the final step involved in program evaluation, after effectiveness testing. This enabled the program to suit cognitive rehabilitation for persons with schizophrenia. Evaluation of the program was considered by the following aspects: 1) the experimental group had higher scores ofcognition, attention, memory, and executive function than the control group, as compared to the baseline; 2) the experimental group had higher scores of personal and social performance than the control group at all-time points, as compared to the baseline.

Results

The integrative cognitive rehabilitation program for persons with schizophrenia development had good content validity, with an IOC of 0.77. The program was comprised of 15 daily, 60-minute group sessions. The 15 sessions were: 1) establishing relationship skill; 2) observing warning signs for skill relapse; 3) compliance with treatment skill; 4) medication management skill; 5) coping and seeking social support skills; 6) self-care for daily living and chores skills; 7) cooking and cleaning skills; 8) safe food consumption and exercise skills; 9) planning and goal attainment skills; 10) emotion and stress management skills; 11) working and community participation skills; 12) communication and assertiveness skills; 13) daily expense planning skill; 14) time management skill; and 15) integrating all skills into real life. Results of examining program effectiveness are concluded as follows :

Demographic characteristics of participants. The mean age of the experimental group participants (n = 16) was 40.81 years (SD = 9.39), while that of the control group participants (n = 16) was 40.13 years (SD = 9.39). Half of all participants were males and employees. All the control group participants and 81.3% of the experimental group participants were single. The number of experimental group participants who finished Grade 6 of elementary school, Grade 9 of secondary school, and a vocational diploma were equal (26.7%). The number of control group participants who finished Grade 6 of elementary school and Grade 9 of secondary school were equal (40%). Average duration of illness of all participants was 4.0 years (SD = 4.3). The majority of participants in the experimental group took both typical and atypical antipsychotic drugs (75%), while only 43.8% of experimental group participants did so. Mean scores of psychiatric symptoms, measured using the BPRS for the experimental and control groups, were 1.19 (SD = 1.47) and 1.31 (SD = 1.58), respectively. There was no significant difference between the experimental and control groups for the mean of each variable ($p > .05$).

The mean post-intervention scores of cognition, auditory memory (CPT3), and executive functions (CA, RocUn, RocS, PS1, PS2 and GS) in the experimental group significantly increased, compared to the baseline ($p = .01$). The experimental group had higher post-intervention scores of executive functions (PS2 and LQ) than the control group. The results are presented in Tables 1 and 2).

Table 1: Differences in Mean Scores of Cognition, Attention, Memory, and Executive Functions at Baseline and Post-intervention in the Experimental Group

Outcomes	Baseline		Post-intervention		Statistic test value	p-value
	mean	S.D.	mean	S.D.		
Cognition	15.75	4.04	23.62	5.23	-4.76t	.000

Table 1: Differences in Mean Scores of Cognition, Attention, Memory, and Executive Functions at Baseline and Post-intervention in the Experimental Group (Cont.)

Outcomes	Baseline		Post-intervention		Statistic test value	p-value
	mean	S.D.	mean	S.D.		
Attention						
TMTA	1.44	0.94	1.26	1.17	1.067t	.303
TMTB	1.54	1.08	1.21	9.93	1.656t	.119
Total time	10.06	4.15	9.33	1.74	.803t	.435
Memory						
CPT1	3.44	1.93	3.06	1.94	.686t	.503
CPT2	2.94	1.806	3.06	1.84	-.204t	.841
CPT3					-2.238w	.025
CPT4					.000w	1.00
CPT5					-1.134w	.257
Executive functions						
CA	2.50	1.033	3.06	1.063	-3.576t	.003
RocUN	2.88	1.088	3.44	1.094	-3.093t	.007
RocS	3.00	1.155	3.81	1.223	-3.896t	.001
PS1					-2.714w	.007
PS2	2.31	1.078	2.94	.772	-3.478t	.003
GS	2.19	1.109	2.75	1.183	-3.093t	.007
LQ	1.56	1.365	2.06	1.289	-1.826t	.088

t = paired t – test, w = Wilcoxon signed-ranks test

Table 2: Difference in Cognition within Each Group and Between The Experimental and Control Groups

Variables	SS	df	MS	F	p-value
Cognition					
Within subject					
Time	129.39	1	129.39	48.54	.000**
Time x group	70.14	1	70.14	26.31	.000**
Error	79.96	30	2.66		
Between subject					
Group	534.76	1	534.76	545.53	.000**
Error	1174.21	30	39.14	13.16	.001**

a = Sphericity Assumed, was used to adjust the degree of freedom. $p^{**} < .01$, $p^{*} < .05$

3) The mean score of personal and social performance (PSP) in the experimental group increased significantly from the baseline to weeks 4 and 12 follow-up (p =.000). The experimental group had significantly higher personal and social performance (PSP) scores than the control group at weeks 4 and 12 after program completion, compared to the baseline (p = .000). The results are presented in Tables 3 and 4).

Table 3: Difference in Personal and Social Performance within Each Group and Between The Experimental and Control Groups

Variables	SS	df	MS	F	p-value
Cognition					
Within subject					
Time	21429.17a	2	10714.58	84.24	.000**
Time x group	2045.43	2	1022.71	8.041	.001**
Error	7376.56	58	127.18		
Between subject					
Group	5664.31	1	5664.31	18.38	.000**
Error	8936.20	29	308.14		

a = Sphericity Assumed, was used to adjust the degree of freedom. $p^{**} < .01$, $p^{*} < .05$

Table 4: Difference in Personal and Social Performance Between The Experimental and Control Groups at all- time points

Groups	Baseline (1) Mean (S.D.)	4-wk Follow-up (2) Mean (S.D.)	12-week Follow-up (3) Mean (S.D.)	p-value (1) VS (2)	(1) VS (3)	(2) VS (3)
Experimental Group	42.88 (10.27)	86.25 (8.46)	83.12 (14.12)	.000	.000	.216
Control Group	40.40 (8.95)	65.67 (22.02)	59.33 (13.99)			

Discussion

The results can be discussed following the study objectives as follows:

The situation of cognitive impairment and treatment for persons with schizophrenia

The findings revealed that 90 % of persons with schizophrenia admitted to Suanprung Hospital had impairment of memory attention and executive functions (Schizophrenia Patient Care Team of Suanprung Hospital, 2013). Consistent with this, the study conducted at Srinakarin Hospital, Khonkhan Province found a cognitive deficit in 81.3% of schizophrenic patients (Arunpongpaisal & Sangsirilak, 2013 In addition,

caregivers and healthcare providers lacked knowledge about how to care for persons with schizophrenia, and had negative attitudes toward them, such as lack of self-responsibility, ineffective coping mechanisms, self-care deficit, and lack of social participation. In terms of the experts, they suggested that research on cognitive development for this population is needed in order to help them reach their full potential, reduce burden of care and live happily. They suggested that the cognitive rehabilitation program should focus on regular and repeated practices, be under the supervision of experienced trainers, incorporate various patient - oriented activities, and utilize empirical evidence.

Development of the integrative cognitive rehabilitation program for persons with schizophrenia

To ensure validity and quality of the program, the following procedures were undertaken : 1) the program was developed using research and development research design; and the program content was based on problems and needs of persons with schizophrenia. Following improvement, the Index of Item-Objective Congruence (IOC) was 0.77. This indicated that topics and activities of the program were congruent with its objectives and evaluation (Saiyod & Saiyod, 2010) the program was divided into suitable sub-topics, with concise and clear contents as well as evaluation worksheets; 3) Activity sequences began with easy to difficult levels, and simple to complex levels; 4) the program contents were up-to-date, realistic, and daily living-focused; 5) various teaching strategies such as demonstration, role playing, games, and real-life practice were used in the program; 6) the number of group members and time spent for each group were appropriate; 7) the group process emphasized members' participation, self-practice, sharing of experience and opinions, and giving encouragement and support. The participants could apply knowledge and practices they had learned from participating in the program to their daily living. Therefore, the program might be suitable for discharge planning in people with schizophrenia.

Effectiveness of the integrative cognitive rehabilitation program for persons with schizophrenia

The program significantly improved cognition, auditory memory, executive functions, and personal and social performance in the experimental group participants. This could be explained by the contents of the program being based on up-to-date psychiatric nursing and multidisciplinary knowledge, as well as cognitive rehabilitation approaches, and focused on important self-care and daily living skills training. In addition, well-ordered activities and repeated practices perhaps improve the participants' brain capacity and personal and social performance. This is consistent with the findings of prior studies in persons with schizophrenia, which showed significant improvements in executive functions, memory and personal and social performance (Bell, Bryson, Greig, & Friszdon, 2005; Bell, Fiszdon, Bryson & Wexler, 2004), and a decrease in psychotic symptoms (Gharaeipour & Scott, 2012) in particular, negative symptoms (Liu et al., 2017). Previous studies also demonstrated that schizophrenic parents who had good self-care could look after their children effectively (Taylor, 2011); and that there was no difference of attachment style between schizophrenic mothers and healthy ones (Hatam, 2015). Moreover, it is worth noting that participants' personal and social performances persist beyond completion of the program, for up to 3-months (week 12). This is consistent with a study (Tan & King, 2013) who reported that beneficial impact of cognitive remediation on functional outcomes in persons with schizophrenia could endure for up to 1-year. Thefindings of the present study might result from the specific activities of the program and effective

group process, which emphasized sharing experiences and mental support of each other. This supported the results of previous studies demonstrating that people with schizophrenia had learned to change their behaviors through three components: powerful activities, clear teaching strategies, and good support (Chien, Chan, & Thamson, 2006; Kern, Glynn, Horan, & Marder, 2009); this contributed to improvement in personal and social performance among this population.

Implications and suggestions for future research

1. Psychiatric nurses and healthcare providers should use the integrative cognitive rehabilitation program for enhancing cognitive functions and personal and social performance in persons with schizophrenia.
2. Nurse administrators of tertiary psychiatric hospitals should promote utility of the integrative cognitive rehabilitation program along with usual care in discharge planning.
3. It is recommended that future research addresses the longer term effect of the program by extending follow-up periods beyond 3 months.
4. It is also suggested that the program be used to investigate other populations who need continuous improvement of their cognition, such as older persons with brain or cerebrovascular diseases, and in particular, children. The program might be able to develop executive functions of children, and consequently lead to appropriate life skills as well as prevention of behavioral problems and mental illness among this population group

Acknowledgement

This study was funded by the National Research Council of Thailand through The Department of Mental Health for the fiscal year 2017.

References

Arunpongpaisal, S., & Sangsirilak, A. (2013). Using MoCA-Thai to evaluate cognitive impairment in patients with schizophrenia. *Journal of the Medical Association of Thailand, 96*(7), 860-865. (in Thai).

Bell, M. D., Bryson, G. J., Greig, T. C., Fiszdon, J. M., & Wexler, B. E. (2005). Neurocognitive enhancement therapy with work therapy: productivity outcomes at 6-and 12-month follow- ups. *Journal of rehabilitation research and development, 42*(6), 829-838.

Bell, M. D., Fiszdon, J., Bryson, G., & Wexler, B. E. (2004). Effects of neurocognitive ehancement therapyin schizophrenia: normalisation of memory performance. *Cognitive neropsychiatry, 9*(3), 199-211.

Benedict, R. H., Harris, A. E., Markow, T., McCormick, J. A., Nuechterlein, K. H., & Asarnow, R. F. (1994). Effects of attention training on information processing in schizophrenia. *Schizophrenia Bulletin, 20*(3), 537-546.

Bowie, C. R., McGurk, S. R., Mausbach, B., Patterson, T. L., & Harvey, P. D. (2012). Combined cognitive remediation and functional skills training for schizophrenia: effects on cognition, functional competence, and real-world behavior. *American Journal of Psychiatry, 169*(7), 710-718.

Chien, W. T., Chan, S. W., & Thompson, D. R. (2006). Effects of a mutual support group for families of Chinese people with schizophrenia: 18-month follow - up. *The British journal of psychiatry, 189*(1), 41-49.

Gharaeipour, M., & Scott, B. J. (2012). Effects of cognitive remediation on neurocognitive functions and psychiatric symptoms in schizophrenia inpatients. *Schizophrenia research, 142*(1-3), 165-170.

Goldberg, T. E., Torrey, E. F., Gold, J. M., Ragland, J. D., Bigelow, L. B., & Weinberger, D. R. (1993). Learning and memory in monozygotic twins discordant for schizophrenia. *Psychological Medicine, 23*(1), 71-85.

Grove, S. K., Burns, N., & Gray, J. (2013). *The practice of nursing research: Appraisal, synthesis, and generation of evidence.* St. Louis, MO: Elsevier/Saunders.

Hatam, S. (2015). Comparison of Attachment Styles in Children of Mothers with Schizophrenia and Normal Offspring. *European Psychiatry, 30*, 1732.

Keefe, R. S., & Harvey, P. D. (2012). Cognitive Impairment in Schizophrenia. *Novel Antischizophrenia Treatments, 213*, 11-37.

Kern, R. S., Glynn, S. M., Horan, W. P., & Marder, S. R. (2009). Psychosocial Treatments to Promote Functional Recovery in Schizophrenia. *Schizophrenia Bulletin, 35*(2), 347-361

Koomphai, A. (2015). Executive problem solving and planning by tower of London-Drexel University (TOLDXTM)2nd Edition of Psychiatric Inpatients at Suansaranrom Psychiatric Hospital, SuratThani. *Journal of Clinical Psychology, 46*(2), 1-13. (in Thai).

Krabbendam, L., & Aleman, A. (2003). Cognitive rehabilitation in schizophrenia: a quantitative analysis of controlled studies. *Psychopharmacology,169*(3-4),376-382.

Liu, D., Ji, C., Zhuo, K., Song, Z., Wang, Y., Mei, L., ... & Zhu, G. (2017). Impaired cue identification and intention retrieval underlie prospective memory deficits in patients with first-episode schizophrenia. *Australian & New Zealand Journal of Psychiatry, 51*(3), 270 - 277.

McGurk, S. R., Twamley, E. W., Sitzer, D. I., McHugo, G. J., & Mueser, K. T. (2007). A meta-analysis of cognitive remediation in schizophrenia. *American Journal of Psychiatry, 164*(12),1791-1802.

Pillet, B., Morvan, Y., Todd, A., Franck, N., Duboc, C., Grosz,A., ... & Amado, I. (2015). Cognitive remediation therapy (CRT) benefits more to patients with schizophrenia with low initial memory performances. *Disability and rehabilitation, 37*(10), 846-853.

Pliankerd, P. (2014). The competency of psychiatric nursing in the practice of nursing. *Journal of the Royal Thai Army Nurses, 15*(1), 18-21. (in Thai).

Polit-O'Hara, D., & Beck, C. T. (2006). *Study guide to accompany Essentials of nursing research: Methods, appraisal and utilization.* Philadelphia: Lippincott Williams & Wilkins.

Saiyod, L., & Saiyod, A. (2010). Educational Research Technique. Bangkok: Suveeriyasarn.

Schizophrenia Patient Care Team of Suanprung Hospital. (2013). *Situation analysis report of persons with schizophrenia*. Unpublished document. (in Thai).

Schizophrenia Patient Care Team of Suanprung Hospital. (2013). Situation analysis report of persons with schizophrenia. *Unpublished document.* (in Thai).

Tan, B. L., & King, R. (2013). The effects of cognitive remediation on functional outcomes among people with schizophrenia: A randomised controlled study. *Australian & New Zealand Journal of Psychiatry, 47*(11), 1068-1080.

Taylor, V. (2011). *Children of Schizophrenic Parents.* Retrieved from http: // www. Schizophrenic.com/articles/schizophrenia /children-schizophrenic-parents.

Velligan, D. I., Kern, R. S., & Gold, J. M. (2006). Cognitive rehabilitation for schizophrenia and the putative role of motivation and expectancies. *Schizophrenia Bulletin, 32*(3), 474-485.

West, R., Choi, P., & Travers, S. (2010). The influence of negative affect on the neural correlates of cognitive control. *International Journal of Psychophysiology, 76*(2), 107-117.

Wykes, T., Huddy, V., Cellard, C., McGurk, S. R., & Czobor, P. (2011). A meta-analysis of cognitive remediation for schizophrenia: methodology and effect sizes. *American Journal of Psychiatry, 168*(5), 472-485.