International Journal of Advanced Culture Technology Vol.7 No.1 96-102 (2019)
DOI 10.17703/IJACT.2019.7.1.96

IJACT 19-3-15

Enhancement program of social information processing based on metacognitive training for Schizophrenia patients

Sungwon Park

Professor, Department of Nursing, Hannam University,
Email: sungwon@hnu.kr

Abstract

The purpose of this study was to examine the effects of applying a program to enhance social information processing ability in schizophrenic patients. We confirmed the positive effects of the program on the theories of mind and attribution style, which are the social information elements of patients, and confirmed the effect of decreasing paranoid ideation. We used the theory of mind(hinting task, the false belief task), the attributional style questionnaire(external bias, personal bias), and the paranoia scale to test the effectiveness of the program. Specifically, in theory of mind, hinting task performance was improved(t=4.14, p=.000),. The scores of personal bias(t=-7.9, p=.000) and paranoid ideation(t=-2.98, p=.004) decreased. Further research is needed to verify the effectiveness of meta - cognitive training to enhance social information processing.

Keywords: *Schizophrenia, social, information, cognition*

1. Introduction

Recently, a non - pharmacologic supplementary approach has been of interest to treat delusional symptoms or cognitive impairment in patients with schizophrenia. However, the results of the meta-analysis of cognitive-behavioral therapy for psychosis have shown only a small to moderate effect size[3]. The metacognitive training (MCT) developed by Moritz and Woodward is a psychological intervention that based on Cognitive behavioral therapy for psychosis (CBTp), but has a different approach in the treatment of cognitive biases for schizophrenia, such as delusions (for an overview, see [4]). MCT is focused on thinking patterns and processing, whereas the CBTp aims to cope with individual dysfunctional thoughts, emotions, and behavior. MCT takes more of targeting the delusional belief and social cognition. According to results of a meta-analyses [5], CBTp is less effective for chronic patients as compared to acute patients. Many studies have shown that that psychosis involves deficits in social cognition processing including theory of mind and attributional biases[6]. MCT reduces paranoid ideation as well as delusional belief. This cognitive distortion is due to biases on uncertain evidence and is associated with symptoms [7].

The Theory of mind (ToM) is an important component of social cognition [8] and the ability to deduce the intent, thoughts, and beliefs of others. The process of theory of mind implies the ability to look at the world from the perspective of others. Frith and Corcoran [9] is concerned with the impairment of the theory of mind or mentalizing. He explained that the patient's impairment of theory of mind is related to thinking of others

Manuscript received: January 3, 2019/ revised: January 21, 2019 Accepted: February 16, 2019
Corresponding Author: sungwon@hnu.kr
Tel:+82-10-8781-7494, Fax: +82-42-629-8481
Author's affiliation: 70, Hannam-ro, Daedeok-gu, Daejeon, Korea

and intentional supervision disorder (including relational delusions, damaged consciousness, and hallucination that occur when the patient makes inexplicable inferences about the mind state of others). Theory of mind deficits of schizophrenia are associated with psychotic symptoms [10] and related to delusions [11]. The subject of delusions is generally based on inferences about the harmful intentions or actions of others [12]. When patients with chronic illnesses fail to distinguish their subjective experience from objective reality. Cognitive biases can lead to the formation of a delusional picture, if they can infer the intention of others or ignore social cues without evidence[13]. The patients with schizophrenia tend to externalize their personal experience in negative events, which may increase the sense of powerlessness or being controlled[14]. Patients with schizophrenia tend to have excessive single causal reasoning [15]. First of all, paranoid people tend to criticize others for negative events rather than for the environment. Lack of ability to understand situational factors of others' behavior creates delusions of blaming others in combination with defensive avoidance of self-denunciation of negative events [16].

Kinderman and Bentall [17] proposed external attribution errors and personalization errors as two separate attribution errors explaining vulnerabilities to paranoid delusion. They explained that paranoid people tend to blame others for negative events rather than the environment. An external attribution error (EB) is a criticism of the environment or someone else rather than self when a negative event occurs, and personalization error means denouncing others rather than (PB) environment. Although the MCT has been applied in various countries and languages, its effectiveness has not yet been verified in various cultures including Korea. Therefore, this study was accomplished to identify whether MCT could improve social information processing in a Korean schizophrenic patients. It is therefore important to identify the feasibility and efficacy of MCT in a Korean patients.

Specifically, the influences of enhancement program of social information processing(EPSIP) were evaluated on: 1) theory of mind; 2) paranoid ideation; and 3) attributional biases. The research hypotheses were that EPSIP would reduce paranoid ideation and attributional biases, and improve theory of mind.

2. Methods

2.1 Study Design

This quasi-experimental study was conducted using a pretest-posttest design with a non-equivalent control group.

2.2 Participants

Thirty six experimental schizophrenic patients and thirty one controls participated in the study. These patients were recruited from two community psychiatric centers in Korea and assessed according to DSM-V criteria. All patients were clinically stable. Data collection was conducted using the structured questionnaires from February to August 2018. We have followed the Declaration of Helsinki and ethical Principles. Substance abuse, comorbid medical disorders, and history of neurological disease were excluded. All participants received explanations of the study and signed an informed consent before participating. We explained that participants could be dropped at any time during the study. All participants were given stationery after the test, and snacks were provided each time they participated in the program.

2.3. Measures

2.3.1 Theory-of-mind assessments

a) Hinting task

The hinting task [18] was used to test inference ability, consists of 10 short passages. 10 stories included dialogues between two characters. The English version of tasks was translated into Korean. At the end of each passage, participants were asked what the meanings of the words that the characters are vaguely expressed mean. Exact answer is scored two points. If the participant responses incorrectly, additional information was given; a subsequent correct answer is given one point. At this stage, if the participants response incorrectly, the score will be zero. Cronbach's α was .71 in this study.

b) False belief task

The false belief task consisted of six stories was used. It was developed by Frith and Corcoran [9]. We revised the original task to cartoons. The task requires the participants to infer from the story what one character considers about the intention of another character. The task includes two first-order stories and two second-order stories. The first-order story tests was used to find whether the participant can infer a character's false belief. For example, a man leaves the room after putting things in the drawer. After a while a woman comes in and leaves the room with the things in the drawer. When the man returns and believes that there will still be it in the drawer. Through this story, participants should answer what is the man false beliefs.

The second-order stories require participants to infer also. There are three characters in this story. The participant should deduce the content that one of the characters infer thought of another character from the relationship of the two. At the end of each passage, there is a question about the thought of the character (0 = incorrect answer 1 = correct answer). Cronbach's α was .72 in this study.

2.3.2 Attribution style

The Internal Personal and Situational Attributions Questionnaire(IPSAQ) was used to investigate attributional style [16]. The questionnaire comprises 32 statements which describe 16 positive and 16 negative social event. For each item the participants are required to imagine a most likely, cause and then to classify it as being either internal (something to do with the respondent), personal (something to do with another person or persons) or situational (something to do with circumstances or chance).The questionnaire is scored by summing the number of positive or negative items for which each type of attribution has been chosen. Externalizing bias (EB) is calculated by subtracting the number of internal attributions for negative events from the number of internal attributions for positive events. A positive EB score indicates strong self-serving biases (blaming oneself less for negative events than for positive events). Personalizing bias for negative events (PB), calculated by dividing the number of personal attributions by the sum of both personal and situational attributions for negative events, represents the proportion of attributions for negative events which are personal as opposed to situational. A PB score of greater than 0.5 represents a tendency to use personal rather than situational external attributions for negative events. Cronbach's α was .70 in this study.

2.3.3 Paranoia

The Paranoia Scale (PS)[19] was used to assess paranoid ideation. The PS is a self-report inventory using 20 –item. PS scores range from 20 to 100. Whereas the PS was designed originally for use with non-clinical samples, this scale has been used many times since to assess general paranoid ideation (not necessarily of delusional intensity) in schizophrenia[20]. In the present study, the PS showed good internal consistency within patients (Cronbach's alpha .86) and within controls (Cronbach's alpha .87).

2.4. Data analysis

Statistical analysis was performed by using the SPSS program v22. Descriptive statistics, t-test and Chi square were used for group comparison, etc.

3. Procedure of Metacognitive program.

The topics and contents of each session of the EPSIP are described in Table 1. All sessions were conducted once or twice a week for a total of 10 weeks. It took about 40 minutes for each session, and pictures and educational materials using PowerPoint were used. Each session started with a warming up and was given a challenge each time, but did not give the pressure to do. All sessions were conducted with training, explanations, examples, telling own situation, feedback, and answering questions. Controls were provided only educational materials when all sessions and tests were completed.

Table 1. Procedure of enhancement program of social information processing

Session	Topic	Goal	Contents
1	Orientation	To understand the program	Introducing the programm to participants ;Meaning, aim, contents, processes, rules, and etc
2 ~ 3	Attribution	External-personal attribution for failure; monocausal inferences	Encouraging generate explanations for different situations by considering three possible sources (alone or in combination): oneself, others, or situational factors. Pointing out that multiple factors can lead to one incident/scenario. Raising the participants' awareness of these distortions and to prompt them to critically reflect on, complement, and change their current repertoire of problem solving skills.
4 ~ 8	Situation intentions	Bias against disconfirmatory evidence	To withstand the normal tendency to stick to first impressions as this response bias fosters faulty decisions. To maintain an open mind. To understand the potential negative consequences of hasty decision-making
9 ~ 11	Beliefs probability	Theory of mind /social cognition ; emotion perception	Understanding the mental state and inner feelings of a person Considering other sources of information (e.g., context; personal background). Learning to consider a variety of contextual information rather than relying on singular details. Proposing what additional information is needed to ultimately verify one of the hypotheses.
12 ~ 13	Self-steem Wrap up	Negative schemata, low self-esteem	Regular training dysfunctional thinking styles can be corrected.

4. Results

The results of this study are shown in the table 2 and 3. As a result of the homogeneity test between the experimental group and the control group, there was no difference between the two groups(p=.054~.618) (Table 2). As a result of comparing before and after treatment of experimental group and control group, there were two group differences in hinting task(t=4.14, p=.000), PB(t=-7.9, p=.000),, and Paranoia scores(t=-2.98, p=.004),. The hinting task score of the experimental group was significantly higher than that of the control group, and the PB and paranoia scores were significantly decreased (Table 3).

Table 2. Homogeneity for general characteristics and main variables between the two groups

Variables	categories	Exp. (n=36)	Cont. (n=31)	χ^2, t	*p*
		n (%) or M±SD			
Sex	Male	19 (60.0)	17 (65.5)	.268	.605
	Female	17 (40.0)	14 (34.5)		
Age		36.22±8.16	39.16± 7.70	-1.515	.135
Age of onset		24.39± 5.87	25.10± 4.65	-.550	.584
Duration of illness (years)		11.86± 8.26	13.06± 6.763	-1.053*	.296
Duration of education (years)		13.33± 3.43	12.39± 4.61	-.106	.919
Theory of mind					
Hinting task		14.67±2.13	15.58±2.39	-1.638	.107
False belief task		7.97±3.14	8.94±3.56	-1.163	.249
Paranoia		30.22±12.61	24.84±9.78	1.964	.054
IPSAQ					
Externalizing bias		-7.50 ±3.14	-7.16±2.23	-.501	.618
Personalizing bias		.89±.15	.87±.19	.573	.569

Exp.=Experimental group; Cont.=Control group; IPSAQ=The Internal Personal and Situational Attributions Questionnaire

Table 3. Comparison of dependent variables between two groups after treatment

Variables	Group	Pretest	Posttest	Difference (post-pre)	t	*p*
		M±SD				
Theory of mind						
Hinting task	Exp.	14.67±2.13	16.33±2.65	1.66±3.76	4.14	.000
	Cont.	15.58±2.39	12.84±3.97	-2.74±3.65		
False belief task	Exp.	7.97±3.14	8.83±2.66	86±2.49	1.53	.129
	Cont.	8.94±3.56	8.16±2.97	-.77±3.15		
IPSAQ						
Externalizing bias	Exp.	-7.50 ±3.14	-2.94±2.81	4.55±3.43	-1.62	.109
	Cont.	-7.16±2.23	-1.23±2.41	5.93±4.51		
Personalizing bias	Exp.	.89±15	.544±.108	-.34±.10	-7.90	.000
	Cont.	.87±.19	.755±.145	-.10±.13		
Paranoia	Exp.	30.22±12.6	26.19±16.28	-5.89±10.49	-2.98	.004
	Cont.	24.84±9.78	25.52±8.11	.68±7.44		

Exp.=Experimental group; Cont.=Control group; IPSAQ=The Internal Personal and Situational Attributions Questionnaire

5. Discussion and Conclusion

We attempted to investigate the effect of the program to enhance the social information processing on schizophrenic patients. In general, schizophrenic patients are reported to be vulnerable to social information processing, and it is known that they tend not to sympathize with others[21].

Herold, et al. [22] suggested that patients showed impairment on ToM task. Also, they have deficits interpreting social situations, and tend to blame others or circumstances in negative events. As a result of applying EPSIP, the score was improved in hinting task, but score was not improved in false belief task. The false belief task is known to require complex theory-of-mind abilities than the hinting task. The false belief task poses higher information processing demands, performance partly determined by general cognitive abilities [24].

The reason for not improving on the false belief task is that the enhancement program focuses on the social cognition based on the social situation and does not include the cognitive domain such as memory or attention. This training did not affect the external bias of patients with schizophrenia, but it was found to improve personal bias. External bias need more cognitive effort to function unconsciously and contextualize to defend weak self-concepts by avoiding negative self-attributions. On the other hand, PB is a liability avoidance method that makes it easy to blame others[28]. When inferring the state of minds of others in complex social contexts, those who lack these skills are more likely to blame others for negative events. There is a possibility that the complex social situation and PB are in some way connected.

This program has the effect of reducing the paranoid ideation. Schizophrenia tend to pay selective attention to threatening and have difficulty understanding the minds of other people. Cognitive imbalances can cause delusions [13]. Previous research has suggested that delusions are associated with disruptions in inductive reasoning [25] and that paranoid patients show ToM deficits [9].

The lack of ability to understand the behavior of others in a situation will cause delusions to blame others in combination with defensive avoidance of self - denunciation of negative events. Therefore, as the social cognitive properties of the enhancement program improves the paranoid ideation and the theory of mind ability at the same time, it is necessary to examine closely the relationship between the mechanism of the paranoid delusion and the theory of mind.

6. Acknowledgement

This work was supported by 2018 Hannam University Research Fund.

References

[1] P.W. Corrigan, "The social perceptual deficits of schizophrenia," *Psychiatry,* vol. 60, no. 4, pp. 309-26, Winter 1997.

[2] J. Brekke, D.D. Kay, K.S. Lee, and M.F. Green, "Biosocial pathways to functional outcome in schizophrenia," *Schizophr Res,* vol. 80, no. 2-3, pp. 213-25, Dec 15 2005.

[3] A.P. Morrison, D. Turkington, M. Pyle, H. Spencer, A. Brabban, and G. Dunn, "Cognitive therapy for people with schizophrenia spectrum disorders not taking antipsychotic drugs: a single-blind randomised controlled trial.," 2014.

[4] S. Moritz and T S. Woodward, "Metacognitive training in schizophrenia: from basic research to knowledge translation and intervention," *Curr Opin Psychiatry,* vol. 20, no. 6, pp. 619-25, Nov 2007.

[5] G. Zimmermann, J. Favrod, V.H. Trieu, and V. Pomini, "The effect of cognitive behavioral treatment on the positive symptoms of schizophrenia spectrum disorders: a meta-analysis. ," vol. 77, no. 1, pp. 1-9, 2005.

[6] G.N. Savla, L. Vella, C.C. Armstrong, D.L. Penn, and E. W. Twamley, "Deficits in domains of social cognition in schizophrenia: a meta-analysis of the empirical evidence," *Schizophr Bull,* vol. 39, no. 5, pp. 979-92, Sep 2013.

[7] T.S. Woodward, S. Moritz, C. Cuttler, and J.C. Whitman, "The contribution of a cognitive bias against disconfirmatory evidence (BADE) to delusions in schizophrenia," *Journal of Clinical and Experimental Neuropsychology,* vol. 28, pp. 605-617, 2006.

[8] L. Brothers, "The social brain: a project for integrating primate behavior and neurophysiology in a new domain. ," *Concepts in Neuroscience,* vol. 1, pp. 27-51, 1990.

[9] C.D. Frith and R. Corcoran, "Exploring 'theory of mind' in people with schizophrenia," *Psychol Med,* vol. 26, no. 3, pp. 521-30, May 1996.

[10] G.J. Pickup, "Relationship between Theory of Mind and executive function in schizophrenia: a systematic review," *Psychopathology,* vol. 41, no. 4, pp. 206-13, 2008.

[11] L. Harrington, R. Langdon, R.J. Siegert, and J. McClure, "Schizophrenia, theory of mind, and persecutory delusions," *Cognitive Neuropsychiatry,* vol. 10, no. 2, pp. 87-104, Mar 2005.

[12] R. Langdon, M. Coltheart, P. B. Ward, and S. V. Catts, "Mentalising, executive planning and disengagement in schizophrenia," *Cognitive Neuropsychiatry,* vol. 6, no. 2, pp. 81-108, 2001.

[13] N.J. Blackwood, R.J. Howard, R.P. Bentall, and R.M. Murray, "Cognitive neuropsychiatric models of persecutory delusions," *Am J Psychiatry,* vol. 158, no. 4, pp. 527-39, Apr 2001.

[14] T M. Lincoln, N. Peter, M. Schäfer, and S. Moritz, "From stress to paranoia: An experimental investigation of the moderating and mediating role of reasoning biases," *Psychological Medicine,* vol. 40, pp. 169-171, 2010.

[15] S. Randjbar, R. Veckenstedt, F. Vitzthum, and B. Hottenrott, "Attributional biases in paranoid schizophrenia: further evidence for a decreased sense of self-causation in paranoia," *Psychosis,* vol. 3, pp. 74-85, 2010.

[16] P.Kinderman and R. Bentall, "Causal attributions in paranoia and depression: internal, personal, and situational attributions for negative events," *Journal of Abnormal Psychology* vol. 106, no. 2, pp. 341-345, 1997.

[17] P. Kinderman and R. P. Bentall, "Self-discrepancies and causal attributions: Studies of hypothesized relationships.," *British Journal of Clinical Psychology,* vol. 39, p. 255-273, 2000.

[18] R. Corcoran, G. Mercer, and C.D. Frith, "Schizophrenia, symptomatology and social inference: investigating "theory of mind" in people with schizophrenia," *Schizophr Res,* vol. 17, no. 1, pp. 5-13, Sep 1995.

[19] A. Fenigstein and P.A. Vanable, "Paranoia and self-consciousness," *Journal of Personality and Social Psychology,* vol. 62, no. 1, pp. 129-138, 1992.

[20] J.S. Craig, C. Hatton, F.B. Craig, and R.P. Bentall, "Persecutory beliefs, attributions and theory of mind: Comparison of patients with paranoid delusions, Asperger's syndrome and healthy controls.," *Schizophrenia Research* vol. 69, no. 1, pp. 29–33, 2004.

[21] E. Bora, A. Eryavuz, B. Kayahan, G. Sungu, and B. Veznedaroglu, "Social functioning, theory of mind and neurocognition in outpatients with schizophrenia; mental state decoding may be a better predictor of social functioning than mental state reasoning," *Psychiatry Res,* vol. 145, no. 2-3, pp. 95-103, Dec 7 2006.

[22] R. Herold, T. Tenyi, K. Lenard, and M. Trixler, "Theory of mind deficit in people with schizophrenia during remission," *Psychol Med,* vol. 32, no. 6, pp. 1125-9, Aug 2002.

[23] E. Pousa, R. Duno, G. Brebion, A. S. David, A. I. Ruiz, and J. E. Obiols, "Theory of mind deficits in chronic schizophrenia: evidence for state dependence," *Psychiatry Res,* vol. 158, no. 1, pp. 1-10, Feb 28 2008.

[24] I. Janssen, L. Krabbendam, J. Jolles, and J. Van Os, "Alterations in theory of mind in patients with schizophrenia and non-psychotic relatives," *Acta psychiatrica scandinavica.,* vol. 108, no. 2, pp. 110-117, 2003.

[25] R. Corcoran and C.D. Frith, "Autobiographical memory and theory of mind: evidence of a relationship in schizophrenia," *Psychol Med,* vol. 33, no. 5, pp. 897-905, Jul 2003.

[26] Y. Sarfati, M. C. Hardy Bayle, E. Brunet, and D. Widlocher, "Investigating theory of mind in schizophrenia: influence of verbalization in disorganized and non-disorganized patients," *schizophr Res* vol. 37, no. 2, pp. 183-190, 1999.

[27] M. Brüne, M. Abdel-Hamid, C. Lehmkamper, and C. Sonntag, "Mental state attribution, neurocognitive functioning, and psychopathology: what predicts poor social competence in schizophrenia best?," *Schizophr Res,* vol. 92, no. 1-3, pp. 151-9, May 2007.

[28] P. Kinderman, R. Dunbar, and R P. Bental, "Theory-of-mind deficits and causal attributions," *British Journal of Psychology,* vol. 89, no. 2, 1998.