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# Effectiveness of a Metacognitive Intervention for Schizophrenia (MCI-S) Program for Symptom Relief and Improvement in Social Cognitive Functioning in Patients with Schizophrenia

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ABSTRACT

This study investigated the effectiveness of a metacognitive intervention program for symptom relief and improvement in social cognitive functioning among adults with schizophrenia. The program focused on enhancing metacognition to encourage self-awareness and step-by-step perspective expansion. There were 24 participants in the experimental group and 19 participants in the control group. Delusions decreased, and social cognition and social functioning improved in the experimental group compared to the control group. The program demonstrated utility as a treatment modality, which can be part of an overall program of a mental health promotion institution to improve functioning in patients with schizophrenia.

## Introduction

The main psychotic symptoms of schizophrenia destroy an individual's ability to accurately evaluate reality and negatively affect one's quality of life, putting limits on one's social life as well as personal aspects of daily living (Ben-Zeev et al., 2020; Jensen, 2020). Auditory hallucinations are a phenomenon in which thoughts from inside a person feel like they are coming from outside of the person. The person subjectively experiences something vividly, although there is no stimulation sensed by the sensory organ (Jensen, 2020). Delusions are when individuals grant meaning to their own thoughts and beliefs even though they run contrary to what is generally accepted or what the person has experienced (Sellers et al., 2016). Patients with schizophrenia often experience hallucinations and delusions, which cause confusion and pain if they do not realize that the hallucinations and delusions are in their own mind and not due to someone or something external to themselves (Prochwicz, 2015; Simonsen et al., 2020).

Numerous studies worldwide have investigated the epidemiology of schizophrenia, reporting a lifetime prevalence of 0.3–0.7 % in the general population, and rates in South Korea have been similar to those reported in other countries (Cho et al., 2020). Fine et al. (2007) maintained that the main psychotic symptoms of schizophrenia appear to be due to cognitive bias causing distortion in processing information from the external environment. Lazarus and Folkman (1987) insisted that personal cognitive assessment and the selection of a method to cope with the relationship between humans and the environment determine adaptation or inadaptation. In this regard, the main psychotic symptoms of schizophrenia appear as residual symptoms when patients are in the community rehabilitation stage, and the symptoms should be viewed as something to manage as opposed to the expectation of full recovery (Jensen, 2020).

The treatment of schizophrenia aims to effectively manage symptoms, integrate the patient into the community, and, to the extent possible, assist the patient in maintaining an independent life in the community (Keepers et al., 2020). Although developments in the pharmacological treatment of schizophrenia have been remarkable, pharmacological treatment alone has not prevented a revolving door phenomenon in which rehospitalization frequently occurs (Ciudad et al., 2012). To promote the recovery and treatment effects of patients with schizophrenia, there is a need to offer psychosocial interventions alongside pharmacological treatment (Kern et al., 2009). As a psychological treatment to reduce psychotic symptoms, cognitive behavioral therapy shows relatively consistent effects, but the effects are not large compared with a control group (Jauhar et al., 2014). In addition, various types of interventions, such as cognitive intervention and psychoeducation, have been developed, and the effects of these interventions

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on psychotic symptoms have been small to moderate (Eichner & Berna, 2016; Lejeune et al., 2021).

Moritz and Woodward (2007) developed metacognitive training based on a cognitive-behavioral model. Metacognitive training consists of increasing the patient's awareness of and control over their cognitive distortions and abnormal behavior. Wells and Matthews (1994) argued that a bias towards one's individual way of thinking and response to stress generates a reverse effect, and psychopathy is caused by a self-regulatory executive function (S-REF) model. Further, individuals can solve various mental problems by controlling reactions to their own way of thinking and thoughts through metacognition. Wells (2009) argued that the process of repeated worrying and rumination in psychopathy can be controlled by metacognition and developed metacognitive therapy based on the S-REF model. Metacognitive therapy focuses on the details of thought, including negative auto-thinking or irrational beliefs, and views cognition as hierarchical; through upper cognition, namely metacognition, metacognitive therapy focuses on changing one's way of thinking (Fisher & Wells, 2009).

A metacognition-applied program involves changing the cognitive basis of distorted thought through metacognition, and the program aims to increase insight into one's cognitive distortions. The principle of the program is that patients are not confined to cognitive traps because they learn to observe their thinking and exert metacognitive control (Moritz et al., 2010). For patients with schizophrenia, the application of metacognition helps them to see subjective experiences more objectively by expanding their perspective of themselves, others, and situations. To be able to recognize their psychotic symptoms when experiencing them means improvement in insight, which can be connected to interpersonal relationships and improvement in social functioning (Bell, Raihani, & Wilkinson, 2021; Chen et al., 2021; Parker et al., 2020). Such a change is regarded as an essential process for rehabilitating people with schizophrenia (Manoli et al., 2021). When patients recognize their psychotic symptoms in relationships with others, it is referred to as social cognition improvement (Bell et al., 2017). Social cognition is related to personal and social performance (PSP); realizing how people understand themselves and others encompasses an ability to understand others' behavior and infer their mental state (Fiske & Taylor, 2013). Lysaker et al. (2014) reported that the social cognition of patients with schizophrenia is related to social functioning and that social functioning and metacognition are uniquely related.

Recognizing and managing hallucinations and delusions by applying metacognition has been shown to improve PSP, insight, and social cognition (Eichner & Berna, 2016). However, the evaluation of the effectiveness of metacognitive programs is necessary to verify a proper intervention method (Philipp et al., 2019). Consequently, this study aimed to develop a metacognitive intervention program to expand the perspectives on self-recognition, others, and situations, focusing on cognitive assessment and a method to cope with psychotic symptoms. The program, Metacognitive Intervention for Schizophrenia (MCI-S), was developed by revising and complementing Metacognitive Training (MCTain) and Metacognitive Therapy (MCTherp) (Moritz & Woodward, 2007; Wells, 2009). The effectiveness of the MCI-S program was evaluated with regard to symptom relief and functional improvement in patients with schizophrenia.

## Methods

### *Design*

The study was a pretest-posttest quasi-experimental study with a nonequivalent control group. The MCI-S program was conducted at three community psychosocial rehabilitation facilities located in three regions of Korea. One other facility in a different location was used to recruit participants for the control group. Treatment in a general community rehabilitation program includes case management and standard psychiatric rehabilitation services (referred to as TAU for “treatment as usual”). The study compared the effects of the MCI-S program plus TAU to TAU only. To calculate the sample size needed, G*Power 3.1 was used (Faul et al., 2007). Based on previous studies (Moritz et al., 2013), the sample size required for a power of 0.80, a significance level of 0.05, an effect size of 0.25, and a two-way ANOVA, 36 participants were required. However, 50 were recruited in consideration of representativeness, the normal distribution, and the dropout rate because the dropout rate reported in previous studies was 31 % (Van Oosterhout et al., 2014). Facilities that had never executed a cognitive behavioral therapy program were contacted to recruit participants. The pre- and post-assessments and a follow-up assessment were performed in the mental health programs where the participants were receiving treatment. All participants completed a pre-assessment questionnaire prior to the beginning of the MCI-S program. Post-assessment occurred immediately after the program ended, and the follow-up assessment was conducted in the fourth week after the post-assessment. The intervention was offered to the control group after the study ended. Approval for the study was received from K University's Institutional Review Board (No. 40525-202004-HR-006-04).

### *Participants*

The participants were patients diagnosed with schizophrenia based on DSM-5 criteria and who were registered with the community mental health promotion institutions. Criteria for participation included those aged 18–65, psychiatrically stable and taking antipsychotic medication for three months, who understood the purpose of the study, and agreed to participate by indicating their consent in writing. The exclusion criteria included a history of brain damage, a history of drug abuse within the past three years, and patients with a neurological disorder, including intellectual disability or visual perception disorder. Although the aim was to recruit 25 people for each group, initially 25 participants comprised the experimental group, and 20 participants comprised the control group. One participant in the experiment group dropped out after the fifth session. One person in the control group dropped out before the final assessment. Thus, the analysis included 24 participants in the experimental group and 19 in the control group (Fig. 1).

### *Process of developing the intervention (MCI-S)*

First, the process in which participants view their subjective experience from the metacognitive perspective in handling their main psychotic symptoms is very important. To this end, the content of the program reflecting domestic schizophrenia is essential. Second, patients with schizophrenia have difficulty accepting external stimulations due to their psychotic symptoms (Moritz et al., 2021). There is a need to compose the content so that feelings of frustration are reduced. Third, a step-by-step approach is needed for participants to understand and apply metacognition. To improve and expand metacognitive ability, self-recognition needs to be conducted first, from which understanding of others and situations is possible. Perspective expansion into others and situations is possible only if metacognition is first applied to oneself.

The metacognition therapy of Wells (2009) is suitable for recognizing one's inner problems and applying metacognition. The metacognitive training of Moritz and Woodward (2007) consists of content to expand metacognition so that three perspectives—oneself, others, and situations—can be viewed, and so it is suitable for the second stage. The researcher of this study applied a metacognitive program step-by-step by integrating the two metacognitive therapies. In the stage where the participant applies metacognition for the first time, recognizes their own symptoms, and views problems as they are, the program's content was based on a revised and complementary version of Wells' (2009) metacognitive therapy. In the stage where the participant identifies social context from various perspectives based on increased self-recognition, the content of the program was based on a revised and complementary version of Moritz and Woodward's (2007) metacognitive training.



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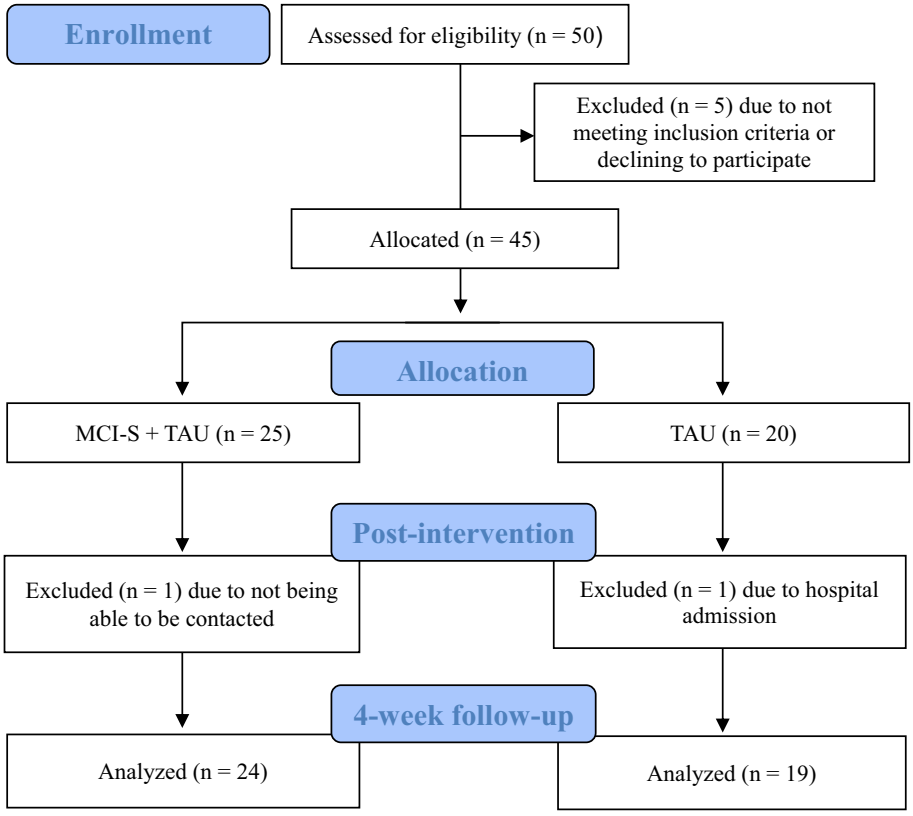


**Fig. 1.** Participant flowchart. MCI-S, metacognitive intervention for schizophrenia; TAU, treatment as usual.

The program was initially reviewed by a group of five experts including a professor of psychiatric nursing, a psychologist, and three mental health workers with experience working in psychosocial rehabilitation programs with patients diagnosed with schizophrenia. The content validity index of the program was calculated (Lynn, 1986) for the group of experts. All five rated the items either three or four points (using a four-point scale), indicating the program content was suitable.

A preliminary evaluation was conducted after experts' verified the program's validity to evaluate the study's applicability. In this evaluation, three patients diagnosed with schizophrenia who were participating in a psychosocial rehabilitation program within a mental health welfare center were selected. They were told the purpose of this study, provided their consent, and participated in a demonstration program lasting three hours on October 15, 2020. By reflecting on the results of this preliminary evaluation, additional examples were added to the program, and this study enabled the participants to easily understand and apply metacognitive perspective.

The composition of the MCI-S program is shown in Table 1. The program consists of two stages. In the first stage, participants' commitment, anxiety, excessive worry, threat, control of thinking, and avoidance are identified through metacognitive intervention. They realize the wrong use of a metacognitive belief, and the metacognition is revised. In the second stage, in which the participants may experience excessive confidence, self-focus, and commitment generated by characteristic symptoms of schizophrenia, namely attribution bias and hasty concluding, participants begin to recognize others and social situations through metacognitive training. In other words, the program consists of a self-recognition stage and an others and situations recognition stage for step-by-step perspective expansion to be carried out. The most important element in developing the MCI-S program was that patients participating in the program would objectively observe and recognize their own situations in relation to their main psychotic symptoms, accept themselves, and expand their perspective to include others and other possible situations.

### *Research procedures*

The program consisted of 10 sessions for 10 weeks, once a week, and 90 min per session. There were 5–10 people in each group. The first 20 min involved reviewing the details learned in the previous session. The next 50 min involved the content to be learned and the related activity. The last 20 min focused on sharing feelings and opinions about the session and providing guidance on the tasks to be completed for the next session. The content of the program included the following: nickname and self-introduction, Self-Attention Rating Scale presentation, the practice of attention training technique, discernment of actual experience and one's own thinking, the difference between worry and reality, distancing from worries (Wells, 2009), putting yourself in someone else's shoes or communication, not making hasty decisions, outer and inner values (Moritz & Woodward, 2007), and establishing a plan to practice in everyday life. Each session started with completing a self-attention rating scale (Wells, 2009). The purpose of the scale is to self-check their level of concentration so that they are better able to focus their attention (Wells, 2009). Then, the program was executed in which the participants shared their experiences after various examples of the session topic were explained to them. A workbook containing each session's content and an activity report was distributed to each participant in advance, and printed materials were offered in each session so that the participants could remember metacognition principles and program content.

### *Data collection*

The participants completed self-report items regarding their demographic information, insight, and social cognition. Participants' primary psychotic symptoms and personal and social performance were



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**Table 1**
Composition of the MCI-S program.

| Key objective | Session (90 min.) | Theme | Content |
|---|---|---|---|
| Realizing my mind | 1 | Orientation | • Introduction to the objectives, content, and progress of the program<br>• Self-Attention Rating Scale<br>• Checking intricate inner problems and stress |
| | 2 | Concentration training technique and execution | • Understanding of metacognition<br>• Explanation and execution of attention training technique<br>• Understanding of auditory hallucinations and sharing the experience |
| | 3 | Discerning actual experience and thinking | • Discerning actual experience and thinking and sharing the experience<br>• Viewing thinking in mind by applying metacognition |
| | 4 | Identifying the differences between worries and reality | • Identifying my beliefs on worries<br>• Understanding difference between worries and reality and sharing the experience |
| | 5 | Distancing from worries | • Identifying my worries<br>• Understanding the causes and results of worries<br>• Distancing from worries using metaphor |
| Viewing from diverse perspectives | 6 | Putting yourself in someone else's shoes for communication | • Viewing incidents occurring to me from my own, others', and situational perspectives<br>• Recalling the experience of being rejected and finding causes from my own, others', and situational perspectives |
| | 7 | Not making a hasty decision | • Explaining the causes and results of the event by looking at the presented picture<br>• Finding a way to cope by changing decisions when new evidence is found<br>• Interpreting and explaining about experienced events in various ways |
| | 8 | Outer value and inner value | • Thinking about others' motivation from diverse perspectives<br>• Talking about outer visible and invisible sides (consolidation of strengths) |
| Practicing in everyday life | 9 | Establishing a plan in everyday life | • Finding changes in the questions written upon orientation and stress level<br>• Prioritizing plans in everyday life by applying metacognition |
| | 10 | Towards the future | • Sharing experience to which metacognition is applied<br>• Planning to put it into practice in the future<br>• Mutually encouraging and sharing feelings and opinions |

MCI-S, metacognitive intervention for schizophrenia.

evaluated by specialized mental health professionals that consisted of two mental health nurses, two mental health social workers, and one mental health clinical psychologist. These professionals included two men and three women with a mean age of 39.8 years and 11 years and six months of experience working in the mental health sector. The specialized mental health professionals had, on average, worked in their current position for seven years and four months and reported having a mean caseload of eight individuals. They completed the questionnaire assessing the participants' primary psychotic symptoms and personal and social performance following the one-on-one interviews. Before completing the scale, the surveys were completed after conducting at least four interviews and receiving training on the assessment and guidance from a clinical psychologist until $\kappa = 0.80$ or higher was achieved for their inter-rater reliability.

### *Measures*

#### *Psychotic symptoms*

Psychotic symptoms were assessed using the 17-item Psychotic Symptom Rating Scale (Haddock et al., 1999), which includes 11 auditory hallucinations items and six delusion items. Items are rated using a 5-point Likert scale (scored 0–4). Higher scores indicate more severe psychotic symptoms. Haddock et al. (1999) reported Cronbach's alphas of 0.88 and 0.94 for the hallucinations and delusions subscales, respectively. In this study, Cronbach's α was 0.95 and 0.93 for the same subscales, respectively.

#### *Personal and social performance*

The Personal and Social Performance (PSP) Scale was developed by Morosini et al. (2000) and assessed the extent to which aspects of personal and social functioning are being affected by psychopathology. Four dimensions are assessed by the scale: difficulty in socially useful activities including work and school, personal and social relationships, disability level including self-care, and disturbing and aggressive behaviors. Each dimension consists of a single question that is responded to using a six-point scale (from "No symptoms" to "Very severe"). A total score can be derived that ranges from 1 to 100. Higher scores indicate a higher degree of severity in PSP. In the present study, the internal consistency was $\alpha = 0.76$.

#### *Insight*

Insight was measured using Beck's Cognitive Insight Scale (Beck et al., 2004). This tool consists of 15 items: nine items on self-reflection and six on self-certainty. Items are responded to using a four-point Likert scale. The score is derived by subtracting the score for self-certainty from the self-reflection score; higher scores indicate greater cognitive insight. In the present study, Cronbach's α was 0.82.

#### *Social cognition*

Social cognition was measured with the Hinting Task developed by Corcoran et al. (1995). This tool is a self-report questionnaire devised to test the ability to infer the real intention concealed in indirect discourse. Participants respond to questions about the speaker's intention after reading a story composed of a short conversation between two people. If the participant gives a correct answer, they receive two points. If the



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answer is incorrect, the participant receives an opportunity to answer again by receiving a hint. They receive one point if the answer is correct or zero points if incorrect. Higher scores indicate higher social cognition. Ng et al. (2015) reported Cronbach's α = 0.80. The Cronbach's α = 0.89 in this study.

### *Statistical analyses*

The data were analyzed using SPSS/WIN 20.0 Program (IBM Corporation, Armonk, NY). Demographic characteristics were analyzed to determine the frequency, mean, and standard deviation. Cronbach's α was used to determine the reliability of the measures. For the test of normality, the Shapiro-Wilk test was used. To test for homogeneity between groups, the independent *t*-test, chi-square test, Fisher's exact test, and Mann-Whitney *U* test were used depending on the status of the normal distribution. To evaluate the program's effect, delusions and aggressive behavior with non-homogeneous pre-check results were controlled for as covariates. Differences between the groups according to the lapse of time were analyzed using two-way repeated-measures ANCOVAs or Friedman and Wilcoxon signed-ranks test. Statistical significance was set at $p < .05$.

## Results

Regarding the characteristics of the sample, 69.8 % were men, and the mean age was 45.44. The mean age for when schizophrenia occurred was 23.88. The average number of hospital admissions was 4.86, and all participants were taking antipsychotic medication. Most were unmarried (79.1 %), living with their family (60.5 %), and had a high school level of education (60.5 %). According to the pre-homogeneity test results, there were no significant differences between the experimental and control groups in their general characteristics (Table 2).

Pretest assessment results indicated there were no significant differences between the two groups in auditory hallucinations, insight, social cognition, and difficulty in socially useful activities, including work and school, personal and social relationships, and self-care. However, the two groups differed significantly in delusions and disturbing and aggressive behaviors (Table 2).

Before checking the program effects, according to the Shapiro-Wilk test, auditory hallucinations, delusions, and the four dimensions of PSP (socially useful activities, personal and social relationships, self-care, and disturbing and aggressive behaviors) did not comply with the normal distribution. Therefore, the Friedman test and Wilcoxon signed-rank test were conducted. As for the variables confirmed to comply with the normal distribution, the psychotic symptoms whose pre-check result was not homogeneous and disturbing and aggressive behaviors were controlled as covariates in the two-way repeated-measures ANOVA.

Auditory hallucinations decreased in both the experimental and control groups, and the difference between the two groups was not statistically significant. Delusions decreased in both the experimental and control groups, and the difference between the two groups was statistically significant.

Regarding PSP, the interaction with time was significant, but the change in PSP over time in the two groups was not significant. Difficulty in socially useful activities and difficulty in personal and social relationships decreased over time in both groups, and the difference between the two groups was significant. Although difficulty in self-care decreased over time in both groups, the difference between the two groups was not significant. The experimental group's disturbing and aggressive behavior did not show a statistically significant decrease, whereas there was a significant decrease in the control group. However, the difference between the two groups was not significant (Table 3).

As for insight, there were no significant findings. However, there was a significant group-by-time interaction for social cognition. There was more improvement in social cognition in the experimental group (Table 4).

## Discussion

This study involved the development and evaluation of a metacognition program for patients with schizophrenia (MCI-S). Using a pretest-posttest quasi-experimental design with a nonequivalent control group, the study examined whether participants had a decrease in main psychotic symptoms and improvement in social cognitive functioning. The results indicated that the program effectively reduced delusions and

**Table 2**
Pre-homogeneity test of the participants (N = 43).

| Characteristic | Category/range | Total (n = 43) | Experimental group (n = 24) | Control group (n = 19) | $\chi^2/t/U$ | p |
|---|---|---|---|---|---|---|
| | | n (%) or M ± SD | n (%) or M ± SD | n (%) or M ± SD | | |
| Gender | Male | 30(69.8) | 18(75.0) | 12(63.2) | 0.71 | 0.401 |
| | Female | 13(30.2) | 6(25.0) | 7(36.8) | | |
| Age (years) | | 45.44 ± 0.43 | 47.42 ± 10.35 | 42.95 ± 10.26 | 1.41 | 0.166 |
| Age of onset (years) | | 23.88 ± 6.47 | 22.71 ± 5.24 | 25.37 ± 7.65 | −1.29 | 0.205 |
| No. of admissions to psychiatric hospital | | 4.86 ± 4.21 | 5.79 ± 5.13 | 3.68 ± 2.26 | 201.50[a] | 0.508 |
| Marital status | Unmarried | 34(79.1) | 17(70.8) | 17(89.5) | 2.28[b] | 0.610 |
| | Married | 4(9.3) | 3(12.5) | 1(5.3) | | |
| | Other | 5(11.6) | 4(16.7) | 1(5.3) | | |
| Living situation | Alone | 8(18.6) | 7(29.2) | 1(5.3) | 5.70[b] | 0.089 |
| | Family | 26(60.5) | 13(54.2) | 13(68.4) | | |
| | Other | 9(21.0) | 4(16.7) | 5(26.3) | | |
| Education | Middle school | 6(14.0) | 2(8.3) | 4(21.1) | 1.52[b] | 0.555 |
| | High school | 26(60.5) | 15(62.5) | 11(57.9) | | |
| | University or higher | 11(25.5) | 7(29.2) | 4(21.1) | | |
| Auditory hallucinations | 0–25 | 8.30 ± 8.10 | 8.96 ± 8.22 | 7.47 ± 8.09 | 222[a] | 0.882 |
| Delusions | 0–17 | 6.02 ± 5.15 | 7.83 ± 5.31 | 3.74 ± 3.98 | 121[a] | 0.009 |
| PSP | 30–80 | 63.91 ± 10.93 | 61.25 ± 12.11 | 67.26 ± 8.392 | −1.84 | 0.073 |
| Socially useful activities | 2–5 | 2.86 ± 0.83 | 3.00 ± 0.83 | 2.68 ± 0.82 | 175.50[a] | 0.166 |
| Personal and social relationship | 1–5 | 2.77 ± 0.94 | 2.96 ± 0.99 | 2.53 ± 0.84 | 162[a] | 0.084 |
| Self-care | 1–5 | 2.40 ± 0.90 | 2.29 ± 0.99 | 2.53 ± 0.77 | 208.50[a] | 0.612 |
| Disturbing and aggressive behaviors | 1–4 | 1.44 ± 0.73 | 1.29 ± 0.75 | 1.63 ± 0.68 | 153[a] | 0.026 |
| Insight | −5–12 | 3.23 ± 3.19 | 2.58 ± 3.09 | 4.05 ± 3.22 | −1.51 | 0.136 |
| Social cognition | 0–16 | 7.95 ± 4.39 | 8.83 ± 4.45 | 6.84 ± 4.17 | 1.49 | 0.142 |

[a] Mann-Whitney's *U* test.
[b] Fisher's exact test. PSP, Personal and Social Performance Scale.



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**Table 3**
Main psychotic symptoms and personal and social performance (N = 43).

| Variable | Group | Pre-test | Post-test | Follow-up | Source | F/$\chi^2$ | p |
|---|---|---|---|---|---|---|---|
| | | M ± SD | M ± SD | M ± SD | | | |
| Auditory hallucinations | Experimental | 8.96 ± 8.22 | 3.92 ± 5.52 | 3.63 ± 5.15 | | 15.77[a] | <0.001 |
| | Control | 7.47 ± 8.08 | 3.42 ± 6.93 | 3.11 ± 6.12 | | 17.24[a] | <0.001 |
| | | | | | | | 0.114[b] |
| Delusions | Experimental | 7.83 ± 5.31 | 5.46 ± 5.63 | 4.75 ± 4.99 | | 9.43[a] | <0.001 |
| | Control | 3.74 ± 3.98 | 1.47 ± 3.04 | 1.11 ± 2.44 | | 19.93[a] | 0.001 |
| | | | | | | | <0.001[b] |
| Personal and Social Performance (total scale) | Experimental | 61.25 ± 12.10 | 70.83 ± 11.42 | 75.04 ± 9.73 | Group | 2.94 | 0.094 |
| | Control | 67.26 ± 8.39 | 70.95 ± 4.08 | 71.42 ± 2.79 | Time | 2.52 | 0.096 |
| | | | | | Group × Time | 13.45 | <0.001 |
| Socially useful activities | Experimental | 3.00 ± 0.83 | 2.79 ± 0.93 | 2.42 ± 0.92 | | 15.52[a] | <0.001 |
| | Control | 2.68 ± 0.82 | 2.00 ± 0.47 | 1.89 ± 0.31 | | 21.78[a] | <0.001 |
| | | | | | | | 0.001[b] |
| Personal and social relationships | Experimental | 2.96 ± 0.99 | 2.63 ± 0.87 | 2.25 ± 0.98 | | 21.73[a] | <0.001 |
| | Control | 2.53 ± 0.84 | 2.00 ± 0.33 | 2.00 ± 0.00 | | 13.52[a] | 0.001 |
| | | | | | | | <0.001[b] |
| Self-care | Experimental | 2.29 ± 0.99 | 1.92 ± 0.92 | 1.58 ± 0.83 | | 12.11[a] | 0.002 |
| | Control | 2.53 ± 0.77 | 1.74 ± 0.56 | 1.84 ± 0.50 | | 17.90[a] | <0.001 |
| | | | | | | | 0.126[b] |
| Disturbing and aggressive behaviors | Experimental | 1.29 ± 0.75 | 1.13 ± 0.44 | 1.08 ± 0.40 | | 5.20[a] | 0.074 |
| | Control | 1.63 ± 0.68 | 1.11 ± 0.31 | 1.05 ± 0.22 | | 18.20[a] | <0.001 |
| | | | | | | | 0.469[b] |

[a] Friedman test.
[b] Wilcoxon signed-rank test.

**Table 4**
Insight and social cognition (N = 43).

| Variable | Group | Pre-test | Post-test | Follow-up | Source | F | p |
|---|---|---|---|---|---|---|---|
| | | M ± SD | M ± SD | M ± SD | | | |
| Insight | Experimental | 2.58 ± 3.09 | 2.92 ± 4.10 | 3.21 ± 4.42 | Group | 0.64 | 0.430 |
| | Control | 4.05 ± 3.22 | 3.74 ± 2.62 | 3.21 ± 2.52 | Time | 1.39 | 0.255 |
| | | | | | Group × Time | 0.23 | 0.795 |
| Social cognition | Experimental | 8.83 ± 4.44 | 13.08 ± 3.34 | 14.25 ± 2.23 | Group | 3.90 | 0.056 |
| | Control | 6.84 ± 4.16 | 8.79 ± 5.43 | 8.26 ± 5.34 | Time | 0.41 | 0.617 |
| | | | | | Group × Time | 9.92 | 0.001 |

increased personal and social performance and social cognition.

Auditory hallucinations in both the experimental and control groups continuously decreased; however, the difference in the decrease did not differ between the two groups. Our results are consistent with Philipp et al.'s (2019) systematic review and meta-analysis that showed metacognitive training with patients with schizophrenia compared to standard psychological treatments bordered on significance with regard to symptom severity as the outcome variable. As opposed to the results for auditory hallucinations, the difference in the reduction of delusional symptoms in the experimental group was significant. This finding is similar to the results of Moritz et al. (2013), in which participation in a metacognition program was associated with a reduction in delusional symptoms in 150 hospitalized patients and outpatients.

PSP scores increased over time in both groups but not significantly; however, there was a group-by-time interaction effect indicating that there were significant differences between the two groups over time. There was more improvement in PSP in the experimental group compared to the control group. Morrison et al. (2014) similarly did not find a significant increase in PSP in their study of metacognition therapy for patients with schizophrenia. However, they did not include a control group in their study. Fischer et al. (2020) found a significant correlation between metacognition and PSP and that PSP had a negative correlation with main psychotic symptoms; in consideration of this, they recommended using metacognition as an intervention. Given that the experimental group's PSP improvement was remarkable compared to TAU, and delusions significantly decreased, it was confirmed that changes in delusions and PSP occurred through the MCI-S program.

In the four areas of PSP that were assessed, there was significant improvement in socially useful activities and in personal and social relationships in both the experimental and control groups, and the differences between the two groups were significant. Consequently, the MCI-S was found to be effective in improving personal and social relationships. Kawata and Revicki (2008) reported that socially useful activities and personal and social relationships correlated with psychotic symptoms of schizophrenia. Given the results of the present study, it appears a reduction in main psychotic symptoms is concomitant with improvements in aspects of personal and social functioning.

With regard to self-care, there was steady improvement in the experimental group, whereas, in the control group, there was improvement over the 10-week period, then a slight decrease in self-care from posttest to follow-up four weeks later. Nonetheless, although both groups improved significantly, there was no significant difference in self-care improvement between the two groups. It may be that self-care improvement through metacognitive training alone is unreasonable for patients with schizophrenia. To improve self-care ability, it may be necessary to also use more concrete methods.

Disturbing and aggressive behaviors decreased in the experimental group, but the change was not significant, whereas there was a significant decrease in the control group. However, the difference between the two groups was not statistically significant.

Insight continuously increased from pretest to follow-up in the experimental group, whereas insight continuously decreased in the control group. However, the change was not significant for either group, and the group-by-time interaction indicated no significant differences between the two groups over time. Although there was no significant difference between the two groups, there was an unexplainable



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difference in insight scores between the two groups. It would be expected that the MCI-S program would increase insight, but a decrease in insight in participants receiving TAU warrants further investigation.

Social cognition improved in both groups, and the difference in improvement between the two groups was significant. There was more improvement in the experimental group over time. The results are consistent with a previous study in which metacognitive training included 18 participants diagnosed with schizophrenia; it was confirmed that participants' social cognition improved (Moritz et al., 2011). Dark et al. (2020) reported a high correlation between social cognition and PSP. Similarly, in the present study, there were concomitant improvements in both social cognition and PSP in the experimental group compared to the control group. Thus, the changes in PCP and social cognition in the experimental group can be viewed as meaningful or having clinical significance.

### *Strengths and limitations*

A strength of this study is that it was an intervention study that included a control group to test the effects of metacognitive improvement on main psychotic symptoms, personal and social performance, insight, and social cognition. The study provides support for MCI-S as a program for patients with schizophrenia that can be integrated into community rehabilitation programs. The program can be used as a basis for developing a metacognitive program for diverse patient populations. However, the study has limitations with regard to generalizability. The study had a small sample size, and experimental participants were from three facilities in different areas of South Korea. Other limitations concern the study's internal validity: its small sample size can affect the accuracy of the findings; there was no control group at each facility for comparison; there was a lack of homogeneity in the delusion and aggressive behavior on the PSP; and a self-report assessment was used, which may be affected by social desirability bias.

There is a need for further research on the MCI-S with a larger sample size. Follow-up assessments should be conducted at three, six, and 12 months to determine the program's lasting effects. In addition, patients with schizophrenia show very diverse cognitive damages depending on the progress of the disease. It would be important to evaluate the MCI-S program effects given the diversity of cognitive characteristics. Cultural diversity is an important consideration as well. A program reflecting domestic schizophrenia is essential; there is a need to present experiences that the participants can relate to using various examples in consideration of cultural background. Lastly, further research is needed to investigate the relationship between metacognitive beliefs and various psychosocial factors that have yet to be examined.

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## Declaration of competing interest

None.

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## Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.apnu.2022.07.010.

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