

Provided for non-commercial research and education use.  
Not for reproduction, distribution or commercial use.



This article appeared in a journal published by Elsevier. The attached copy is furnished to the author for internal non-commercial research and education use, including for instruction at the author's institution and sharing with colleagues.

Other uses, including reproduction and distribution, or selling or licensing copies, or posting to personal, institutional or third party websites are prohibited.

In most cases authors are permitted to post their version of the article (e.g. in Word or Tex form) to their personal website or institutional repository. Authors requiring further information regarding Elsevier's archiving and manuscript policies are encouraged to visit:

<http://www.elsevier.com/authorsrights>



Contents lists available at ScienceDirect

## Schizophrenia Research

journal homepage: [www.elsevier.com/locate/schres](http://www.elsevier.com/locate/schres)

## Letter to the Editor

### Incorporating music therapy into cognitive remediation to improve both cognitive dysfunction and negative symptoms in schizophrenia



Dear editors:

Cognitive dysfunction and negative symptoms make social participation difficult for patients with schizophrenia (Brekke et al., 2009; Green and Nuechterlein, 1999; Ventura et al., 2014). Interestingly, cognitive dysfunction in schizophrenia can be improved through cognitive remediation (Cella et al., 2015), which simultaneously facilitates social participation (Katsumi et al., 2017; Wykes et al., 2011). In addition, there is evidence that music therapy can ameliorate negative symptoms (Geretsegger et al., 2017; Ulrich et al., 2007). With the goal of improving both cognitive dysfunction and negative symptoms, we originally devised a program of Music Therapy incorporated into Cognitive Remediation (MTCR) and examined its effectiveness. This study was approved by Takasaki University of Health and Welfare Research Ethics Committee, No. 2829.

The program was based on the Neuropsychological Educational Approach to Cognitive Remediation (NEAR) program (Medalia and Freilich, 2008; Medalia et al., 2009). For the verbal sessions, which are conducted to bridge the music sessions with real life, we adopted those in NEAR almost unchanged. Music sessions were conducted in groups of less than 12 participants. We made the content of the MTCR program enjoyable through music activities such as singing and playing instruments. For example, in training for social skills (Module #1 in Table 1), the participants played tambourines in pairs. One person holds out the tambourine at an angle easy for the other person to strike with the stick. Simultaneously, the person with the stick should pay attention to his/her striking force and not make the tambourine holder uncomfortable. Thus, the two participants can learn how to be considerate toward each other. For training in verbal deduction (Module #2 in Table 1), participants deduce the words that have been removed from the lyrics based on the words that come before and after them. To change their negative thinking (Module #5 in Table 1), participants learn they may begin to enjoy activities by becoming aware of their habit of jumping to conclusions and changing their way of thinking about things. Specifically, the music therapist first hands out the sheet music for *In the Mood* to the participants, before abruptly saying, “Now, let’s clap the rhythm,” which induces a negative mindset among the participants. Then, the music therapist plays *In the Mood* on the keyboard. The participants soon notice that it is a cheerful and fun song that they know and become a bit excited. They then follow the example of the music therapist by clapping their hands to the song, and by the time all the participants clap along with the music, they are in a good mood. Through this, the participants can avoid having a negative mindset and immediately

thinking “I can’t do this, it’s impossible!” when encountering something unfamiliar. Instead, they learn that they can enjoy unfamiliar or new experiences if they change their way of thinking. In this way, the participants are enabled to do many kinds of group activities using music as the cognitive remediation. The MTCR program consists of 30 sessions (Table 1). Each session is 60 min long (45-min music session, 15-min verbal session). After the conclusion of the whole program, one participant said, “I never realized I could enjoy working together with other people sharing a common goal.”

The participants were patients aged 18 to 60 years with a diagnosis of schizophrenia based on the DSM-IV who attended day treatment or workshops. They participated in twice-weekly sessions and were assessed by psychologists, using the Brief Assessment of Cognition in Schizophrenia (BACS) and the Brief Psychiatric Rating Scale (BPRS), before and after the 30-session program. All participants signed informed consent.

Thirty-six patients (26 men, 10 women; average age 42.4 years; average session participation of 28.2 times) participated in this study. The BACS total scores improved significantly ( $-2.30 \rightarrow -2.02$ ,  $t(35) = -2.11$ ,  $p = 0.042$ ) after participation in the program; significant improvements were also observed in verbal fluency ( $-1.22 \rightarrow -0.98$ ,  $t(35) = -2.88$ ,  $p = 0.007$ ) and attention ( $-2.02 \rightarrow -1.77$ ,  $t(35) = -2.57$ ,  $p = 0.015$ ) subtests. The BACS scores indicate decays in standard deviation from the normal average. Overall the BPRS scores were essentially unchanged ( $30.72 \rightarrow 29.47$ ,  $t(35) = 0.80$ ,  $p = 0.427$ ), but a significant improvement was observed in the “emotional withdrawal” and “affective flattening” (combined as negative symptoms,  $3.42 \rightarrow 2.78$ ,  $t(35) = 2.41$ ,  $p = 0.021$ ), “hostility” ( $1.11 \rightarrow 1.0$ ,  $t(35) = 2.09$ ,  $p = 0.044$ ), “behavior induced by hallucination” ( $1.92 \rightarrow 1.42$ ,  $t(35) = 2.84$ ,  $p = 0.007$ ), “mannerisms and unnatural posture” ( $1.56 \rightarrow 1.25$ ,  $t(35) = 2.74$ ,  $p = 0.01$ ), and “disorientation” ( $1.36 \rightarrow 1.11$ ,  $t(35) = 2.31$ ,  $p = 0.027$ ) subtests. Based upon one participant’s reflection, MTCR is speculated to strongly motivate participants to achieve cognitive remediation, thereby increasing their likelihood of exhibiting improvements. Though this study has two limitations—there was no control group and the assessments were not blind to the treatment condition—the results demonstrate that MTCR can potentially improve both cognitive dysfunction and negative symptoms, facilitating the social participation of patients with schizophrenia.

**Contributors**

Naoko Kosugi and Chiaki Oshiyama designed the study and the MTCR program, and conducted the study. Shin-ichi Niwa designed the study and MTCR program. Naoki Kodama supported statistical analyses. All authors contributed to and have approved the final manuscript.

**Conflict of interest**

All authors declare that they have no conflicts of interest.

**Acknowledgments**

This work was supported by Grant-in-Aid for Scientific Research (C), Grant Number JP15K00157.

**Table 1**  
The 8 Modules in Music Therapy incorporated into Cognitive Remediation (MTCR).

Module number	Contents	Objectives	Number of sessions	
1	Introduction to Cognitive Functions and Cognitive Remediation	Cognitive Skills—attention, memory, working memory, concentration, information processing, problem solving, social skills, planning	4	6
2	Verbal Reasoning and Problem Solving	Learning Styles and Learning Style Application	2	6
		Verbal Reasoning and Logic Problem Solving	4	
3	Planning and Organization	How to Get Organized—Cognitive Skills	1	4
		Assigning Priority and Executing High-priority Issues Preferentially	1	
		Remembering to Do Things in the Future	1	
4	Attention	Instruction Comprehension and Learning Strategies to Fully Carry Out Instructions	1	4
		Auditory Attention	2	
5	Thinking About Your Thinking	Summarizing the Main Idea and Details	2	5
		Identifying and Escaping from Negative Thoughts	1	
		Learning about Jump to the Conclusion Thinking and Identifying Thinking Errors	1	
		Learning about Over/Undervaluing and Delusional Ideas of Reference	1	
		Checking Automatic Thoughts and Learning about Negative Thoughts	1	
6	Effective Communication	Learning and Practicing Adjusting One's Perspective	1	2
		Paying Attention in Conversations	2	
7	Healthy Lifestyles	The Mind-Body Connection—Eating Healthy, Sleeping, and Exercise	2	2
8	Conclusion	Conclusion and Singing Songs to Celebrate Accomplishment of Program Participation	1	1
Total			30	

Note. Each module includes 1–6 sessions, with 30 sessions in total. The content of each module is indicated in the “Contents” column. The objectives of each module are shown in the “Objectives” column.

## References

- Brekke, J.S., Hoe, M., Green, M.F., 2009. Neurocognitive change, functional change and service intensity during community-based psychosocial rehabilitation for schizophrenia. *Psychol. Med.* 39 (10), 1637–1647.
- Cella, M., Reeder, C., Wykes, T., 2015. Cognitive remediation in schizophrenia – now it is really getting personal. *Curr. Opin. Behav. Sci.* 4, 147–151.
- Geretsegger, M., Mössler, K.A., Bieleninik, Ł., Chen, X.-J., Haldal, T.O., Gold, C., 2017. Music therapy for people with schizophrenia and schizophrenia-like disorders. *Cochrane Database Syst. Rev.* 5, CD004025.
- Green, M.F., Nuechterlein, K.H., 1999. Should schizophrenia be treated as a neurocognitive disorder? *Scizophr. Bull.* 25 (2), 309–319.
- Katsumi, A., Hoshino, H., Fujimoto, S., Yabe, H., Ikebuchi, E., Nakagome, K., Niwa, S., 2017. Effects of cognitive remediation on cognitive and social functions in individuals with schizophrenia. *Neuropsychol. Rehabil.* <https://doi.org/10.1080/09602011.2017.1409639>.
- Medalia, A., Freilich, B., 2008. The neuropsychological educational approach to cognitive remediation (NEAR) model: practice principles and outcome studies. *Am. J. Psychiatr. Rehabil.* 11 (2), 123–143.
- Medalia, A., Revheim, N., Herlands, T., 2009. *Cognitive remediation for psychological disorders*. first ed. Oxford University Press, New York.
- Ulrich, G., Houtmans, T., Gold, C., 2007. The additional therapeutic effect of group music therapy for schizophrenic patients: a randomized study. *Acta Psychiatr. Scand.* 116 (5), 362–370.
- Ventura, J., Subotnik, K.L., Ered, A., Gretchen-Doorly, D., Helleman, G.S., Vaskinn, A., Nuechterlein, K.H., 2014. The relationship of attitudinal beliefs to negative symptoms, neurocognition, and daily functioning in recent-onset schizophrenia. *Schizophr. Bull.* 40 (6), 1308–1318.
- Wykes, T., Huddy, V., Cellard, C., McGurk, S.R., Czobor, P., 2011. A meta-analysis of cognitive remediation for schizophrenia: methodology and effect sizes. *Am. J. Psychiatry* 168 (5), 472–485.

Naoko Kosugi

*Division of Healthcare Informatics, Faculty of Healthcare, Tokyo Healthcare University, 3-11-3 Setagaya, Setagaya-ku, Tokyo, 154-8568, Japan*

Corresponding author at: *Division of Healthcare Informatics, Faculty of Healthcare, Tokyo Healthcare University, 3-11-3 Setagaya, Setagaya-Ku, Tokyo 154-8568, Japan.*

*E-mail address: naonaoan@gmail.com.*

Chiaki Oshiyama

*Division of Cognitive Behavioral Science, United Graduate School of Child Development, Osaka University, Kanazawa University, Hamamatsu University School of Medicine, Chiba University and University of Fukui, 1-8-1 Inohana, Chuo-ku, Chiba-shi, Chiba 260-8670, Japan*  
*E-mail address: oschiaki@yahoo.co.jp.*

Naoki Kodama

*Department of Radiological Technology, Faculty of Medical Technology, Niigata University of Health and Welfare, 1398 Shimami-machi, Kita-ku, Niigata-shi, Niigata 950-3198, Japan*  
*E-mail address: kodama@nuhw.ac.jp.*

Shin-Ichi Niwa

*Department of Psychiatry, Aizu Medical Center, Fukushima Medical University, 21-2 Maeda, Yazawa, Kawahigashi-Machi, Aizuwakamatsu-City, Fukushima 969-3482, Japan*  
*E-mail address: si-niwa@fmu.ac.jp.*

23 March 2018