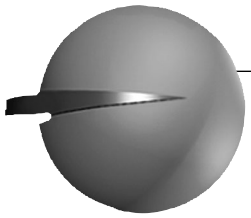

Evidence Review

The Efficacy of Metacognitive Training for Delusions in Patients With Schizophrenia: A Meta-Analysis of Randomized Controlled Trials Informs Evidence-Based Practice

Yu-Chen Liu, RN • Chia-Chun Tang, RN, PhD • Tsai-Tzu Hung, RN • Pei-Ching Tsai, RN • Mei-Feng Lin, RN, PhD

Keywords
meta-cognitive training, schizophrenia, delusion, meta-analysis, moderator

ABSTRACT

Background: Metacognitive training (MCT) was developed in 2007 and widely used to modify the delusions for patient with schizophrenia. However, its effectiveness remains unclear.

Aims: To investigate the overall effectiveness of MCT for delusion in schizophrenia patients from 2007 to 2016, and to investigate the variables (intervention approach, intervention dose, and participant factors) of an MCT study that could influence the effect size.

Methods: Parallel-arm design of MCT for delusions published from 2007 to 2016 were collected and then cross-referenced using these keywords: delusion (psychosis or psychotic or schizophrenia) and metacognitive (training or therapy or intervention). The quality of the studies was evaluated and the effect size and the moderating variables of MCT on delusion were determined.

Results: A total of 11 studies on the effect of MCT for delusion were investigated. The MCT had a moderate immediate postintervention effect ($g = -0.38$) and a lasting effect after 6 months ($g = -0.35$). In terms of immediate effect, moderating variables with significant differences between them were (a) individual approach versus group-based approach and mixed approach, and (b) eastern country versus western country.

Linking Evidence to Action: MCT could be used as a valuable nonpharmacologic intervention to reduce delusions in clinical settings. The individual modularized MCT approach had a beneficial effect and is recommended to healthcare professionals as an application for patients with schizophrenia or delusional disorder.

INTRODUCTION

Delusion is a core symptom of schizophrenia with a prevalence rate of approximately 70% at onset. Delusion-associated consequences have substantial, multidimensional impacts on patients, which in turn affect them at work or home (Coid et al., 2013). Patients' violent behavior associated with delusion can become more severe during the course of the illness, increasing the caretaking burden of family caregivers and gradually damaging their mental well-being (Lam, Ng, & Tori, 2013), and psychological distress (Ong, Ibrahim, & Wahab, 2016).

A delusion is a false belief that patients convince themselves is true, indicating an abnormality in the patients' thoughts. Challenges in the treatment for delusion are that most patients afflicted with it have limited insight into their problem. It is, thus, imperative to reinforce the awareness of their delusion and its assessment and management.

As metacognitive training (MCT) was developed by Moritz and Woodward in 2007, this approach has been applied to promote decline of positive symptoms in psychosis and schizophrenia and has demonstrated promising outcomes. MCT has also been widely used to help patients with delusions by raising patients' awareness of the thinking patterns involved in their illness. Thirty-three MCT translations have been published, including versions in Germany, France, Finland, Holland, Poland, Australia, China, and India (Balzan, Delfabbro, Galletly, & Woodward, 2013; Briki et al., 2014; Kumar et al., 2010; Kuokkanen, Lappalainen, Repo-Tiihonen, & Tiihonen, 2014; Moritz et al., 2013; So et al., 2015; van Oosterhout et al., 2014). Although three meta-analyses examining 11, 4, and 7 clinical trials, respectively, have studied MCT (Eichner & Berna, 2016; Jiang, Zhang, Zhipei, Wei, & Chunbo, 2015; van Oosterhout et al., 2016), its effectiveness for patients with delusions remains unclear.

Worldviews on Evidence-Based Nursing, 2018; 15:2, 130–139.

This meta-analysis was conducted for the following reasons: (a) even though this particular issue has been targeted by meta-analyses for over 10 years, results on the effects of MCT have not been consistent; (b) most indicators of single interventions have focused on the immediate posttreatment effect (Briki et al., 2014; Gawęda, Krężołek, Olbryś, Turska, & Kokoszka, 2015; Kumar et al., 2010; Moritz, Kerstan et al., 2011; Moritz, Veckenstedt, Randjbar, Vitzthum, & Woodward, 2011; So et al., 2015); (c) only four studies have examined the longer term effect following MCT (Andreou et al., 2017; Favrod et al., 2014; Kuokkanen et al., 2014; Moritz et al., 2013; van Oosterhout et al., 2014), and most of these studies included the single intervention approach, employing either individualized or group-based therapies (Andreou et al., 2017; Briki et al., 2014; Favrod et al., 2014; Gawęda et al., 2015; Kumar et al., 2010; Kuokkanen et al., 2014; Moritz, Kerstan et al., 2011, 2013; So et al., 2015; van Oosterhout et al., 2014); (d) none of those studies explored the difference among variables of demographics, therapist readiness, or homework assignment on outcomes; (e) contradictory conclusions were derived by two recent meta-analyses (Table 1; Eichner & Berna, 2016; van Oosterhout et al., 2016); and (f) the dose-response relationship and effective interventional approach of MCT have not been identified due to the limitation of rigor of study methodology in a meta-analysis (Eichner & Berna, 2016).

Therefore, the purpose of this current meta-analysis was to identify the effect of MCT based on reliable and valid randomized controlled trial (RCT) studies during 2007–2016. The anticipation was that new insights would be generated based on our rigorously scientific method regarding (a) the effectiveness of MCT on the severity of delusion (immediately and after 6 months), and (b) the specific variables that affect the effect size and the one variable, if any, that has the greatest effect.

METHODS

Search Strategy

All MCT studies for delusion published from 2007 until April 2, 2016 were collected. The following terms were searched in the databases of Medline, PsycINFO, CINAHL, Joanna Briggs Institute Library, and Cochrane Library: delusion (psychosis or psychotic or schizophrenia) and metacognitive (training or therapy or intervention). Based on our criteria, 11 studies were selected from the total of 116 studies that were initially identified (Table 2 and Figure 1).

Criteria for Inclusion and Exclusion

The inclusion criteria of this current meta-analysis were the following: (a) participants were diagnosed with schizophrenia spectrum disorder by the standards of the Diagnostic and Statistical Manual of Mental Disorders-IV (DSM-IV), DSM-IV-TR, or the International Classification of Diseases (ICD) 10; (b) at least one MCT group was included; (c) the study included one control group; (d) the language of the article was Chinese or English; (e) severity of delusion was measured as an outcome;

Table 1. Empirical Studies on the Effect of Metacognitive Training on Delusion

Authors	Experimental design	Number of studies analyzed	Types of subjects (sample size)	Therapy type	Indicator
Jiang et al. (2015)	Meta-analysis (randomized trial)	4	Schizophrenia spectrum disorder (387)	Group	Severity of delusion
van Oosterhout et al. (2016)	Meta-analysis (randomized trial)	7	Schizophrenia spectrum disorder (500)	Mixed	Severity of delusion
Eichner and Berna (2016)	Meta-analysis (nonrandomized trial)	11	Schizophrenia spectrum disorder (646)	Mixed	Severity of delusion

Table 2. Description of the Intervention, Patient Characteristics, Quality of the Study, and Location

Author	Setting	Country	Intervention format	Number of sessions	Dropout (%)	Quality	Masking
Andreou et al. (2017)	Inpatient and outpatient	Germany	Individual	12	–	6.5	Yes
Briki et al. (2014)	Inpatient and outpatient	France	Group	16	26.5	6.5	Yes
Favrod et al. (2014)	Outpatient	Switzerland	Group	8	9.6	5.5	Yes
Gawęda et al. (2015)	Outpatient	Poland	Group	8	12	5.5	Yes
Kumar et al. (2010)	Inpatient	India	Group	8	0	3	No
Kuokkanen et al. (2014)	Inpatient	Finland	Group	8	0	6.5	Yes
Moritz et al. (2013)	Inpatient and outpatient	Germany	Group	8	10 (ITT)	5.5	Yes
Moritz, Kerstan et al. (2011)	Inpatient and outpatient	Germany	Group	8	0	5.5	Yes
Moritz, Veckenstedt et al. (2011)	Inpatient	Germany	Group and individual	8	8.3	6.5	Yes
So et al. (2015)	Outpatient	Hong Kong	Individual	4	36.4 (ITT)	5.5	Yes
van Oosterhout et al. (2014)	Inpatient and outpatient	The Netherlands	Group	8	16.9 (ITT)	6.5	Yes

ITT = intention to treat.

and (f) a pre- and posttest design was applied. Studies that provided, in addition to MCT, other forms of psychological interventions were excluded. The language limitation was set due to the time and the cost of obtaining and translating articles.

To examine the effectiveness of MCT on delusion severity of schizophrenia patients, two different times were selected for the effect size analysis: (a) immediate effect by posttest score after intervention, and (b) lasting effect by follow-up score at 6 months after intervention.

The modified Jadad scale was used by three researchers independently to assess the methodological quality (Oremus et al., 2001). The study quality was evaluated by the Jadad scale with eight items including randomization and blinding (two items, respectively), and a single item in withdrawals, recruitment criteria, adverse events, and analysis. The trials were separated into low quality (0–3 points) and high quality (4–8 points) based on the above-mentioned items.

Data Collection and Analysis

To confirm error-free and a reliable process of subjective sampling and analysis, three masters-prepared analysts independently handled data abstraction, study inclusion, and registration of the main study variables. The characteristics and outcome variables that did not appear in most articles were removed. The characteristics of studies were summarized as the following variables: author(s), year of publication, study setting, country, intervention approach, frequency and number of MCT sessions, dropout rate, follow-up time postintervention, study quality, and masking.

Synthesis of Results

Delusion indicator was identified as the main outcome of MCT in this current study. The severity of delusion was measured by the delusion subscale of the Psychotic Symptom Rating Scales (PSYRATS; Haddock, McCarron, Tarrier, & Faragher, 1999). As an alternative, two studies used the delusion score of Positive and Negative Syndrome Scale (PANSS) or Brown Assessment of Beliefs Scale (BABS) scale to present the delusion severity. The PANSS, a 7-point (1–7) and 30-item scale, was used to assess the phenomena of positive and negative symptoms of schizophrenia (Kay, Flszbein, & Opfer, 1987). The BABS, a 7-item scale, was developed for the assessment of delusional beliefs of schizophrenia patients (Eisen et al., 1998). The standardized Hedges' mean difference (Hedges & Olkin, 1985) was used to estimate the effect sizes with Comprehensive Meta-Analysis, version 2.0 (2005, Biostat, Engelwood, NJ). Q statistics and I^2 were used as the indicators to determine the homogeneity and heterogeneity, respectively, in this study (Huedo-Medina, Sánchez-Meca, Marín-Martínez, & Botella, 2006).

Worldviews on Evidence-Based Nursing, 2018; 15:2, 130–139.

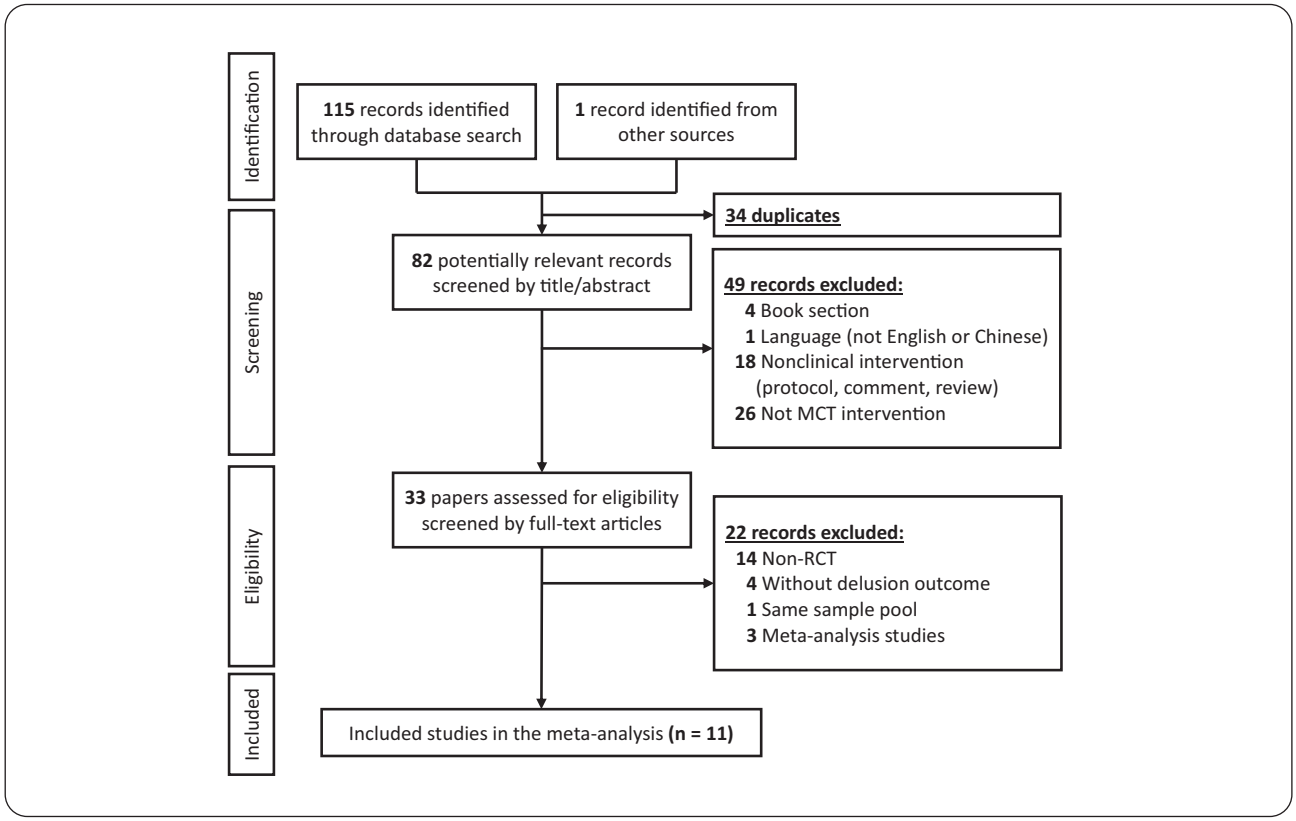

Figure 1. Flowchart of inclusion and exclusion criteria for meta-analysis.

Dealing With Missing Data

The standard deviation of pretreatment scores was used to impute the missing postintervention standard deviation. The change scores were used to impute the missing mean postintervention scores of studies for calculating the effect size. According to Lipsey and Wilson (2001), the sum of change scores was used for the estimation of the effect size. To confirm the same direction of effect size calculated by postintervention mean scores, the sum of change scores in each item was recorded.

Risk of Bias Across Studies

Publication bias may occur while researchers have a tendency to include and publish studies that have significant results (Harrison, 1996); thus, funnel plot as a visual recognition method and two statistical tests, Begg's (Begg & Mazumdar, 1994) and Egger's tests (Egger, Smith, Schneider, & Minder, 1997), were used to identify the publication bias of this current study.

Funnel plots, a graphical method that presents the effect estimates against their standard errors, can be used to detect the publication bias with a visual aid (Duval & Tweedie, 2000). Studies with a symmetric distribution funnel imply no significant publication bias, whereas studies with an asymmetrical funnel imply publication bias. Begg's test, as a rank correlation test, applies the correlation between both ranks of effect sizes and their variances (Begg & Mazumdar, 1994). Egger's test, as a regression test, measures the asymmetry degree of the funnel plot by calculating the intercept from regression of standard normal deviance against precision. Having no statistically significant result means no publication bias (Egger et al., 1997).

Additional Analyses

Subgroup analysis was applied to assess the moderator effect of categorical variables (Feng et al., 2012), to further examine the influence of MCT categorical variables on the effect size, and to identify the particular characteristics resulting in evident outcomes. Mixed-effect model was adopted to examine the variables, where a moderator may be indicated when Q_B is significant. All potential moderating variables were included in the subgroup analysis.

RESULTS

The average participant age was 32.8–51.0 years. Nine of the 11 studies had been conducted in western countries. Nine studies were group-based interventions, with a group size of 4–8 people. The therapy sessions were commonly eight sessions, with each session 45–60 min long. Seven studies lasted for 4 weeks and the other four lasted for 8 weeks. Participants who

received the homework assignments were presented in only three studies.

Effectiveness of MCT on Delusion

Included in the analysis were immediate postintervention outcomes of MCT in 11 effect sizes, and the result showed that MCT had a moderate immediate effect with a *g* value of −0.38 (95% CI [−0.64, −0.12], $p < .01$; Figure 2). These studies were found to be highly heterogeneous (Q [10] = 27.21, $p < .01$, $I^2 = 63.25$).

Regarding the longer effect of MCT on delusion at 6 months postintervention, four effect sizes were analyzed. The result showed that MCT had a moderate lasting effect with a *g* value of −0.35 (95% CI [−0.58, −0.12], $p < .01$; Figure 3). These studies were found to be homogeneous (Q [3] = 2.95, $p = .40$, $I^2 = 0.00$).

Moderating Effects of MCT on Delusion

In the subgroup analysis of immediate postintervention effects, two characteristic variables of MCT had a moderating effect on delusion and differed significantly from each other (Table 3).

The effect size of individualized MCT was significantly larger than that of the group-based approach. A subsample of eastern countries had a significantly greater effect than those of western countries. There were no statistically significant differences in the characteristics of homework assignment, MCT trainer, frequency of MCT, numbers of MCT sessions, intervention length, or participants' sources.

In the results of subgroup analysis after 6 months postintervention, all the factors, such as intervention approach, homework assignment, MCT trainer, frequency of MCT, number of sessions, intervention length, participants' region, and participants' sources, resulted in nonsignificant differences in effect.

Publication Bias Assessment

The results showed an asymmetric funnel plot (Figure 4). Rosenthal's fail-safe N analysis (Rosenthal & DiMatteo, 2001) resulted in significant differences in effect, showing a requirement of 61 missing studies that would reverse the results to nonsignificance. The results of Begg's and Egger's test indicated no significant substantial publication bias (all *p*'s >.05).

DISCUSSION

The included studies of this meta-analysis indicated no significant preintervention difference in the severity of delusion between the experimental and control groups. Our findings imply that MCT is beneficial for patents with schizophrenia who have delusional symptoms. The results indicated that postintervention MCT immediately lowered the severity of delusion, which was similar to the conclusion of Eichner and Berna's (2016) meta-analyses with 11 RCT and non-RCT studies. Both meta-analysis, our study and the Eichner and Berna's study, confirmed the immediate postintervention effect of MCT to be small to moderate.

However, a contradictory conclusion was drawn from the other concurrent meta-analysis, which contained only four and seven RCT studies of MCT, respectively (Jiang et al., 2015; van Oosterhout et al., 2016). The discrepancy may have been generated due to the number of studies and the time range wherein 11 RCT studies of MCT were recruited from 2007 to 2016 for analysis in this current study. Compared to the 2016 meta-analysis of van Oosterhout et al., the current meta-analysis added four high-quality RCT studies, in which MCT was implemented by well-prepared trainers, to generate the contrasted conclusion that is crucial to the knowledge translation of MCT and facilitation for clinical practice.

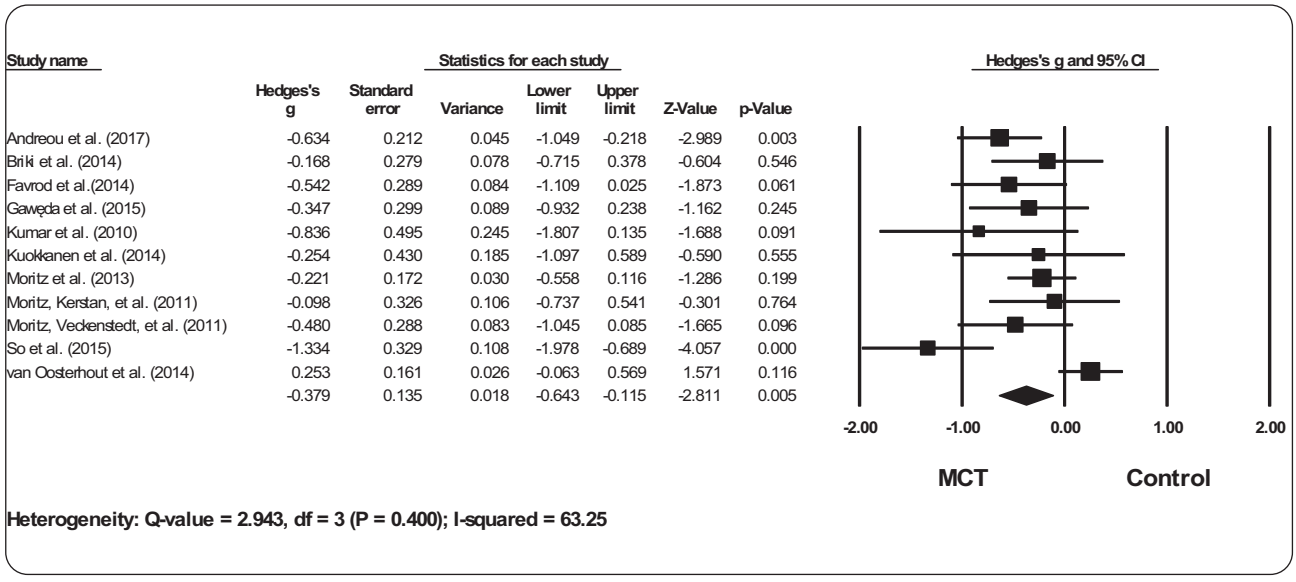

Figure 2. Forest plot of studies in the meta-analysis of immediate effect on delusions.

Worldviews on Evidence-Based Nursing, 2018; 15:2, 130–139.

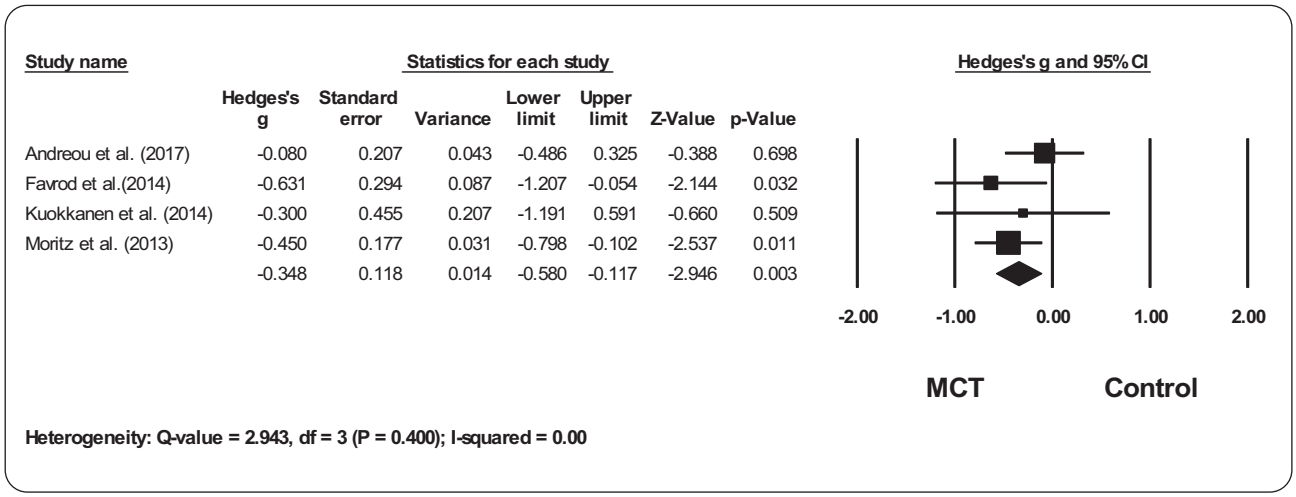

Figure 3. Forest plot of studies in the meta-analysis of lasting effect on delusions.

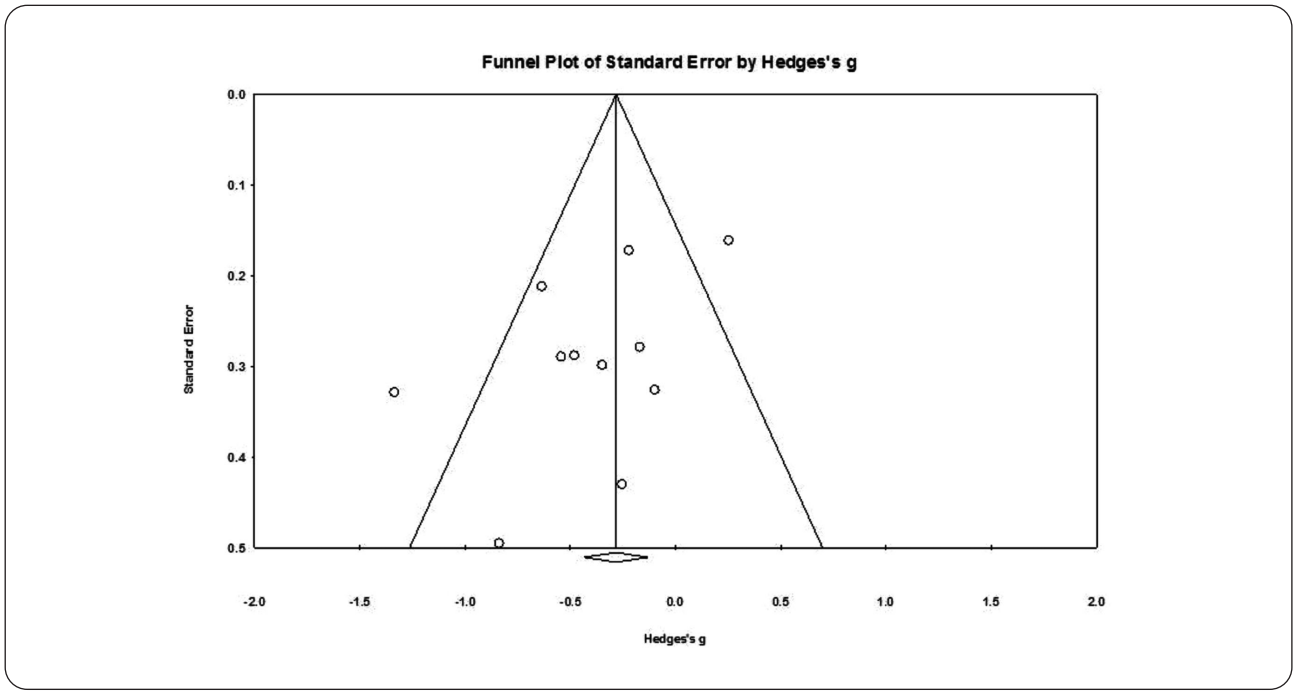

Figure 4. Funnel plot of studies in the meta-analysis of delusions.

Six months postintervention, the results of this study indicated that MCT has a significant effect on delusion, which means that MCT has a positive lasting effect. This is a newly proposed conclusion as compared to the prior three meta-analyses (Eichner & Berna, 2016; Jiang et al., 2015; van Oosterhout et al., 2016). The effect of MCT in the Jiang et al. and the van Oosterhout et al. studies only showed a decreasing trend of delusion when time passed; while in our study and the Eichner and Berna's study, the patients' newly learned thinking process had an immediate influence on delusion reduction.

The positive lasting effect of MCT at 6 months postintervention was identified only in our current meta-analysis, reflecting that patients were aware of patterns of their cognitive bias and what consequences of jumping to conclusion, attribution bias, or memory bias may be caused by those errors. This lasting effect of MCT was validated and supported by the homogeneity test of MCT effect at the 6-month follow-up in the four included RCT studies.

In addition to the overall effect size, the moderating effect between subgroup variables and effect size was examined. The individualized MCT approach significantly lowered the delusion severity with large effect size ($g = -0.90$) immediately postintervention in subgroup analysis. This finding is consistent to Eichner and Berna's (2016) study indicating a

Table 3. Subgroup Analysis of Effect Size on Severity of Delusion

	Effect size			Homogeneity	
Variable	**Number of studies**	**Hedges' *g***	**95% CI**	**Q_B**	***p***
Intervention approach					
Therapy type				6.70	.04
Individual	2	−0.90**	[−0.39, −0.42]		
Group	8	−0.19	[−0.44, 0.06]		
Mixed	1	−0.48	[−1.20, 0.24]		
Homework assignment				2.88	.09
Yes	5	−0.59**	[−0.94, −0.24]		
Info not provided	6	−0.19	[−0.50, 0.11]		
MCT trainer				0.64	.42
With MCT training	9	−0.34*	[−0.62, −0.05]		
Info not provided	2	−0.65	[−1.35, 0.06]		
Intervention dose					
Frequency of MCT				0.02	.88
Once/week	4	−0.36	[−0.80, 0.09]		
Twice/week	7	−0.40	[−0.75, −0.05]		
Number of MCT sessions				2.57	.11
8	8	−0.25	[−0.53, 0.04]		
Other	3	−0.67**	[−1.12, −0.23]		
Intervention length				1.41	.24
Four weeks (and less)	6	−0.54*	[−0.91, −0.17]		
Over 4 weeks	5	−0.22	[−0.59, 0.15]		
Participant factors					
Participants' source				5.64	.06
Outpatient	2	−0.91**	[−1.46, −0.35]		
Inpatient	4	−0.45*	[−0.88, −0.88]		
Mixed	5	−0.16	[−0.46, 0.13]		
Participants' region				7.29	<.01
Eastern country	2	−1.16**	[−1.79, −0.54]		
Western country	9	−0.25*	[−0.47, −0.03]		

Note. *$p < .05$, **$p < .01$.

stronger response to the individual approach than to the group approach. The individualized approach applied to patients with schizophrenia might play a moderating role in buffering the effect of MCT on delusion. Patients may have better concentration on the MCT process and allow trainers to adjust the content and length in each session module with an individualized approach. In addition, the trainer can provide patients more detailed instructions that they have failed to understand

Worldviews on Evidence-Based Nursing, 2018; 15:2, 130–139.

in earlier sessions. The flexibility of an individualized approach is beneficial to modifying distorted cognition of participants as compared to a group-based approach.

MCT applied to patients of an eastern country significantly lowered the severity of delusion with large effect size ($g = -1.16$) immediately postintervention in subgroup analysis. The possible explanation may be the relationships and interactions between teacher and student while learning because students in eastern countries have the habit of better adherence to the teachers' instruction and have more interest in the interactive material of MCT (Ainley, 2006).

Our investigation found that all variables, such as homework assignment, trainer's training, frequency, number of sessions, intervention length, and participants' source, had no significant correlation with effect. Half of the included studies did not point out whether homework assignments were asked for, and two did not mention how they trained the MCT trainer. Some studies made use of homework assignments, finding that homework can improve the effect because it helps participants review the cognitive bias taught in each session and then connect it to their life experience.

Clinical constraints and patients' responses to MCT may influence the single dose of session and total dosage of MCT sessions; however, patients' adherence to the MCT and the dosage of MCT could not be determined without detailed records. This may be a bias of the present study. In terms of participants' source, almost half of the studies that were included were mixed with inpatients and outpatients. The severity of psychotic symptoms may differ between the patient sources. Some studies had reduced the frequency of intervention from twice to a single dose per week while including more outpatient participants in the MCT sessions.

Overall, most variables that were investigated did not affect by themselves the MCT effect size, but their effect in conjunction with other variables was significant.

LIMITATIONS

The current study included only 11 eligible RCT studies that were heterogeneous, and whose methods of delusion measures and data presentations were diverse. Subgroup analysis with stratified techniques may leave inadequate power in each subgroup due to smaller sample size. Various possible confounders and factors other than those included in the model need to be further clarified.

CONCLUSIONS

MCT has effectively improved the experience of delusions in patients with schizophrenia immediately postintervention, with the change lasting for 6 months. To preserve the effect of MCT, the patient's delusion severity should be reevaluated after 6 months and then the patient should undergo another cycle of MCT to reduce the recurrence of distorted cognition. Individualized MCT, compared to a group-based approach, is more flexible and beneficial to modify cognition errors of participants. The participants' region reflects diverse cultural backgrounds that can influence the MCT effect. The interaction between teacher and student, or the learning behavior in eastern culture, may be the important factor that contributes to the effect of MCT, reducing the delusion of schizophrenia in eastern culture.

For similar future studies, including additional variables (e.g., cognitive bias) for outcome evaluation may be needed. A greater comprehension of the mechanism and factors that improve the effectiveness of MCT may be helpful for designing a successful MCT in the future. For patients with delusions, their dysfunctional thought processes cannot be corrected by medication alone. Individualized MCT can be a valuable approach and is recommended to healthcare professionals as a resource for patients with schizophrenia or delusional disorder. **WVN**

LINKING EVIDENCE TO ACTION

- MCT reduces the severity of delusion immediately after the intervention and lasting for at least 6 months.
- Compared to the group approach of MCT, the individualized approach may lead to stronger patient response.
- Culture diversity should be considered when applying MCT to different regions.
- There is no sufficient evidence to conclude whether homework assignments are helpful. Although homework assignments can be viewed as supplementary strategies of MCT, further validation of its effectiveness is needed.

Author information

Yu-Chen Liu, Master, Department of Nursing, College of Medicine, National Cheng Kung University, Tainan City, Taiwan, Republic of China; Chia-Chun Tang, Pre-doctoral fellow of Behavioral Cooperative Oncology Group Center for Symptom Management, School of Nursing, Indiana University Purdue University at Indianapolis, Indianapolis, IN, USA; Tsai-Tzu Hung, Master's student, Department of Nursing, College of Medicine, National Cheng Kung University, and Cancer Center, Tainan City, Taiwan, Republic of China; Pei-Ching Tsai, Master's student, Department of Nursing, College of Medicine, National Cheng Kung University, and Ditmanson Medical Foundation Chia-Yi Christian Hospital, Tainan City, Taiwan, Republic of China; Mei-Feng Lin, Professor, Department of Nursing, College of Medicine, National Cheng Kung University, Tainan City, Taiwan, Republic of China

Address correspondence to Mei-Feng Lin, Department of Nursing, College of Medicine, National Cheng Kung

University, No. 1, Tai-Hsueh Road, Tainan City 701, Taiwan, Republic of China; L30mf@mail.ncku.edu.tw

Accepted 25 November 2017

References

Ainley, M. (2006). Connecting with learning: Motivation, affect and cognition in interest processes. *Educational Psychology Review, 18*(4), 391–405.

Andreou, C., Wittekind, C., Fieker, M., Heitz, U., Veckenstedt, R., Bohn, F., & Moritz, S. (2017). Individualized metacognitive therapy for delusions: A randomized controlled rater-blind study. *Journal of Behavioral Therapy and Experimental Psychiatry, 56*, 144–151.

Balzan, R. P., Delfabbro, P. H., Galletly, C. A., & Woodward, T. S. (2013). Metacognitive training for patients with schizophrenia: Preliminary evidence for a targeted, single-module programme. *Australian and New Zealand Journal of Psychiatry, 48*(12), 1126–1137.

Begg, C. B., & Mazumdar, M. (1994). Operating characteristics of a rank correlation test for publication bias. *Biometrics, 50*(4), 1088–1101.

Briki, M., Monnin, J., Haffen, E., Sechter, D., Favrod, J., Netillard, C., … Tio, G. (2014). Metacognitive training for schizophrenia: A multicentre randomised controlled trial. *Schizophrenia Research, 157*(1), 99–106.

Coid, J. W., Ullrich, S., Kallis, C., Keers, R., Barker, D., Cowden, F., & Stamps, R. (2013). The relationship between delusions and violence: Findings from the East London first episode psychosis study. *Journal of the American Medical Association Psychiatry, 70*(5), 465–471.

Duval, S., & Tweedie, R. (2000). Trim and fill: A simple funnel-plot-based method of testing and adjusting for publication bias in meta-analysis. *Biometrics, 56*(2), 455–463.

Egger, M., Smith, G. D., Schneider, M., & Minder, C. (1997). Bias in meta-analysis detected by a simple, graphical test. *British Medical Journal, 315*(7109), 629–634.

Eichner, C., & Berna, F. (2016). Acceptance and efficacy of metacognitive training (MCT) on positive symptoms and delusions in patients with schizophrenia: A meta-analysis taking into account important moderators. *Schizophrenia Bulletin, 42*(4), 952–962.

Eisen, J. L., Phillips, K. A., Baer, L., Beer, D. A., Atala, K. D., & Rasmussen, S. A. (1998). The brown assessment of beliefs scale: Reliability and validity. *American Journal of Psychiatry, 155*(1), 102–108.

Favrod, J., Rexhaj, S., Bardy, S., Ferrari, P., Hayoz, C., Moritz, S., … Bonsack, C. (2014). Sustained antipsychotic effect of metacognitive training in psychosis: A randomized-controlled study. *European Psychiatry, 29*(5), 275–281.

Feng, C. Y., Chu, H., Chen, C. H., Chang, Y. S., Chen, T. H., Chou, Y. H., … Chou, K. R. (2012). The effect of cognitive behavioral group therapy for depression: A meta-analysis 2000–2010. *Worldviews on Evidence-Based Nursing, 9*(1), 2–17.

Gawęda, Ł., Krężołek, M., Olbryś, J., Turska, A., & Kokoszka, A. (2015). Decreasing self-reported cognitive biases and increasing clinical insight through meta-cognitive training in patients with chronic schizophrenia. *Journal of Behavioral Therapy and Experimental Psychiatry, 48*, 98–104.

Haddock, G., McCarron, J., Tarrier, N., & Faragher, E. (1999). Scales to measure dimensions of hallucinations and delusions: The psychotic symptom rating scales (PSYRATS). *Psychological Medicine, 29*(4), 879–889.

Harrison, L. L. (1996). Pulling it all together: The importance of integrative research reviews and meta-analyses in nursing. *Journal of Advanced Nursing, 24*(2), 224–225.

Hedges, L. V., & Olkin, I. (1985). *Statistical methods for meta-analysis*. Orlando, FL: Academic Press.

Huedo-Medina, T. B., Sánchez-Meca, J., Marín-Martínez, F., & Botella, J. (2006). Assessing heterogeneity in meta-analysis: Q statistic or I^2 index? *Psychological Methods, 11*(2), 193–206.

Jiang, J., Zhang, L., Zhipei, Z., Wei, L., & Chunbo, L. (2015). Metacognitive training for schizophrenia: A systematic review. *Shanghai Archives of Psychiatry, 27*(3), 149–157.

Kay, S. R., Flszbein, A., & Opfer, L. A. (1987). The positive and negative syndrome scale (PANSS) for schizophrenia. *Schizophrenia Bulletin, 13*(2), 261–276.

Kumar, D., Zia Ul Haq, M., Dubey, I., Dotivala, K. N., Veqar Siddiqui, S., Prakash, R., … Nizamie, S. H. (2010). Effect of meta-cognitive training in the reduction of positive symptoms in schizophrenia. *European Journal of Psychotherapy and Counselling, 12*(2), 149–158.

Kuokkanen, R., Lappalainen, R., Repo-Tiihonen, E., & Tiihonen, J. (2014). Metacognitive group training for forensic and dangerous non-forensic patients with schizophrenia: A randomised controlled feasibility trial. *Criminal Behaviour and Mental Health, 24*(5), 345–357.

Lam, P. C., Ng, P., & Tori, C. (2013). Burdens and psychological health of family caregivers of people with schizophrenia in two Chinese metropolitan cities: Hong Kong and Guangzhou. *Community Mental Health Journal, 49*(6), 841–846.

Lipsey, M. W., & Wilson, D. B. (2001). *Practical meta-analysis* (Vol. 49). Thousand Oaks, CA: Sage.

Moritz, S., Kerstan, A., Veckenstedt, R., Randjbar, S., Vitzthum, F., … Woodward, T. (2011). Further evidence for the efficacy of a metacognitive group training in schizophrenia. *Behaviour Research and Therapy, 49*(3), 151–157.

Moritz, S., Veckenstedt, R., Bohn, F., Hottenrott, B., Scheu, F., Randjbar, S., … Treszl, A. (2013). Complementary group Metacognitive Training (MCT) reduces delusional ideation in schizophrenia. *Schizophrenia Research, 151*(1), 61–69.

Moritz, S., Veckenstedt, R., Randjbar, S., Vitzthum, F., & Woodward, T. (2011). Antipsychotic treatment beyond antipsychotics: Metacognitive intervention for schizophrenia patients improves delusional symptoms. *Psychological Medicine, 41*(9), 1823–1832.

Moritz, S., & Woodward, T. S. (2007). Metacognitive training in schizophrenia: From basic research to knowledge translation and intervention. *Current Opinion in Psychiatry, 20*(6), 619–625.

Ong, H. C., Ibrahim, N., & Wahab, S. (2016). Psychological distress, perceived stigma, and coping among caregivers of patients with schizophrenia. *Psychology Research and Behavior Management, 9*, 211–218.

Oremus, M., Wolfson, C., Perrault, A., Demers, L., Momoli, F., & Moride, Y. (2001). Interrater reliability of the modified Jadad quality scale for systematic reviews of Alzheimer's disease drug trials. *Dementia and Geriatric Cognitive Disorders, 12*(3), 232–236.

Rosenthal, R., & DiMatteo, M. R. (2001). Meta-analysis: Recent developments in quantitative methods for literature reviews. *Annual Review of Psychology, 52*, 59–82.

So, S. H.-W., Chan, A. P., Chong, C. S.-Y., Wong, M. H.-M., Lo, W. T.-L., Chung, D. W.-S., & Chan, S. S. (2015). Metacognitive training for delusions (MCTd): Effectiveness on data-gathering and belief flexibility in a Chinese sample. *Frontiers in Psychology*, *6*(730), 1–13.

van Oosterhout, B., Krabbendam, L., De Boer, K., Ferwerda, J., van der Helm, M., Stant, A., & van der Gaag, M. (2014). Metacognitive group training for schizophrenia spectrum patients with delusions: A randomized controlled trial. *Psychological Medicine*, *44*(14), 3025–3035.

van Oosterhout, B., Smit, F., Krabbendam, L., Castelein, S., Staring, A., & van der Gaag, M. (2016). Metacognitive training for schizophrenia spectrum patients: A meta-analysis on outcome studies. *Psychological Medicine*, *46*(1), 47–57.

doi 10.1111/wvn.12282
WVN 2018;15:130–139