Journal of
Research in Psychopathology
https://dx.doi.org/10.22098/jrp.2022.10463.1076

2022; Vol. 3, No. 8
Pages: 26-33

Original Article

Social cognition training for social cognition and social functioning in people with a psychotic disorder

Aniseh Ahmadnian[1], Zahra Hosseinzadeh[2], Hoda Najafi Birgani[3], Saba Mohammadi[4], Sima Bijan[5*] and Javad Seyyed Jafari[6]

1. M.Sc, Faculty of Humanities, Payame Noor University, Tehran, Iran.
2. M.Sc, Department of Psychology, Garmsar Branch, Islamic Azadi University, Garmsar, Iran.
3. M.Sc, Payame-Noor University, Tehran, Iran.
4. Department of Psychology, Faculty of Education and Psychology, University of Tabriz, Tabriz, Iran.
5. M.Sc., Faculty of Psychology, Shiraz Branch, Islamic Azad University, Shiraz, Iran.
6..Ph.D Candidate in Psychology, Allameh Tabataba'i University, Tehran, Iran.

Abstract

This study aimed to investigate the effect of social cognition training on social cognition and social functioning in people with a psychotic disorder. A quasi-experimental design with pre-test, post-test, and a control group was used for this study. A purposeful sampling method was used to select 20 schizophrenia patients at the Razi psychiatric hospital in Tehran, Iran from 2019 to 2020. The participants were randomized to an experimental group (n=10) and a control group (n=10). The experimental group received ten, 60-minute sessions, but the control group was treated as usual. Eye Test-Test Revised Version Reflective Function Questionnaire for Adult (RFQA) was used to collect data. In addition to descriptive statistics, analysis of covariance (ANCOVA) was used to analyze the data, and SPSS-24 software was used for all analyses. The results showed that F for social cognition ($p < .05$, $F=11.462$) and social functioning ($p < .05$, $F=12.256$) were significant. Based on these findings, these variables differ significantly between the two groups. Taking these findings into consideration, it is possible to conclude that social cognition training is effective in improving social cognition and social functioning. The current study supports the feasibility and potential effectiveness of SCT in Iranian community settings.

Keywords

Social cognition training, social cognition, social functioning, psychotic disorder.

Received: 2022/03/06
Accepted: 2022/04/16
Available Online: 2022/05/22

Introduction

Social cognition is essential for successful human interaction and comprises processes relevant to understanding others' emotions, perspectives, and mental states to interpret, explain, and predict the behavior of others (Arioli, Crespi, & Canessa, 2018). Social cognition refers to a broad range of cognitive processes and skills that allow individuals to interact with and understand others (Gattis, 2018). Social cognition first emerges in infancy and continues to develop through early childhood via the accumulation of different skills. Moreover, cognitive processes that facilitate adaptation to novel and challenging social environments are subject to maturation and degeneration, similar to the patterns observed in other cognitive domains (Arioli et al., 2018). Numerous studies have documented that patients with schizophrenia execute deficient management of the different domains that comprise social cognition (d'Arma et al., 2021; Lindenmayer et al., 2013; Lindenmayer et al., 2018) and that these deficits are related to functional performance (Nahum et al., 2021; Lindenmayer et al., 2018) even more so than neurocognitive deficits (Gil-Sanz et al., 2016; Campos et al., 2018; Nijman et al., 2019). These studies have shown that patients with schizophrenia show deficits across these domains throughout the illness. Social cognition impairments are present in chronic patients (Savla, Vella, Armstrong, Penn, & Twamley, 2013), patients with a first episode of psychosis (Thompson et al., 2012), and individuals who are at ultra-high risk of developing a psychotic disorder (Barbato et al., 2015).

Corresponding author: M.Sc., Faculty of Psychology, Shiraz Branch, Islamic Azad University, Shiraz, Iran.
E-mail: **Sima.Bijan48@gmail.com**

Moreover, these deficits have been associated with poor community functioning, even to a greater extent than neurocognitive deficits (Fernández-Modamio et al., 2021). Advanced age is also associated with cognitive decline, which has marked effects on social functioning (Arioli et al., 2018). In a review carried out by Couture et al. (2006), the authors found that the domains that were more strongly associated with social functioning were emotional processing and social perception. However, subsequent studies also found a relationship between the theory of mind and communal functioning (Clark, Beck, & Aragón, 2019; Iqbal et al., 2020). Social cognition has also been proposed as a mediator variable between non-social cognition or neurocognitive and social functioning (Iqbal, Farid, Ma, & Mehmood, 2018). Importantly, impairment of social functioning in later life has been linked to mental and physical problems, functional disability, and reduced quality of life. Moreover, socio-cognitive impairment is a core feature of many neurodegenerative disorders such as frontotemporal dementia or Alzheimer's disease and also an early and a salient marker of many neurodevelopmental, neuropsychiatric disorders. Consequently, there is considerable research interest in designing socio-cognitive training approaches that foster socio-cognitive development or prevent age-related decline across the human lifespan (Roheger et al., 2022).

Social cognition has therefore become a target for psychosocial interventions aiming to improve social functioning through social cognitive training (Horan, & Green, 2019), a class of interventions also known as social cognition training (SCT). SCT aims to improve social cognition, and ultimately social functioning through repeated practice with social stimuli (e.g., identifying emotions in pictures of faces), and compensatory strategy training (e.g., verbalization of salient facial features) (Paquin et al., 2014). A meta-analysis of all types of SCT found large effects on emotion perception (recognition of emotions), and small to moderate effects of the theory of mind (the ability to recognize and reflect on others' mental states) (Kurtz, & Richardson, 2012). A more recent meta-analysis, including only comprehensive forms of SCT (i.e., targeting multiple areas of social cognition), found a large effect on emotion perception and theory of mind, and a small to moderate effect on attribution style (judgments about the causes of events and others' behavior). Together, these meta-analyses suggest that it is possible to improve social cognition with SCT in people with a psychotic disorder (Kurtz et al., 2016). In a study conducted by Nijman, Veling, Greaves-Lord, Vermeer, Vos, et al. (2019), Interactive Social Cognition Training in Virtual Reality (DiSCoVR) found that people with psychosis showed greater improvements in emotion perception and theory of mind than people with the relaxing disorder. This result lasted for 3 months after the study was completed. Additionally, DiSCoVR group participants improved their social functioning. Furthermore, participants in the DiSCoVR group obtained greater improvement in everyday social functioning (i.e., feelings of acceptance, subjective social cognition, social participation, and social initiative) than those in the VRelax group. Given that VRelax targets stress, anxiety, coping, and stress reactivity, participants in the control group also showed similar or greater improvements in perceived stress and general anxiety. Moreover, a meta-analysis of 46 randomized studies found that all SCT types improved social cognition and functioning compared to treatment as usual (Nijman, Veling, van der Stouwe, & Pijnenborg, 2020). A study conducted using auditory and visual cognitive training combined with social cognition training demonstrated improvement in prosody identification and reward processing in schizophrenia patients (Fisher et al., 2017). The study of Scoriels, Genaro, Keffer, Guimaraes, and Barros-Dumas (2022) concluded that auditory versus visual neuroscience-inspired cognitive training is more effective in improving emotion processing and social cognition in individuals with schizophrenia. Participants from both groups decreased their reaction time for recognizing facial emotions after training. The improvement in emotion processing was associated with better reasoning and problem-solving skills, as well as better global cognition, while the improvement in the theory of mind was associated with better attention.

The most widely studied social cognitive treatment for schizophrenia is Social Cognition and Interaction Training (SCIT), 24-week group therapy and skills training approach. Although SCIT has been implemented in nine countries with over 1.500 patients, few trials of the intervention have been conducted outside and inside Iran (Roberts, Penn, & Combs, 2015). Given that social cognitive norms are known to vary across cultures, it is important to assess SCT's acceptability and effectiveness before using it as part of regular treatment programming outside Iran. Further, despite support in research efficacy trials, few studies have examined whether SCIT leads to measurable improvements in social cognition and functioning when implemented in routine clinical settings by clinicians rather than research staff (Palha, & Roberts, 2019). The primary goal of the current study was to evaluate SCIT's effectiveness in people with a psychotic disorder.

Method

Participants

A quasi-experimental design with pre-test, post-test, and a control group was used for this study. A purposeful sampling was used to select 20 schizophrenic patients at the Razi psychiatric hospital in Tehran, Iran from 2019 to 2020. Twenty schizophrenia patients were being treated at the Razi psychiatric hospital (Social Cognition Training). Throughout the study, the patients also received antipsychotic medications. All participants signed informed consent forms before taking part in the study. The inclusion criteria are a diagnosis of the psychotic disorder according to DSM-5 criteria, a stable phase of the illness, or a structured clinical interview

(e.g., Neuropsychiatric Interview by Razi psychiatrists, Structured Clinical Interview for DSM). Social cognition deficits, as diagnosed by a clinician. Between 18 and 50 years of age; 10 years of illness without significant changes in medication during the 3 months before recruitment. Exclusion criteria were preceding psychotic experience of less than the 1-week duration; psychiatric symptoms that had been defined through a physical illness with a psychotropic effect (e.g. delirium) or acute intoxication (e.g. cannabis use); a prognosis of a critical developmental disorder (e.g., Asperger's syndrome); In the last 6 months, the presence of diseases involving disability and habitual use of alcohol or drugs.

Procedure

The ten patients were randomized to an experimental group, and a control group was formed by ten patients. Both groups received treatment as usual alongside their designated intervention. The participants completed two assessments (Eye Test-Test Revised Version and Reflective Function Questionnaire for Adult): before the intervention (baseline, T0), directly after the intervention (post-treatment, T1). After completion of the study, participants have the opportunity to receive the other treatment, if they wish. Written informed consent will be collected from all participants. This study is carried out by the Declaration of Helsinki. Clinicians approached potential study participants and gauged their interest in this research study. Interested patients and potential participants are contacted and screened by the research team if they express interest or approach the team directly. After this, participants are randomized to experimental and control groups and received ten, 60 minute sessions. When treatment has been completed, the post-treatment assessment takes place. In addition to descriptive statistics, analysis of covariance (ANCOVA) was used to analyze the data, and SPSS-24 software was used for all analyses.

Instrument

Eye Test-Test Revised Version:

Baron-Cohen et al. (2001) developed the Reading the Mind in the Eyes Test (RMET), which measures the ability to discriminate mental states from photographs of pairs of human eyes. It consists of 36 different states of the artists' eyes region developed to measure social cognition in adult edited photographs featuring males (19) and females (17), each image surrounded by four mental state terms (e.g., bored, arrogant, flustered, and preoccupied). The respondent should choose the option out of four choices that best describes the mental state. The participant must select the appropriate word to describe what the person in the picture is thinking or feeling. Baron-Cohen et al. (2001) provide correct answers based on expert consensus, and scores range from 0 to 36. The participants are provided with a glossary of mental state terms during testing. To evaluate the validity, correlation with social skill was used ($r = 0.43$, $p \leq 0.001$) (Baron-Cohen et al., 2001). In the Persian version, the reliability using Cronbach's alpha was significant ($\alpha = 0.72$) (Khorashad et al., 2015). In this study, Cronbach's alpha was 0.72.

Reflective Function Questionnaire for Adult (RFQA):

The RFQ was originally a 54-item questionnaire but was shortened to 8 items following factor analyses conducted because the researchers wanted to develop a brief screening measure of RF (Fonagy et al., 2016). The short-form version of the Reflective Functioning Questionnaire (RFQ-8; Fonagy et al., 2016) was used to evaluate participants' capacity to think about themselves and others in terms of mental states. The RFQ-8 has eight items rated on a 7-point Likert scale from 1 (completely disagree) to 7 (completely agree). The median-scoring method is used to obtain two sub-scales (Certainty and Uncertainty) reflecting distinct impairments in understanding the interplay between internal states and behaviors (Fonagy et al., 2016). Certainty scale indicates hyper-mentalization, meaning that the respondent assumes being excessively knowledgeable about his mental state and those of others, going far beyond the available evidence (Badoud et al., 2015). The six items used for the Certainty scale are restored so that the original responses ranging from 1 to 7 are scored 3, 2, 1, 0, 0, 0, 0. In this way, low agreement on these items is indicative of hyper-mentalization, whereas moderate agreement reflects adequate levels of certainty about mental states. Conversely, the Uncertainty scale refers to hypo-mineralization, meaning that the respondent shows a complete lack of knowledge about mental states and mainly relies on concrete thinking (Badoud et al., 2015). Additionally, the six items measuring Uncertainty are re-scored based on the median-score method: original responses (from 1 to 7) are scored 0, 0, 0, 0, 1, 2, 3, meaning that low to moderate levels of the agreement reflect adequate knowledge that mental states are opaque, while high levels of the agreement reflect a completely inadequate understanding of one's own and others' mental states. A total of four out of eight items of the RFQ-8 are from one of the two subscales (items, 1, 3, and 7), while the remaining four items are from the Certainty scale and the Uncertainty scale. Both the original English version and the short version of the questionnaire (Badoud et al., 2015; Fonagy et al., 2016) showed good psychometric properties. The RFQ demonstrated acceptable internal consistency coefficients in this study ($\alpha = .70$ for the Uncertainty scale and $\alpha = .78$ for the Certainty scale). The internal consistency was reported to be 0.77 using Cronbach's alpha method for the overall score. The correlation of each item with the total score for the whole scale ($r = 0.29$, $P \leq 0.001$) was at the desired level (Fonagy et al., 2016). This questionnaire was translated and validated in this study. The reliability of this scale was also examined through internal consistency, with Cronbach's

alpha, which was significant (α = 0.71) (Khabir, Mohamadi, Rahimi, & Dastgheib, 2020).

Social Cognition Training:

Using guidelines from the stage model of psychotherapy development, SCIT was developed as a manual that included the following items (Penn et al., 2007): an overview of SCIT, a description of its phases, essential elements of treatment, recommended, and required, a structure and format for the sessions, content, and goals. The SCIT consists of three phases: training emotions, figuring out situations, and integrating them. Each session lasts 60 minutes and is conducted by one or two therapists. The primary purpose of emotion training is to teach clients about emotions, how they relate to thoughts and situations, and how to perceive emotions using computer programs. Another goal of emotion training is to help clients distinguish between legitimate suspicion and unjustified suspicion. The goals of figuring out situations are to teach clients how to avoid jumping to conclusions, to improve cognitive flexibility in social situations, and to distinguish between social "facts" and social "guesses." Supporting materials and activities are used to accomplish these goals. Clients are asked to independently generate facts based on photographs of people acting together (e.g., "there are two women in this picture") and to compare these facts with a second, independently generated list of predictions about what is happening or what their relationship is. The exercise typically shows excellent agreement among clients regarding facts, but greater variability regarding guesses, with the lesson being that it is preferable to draw conclusions based on facts rather than guesses. Researchers also played a variation of the game 20 questions, in which clients were encouraged to ask more questions (and penalized for making early guesses), to improve their tolerance for ambiguity and reduce their tendency to jump to conclusions. In the integration phase, clients can put into practice what they learned in SCIT. In this phase, clients share troubling interpersonal situations with the therapist. They are then guided through the process of identifying the other person's affective, distinguishing facts from guesses, avoiding premature conclusions, and developing a solution or plan of action. As an example, a client may believe that his roommate is angry with him. In collaboration with the group, the client discussed the roommate's facial features and how they matched the emotions discussed. It then prompts the client to differentiate between facts (for example, the roommate told him that he was too busy) and guesses (for example, the roommate was angry at him) and suggest possible solutions, such as doing nothing, asking a friend of the roommate about his mood, or asking the roommate if something is wrong. The latter solution involves role-playing with the therapist or other clients, which improves the client's social skills in this situation.

Results

The number of participants (N = 20) had shown that the M and SD of the ages of the experimental and control groups were in the following ranges: (M age = 38.7; SD = 13.70); (M age = 36.23; SD = 14.87).

Table 1. Descriptive indicators of research variables in pre-test and post-test

Variables	Groups	Experimental	Control
		Mean ±SD	Mean ±SD
Social cognition	Pre-test	33.13±5.16	33.23±4.86
	Post-test	36.33±6.66	34.43±6.67
Social functioning	Pre-test	34.24±4.91	33.27±4.88
	Post-test	36.27±6.58	34.67±6.98

To determine the normalization of the distribution of scores, the Kolmogorov–Smirnov test was used, which was confirmed due to the lack of significance obtained from the normal distribution of scores. The results of the test of pre-test slop of regression and post-test grades in the experimental and control group showed that the slope of regression in both groups was equal ($p > .05$). The results of the Levene's test for studying variance of variables dependent variables in the groups showed that the variance of the social cognition and social functioning variables ($p > .05$) in the group was equal. In this study, the Box test for evaluating the equality of covariance matrix variables in the experimental and control groups also showed that the covariance matrix dependent variables in the groups were equal ($F = 0.811$, BOX M=5.137, $p > .05$). After evaluating multivariate covariance analysis, the test results showed a significant difference between social cognition and social functioning groups and control groups (Wilks Lambda=0.204, $F = 281.08$, $p < .01$).

Table 2. The results of Univariate Analysis of Covariance of variables

Source	Dependent Variable	df	Mean Square	F	Sig.
Group factor	Social cognition	1	53.108	11.462	0.004
	Social functioning	1	48.238	12.256	0.002

According to Table 2, F for social cognition ($p < .05$, $F = 11.462$) and social functioning ($p < .05$, $F = 12.256$) are significant. Based on these results, these variables differ significantly between groups. Taking these results into consideration, it is possible to conclude that social cognition training is effective at improving social cognition and social functioning.

Discussion

The main objective of this experiment was to assess the effect of social cognition training on social cognition and social functioning. Furthermore, it was found that training programs tend to address cognitive improvements at larger rather than focusing on specific deficits identified by a person's profile which is most likely to allow more people to receive training without the need for neuropsychological or socio-cognitive evaluations. Numerous studies, including Trujillo et al., 2017; Lindenmayer et al., 2018; Nijman et al., 2019; Palha and Roberts., 2019; Fernández-Modamio et al., 2020; Nahum et al., 2021, and Barbato et al. (2015) have found that improvements in social cognition are mediated by neurocognitive improvements following Cognitive Enhancement Training, a form of SCT combining social cognition with neurocognitive training. Therefore, the neurocognitive function may be a mediator of treatment outcome in the present study. However, little is known about the mediators of SCT treatment efficacy (Nijman et al., 2019). Kurtz et al. (2016) demonstrated that illness duration and education level moderated the effects of treatment on social cognition in SCT. While improving cognitive deficits is commendable, it is equally important to consider functional outcomes when it comes to the challenges individuals with schizophrenia face when trying to reintegrate into the workforce or establish social contacts. Many researchers consider social cognition to be strongly correlated with positive functional outcomes (Horan et al., 2019; d'Armaet al., 2021).

In social cognition training, repeated practice with social stimuli is used to improve social cognition and social function (e.g., identifying emotions in face pictures), as well as compensatory strategy development (e.g., verbalizing salient facial features) (Paquin et al., 2014). One meta-analysis, which included only comprehensive forms of SCT (i.e., targeting multiple areas of social cognition), reported large effects on emotion perception and theory of mind, and small to moderate effects on attribution style (decisions about the causes of events and others' behavior) (Kurtz et al., 2016). Based on these meta-analyses, it appears that social cognition can indeed be improved with SCT in individuals with a psychotic disorder (Nijman et al., 2019).

Additionally, Palha, Roberts, and Nijman et al. (2019), Nijman et al. (2020) and Nahum et al., (2021) support our results. According to the meta-analysis by Roheger et al. (2022), strategy, coaching programs (drills and strategy training) have shown strong effects on both functional outcomes and targeted social cognition skills in individuals with socio-cognitive deficits. Accordingly, Paquin et al., (2014) found that drill and strategy training were the most common types of socio-cognitive retraining. It seems intuitive that learning and integrating a social skill requires that it be practiced in a social setting, which was consistent with our findings when analyzing the studies. Studies of socio-cognitive functioning or social adjustment are more likely to focus on social functioning and social adjustment following training than on addressing neurocognitive deficits (Horan et al., 2019; d'Armaet al., 2021; Roheger et al., 2022). In social cognitive psychology, the field of implicit learning suggests drill and practice or other forms of implicit instruction can also benefit socio-cognition (Paquin et al., 2014; Roheger et al., 2022). Compared to other forms of treatment, social cognitive treatment yielded more rapidly detectable effects (Palha, & Roberts., 2019).

Some authors have argued that cognitive remediation can improve some aspects of social cognition, although the combination of cognitive remediation plus social cognition training is more effective (Nijman et al., 2019; Palha and Roberts., 2019; Fernández-Modamio et al., 2020; Nahum et al., 2021). Inconsistent with the study results, Gil-Sanz et al (2016) did not show an enhancement of social cognitive abilities in the control task group that received cognition training. Results obtained showed that deficits in social cognition can be ameliorated, although it could be necessary to have booster sessions to maintain the benefits of the training and to complement the SCPT with another type of interven aimed specifically at transferring the benefits of social cognition training to "real" life (Palha, & Roberts., 2019).

Several limitations should be considered when interpreting our results. Because the experimental group consisted of only ten subjects, the results of this study should be interpreted with care. To obtain more conclusive data, a larger sample would be necessary. It should also be noted that the sample includes non-hospitalized patients with long chronicity and low symptomatology profile, making, therefore, these results inapplicable to patients with other clinical characteristics (e.g., patients with first psychotic episodes, inpatients, or patients with higher symptomatology). Social cognition training in

individuals with schizophrenia has been proven to be successful in the improvement of the patient's social cognitive functioning, especially in the areas of emotion recognition and theory of mind, thus having a significant impact on the improvement in the quality of life of these individuals and their loved ones. Even though randomized controlled trials have not yet been carried out and replication across different settings and laboratories is still required, our initial findings suggest that SCT holds promise as a best-practice design. There is a possibility that the interaction of these disorders could represent a significant challenge in training. However, very few studies have looked at the impact of these presentations, and it would be crucial to do so, as it would increase the ecological validity and generalizability of the findings. Moreover, studies including long-term effects observations on these cognitive improvements are needed to fill this gap in the existing literature.

Conclusion

In summary, the current study supports the feasibility and potential effectiveness of SCT in Iranian community settings. In conjunction, the major results obtained indicated that SCT improved social cognition in patients with psychotic disorders, and was well received by clinicians and clients.

Disclosure Statement

No potential conflict of interest was reported by the authors.

ORCID

Sima Bijan: https://orcid.org/0000-0002-3338-0113

References

Arioli, M., Crespi, C., & Canessa, N. (2018). Social cognition through the lens of cognitive and clinical neuroscience. *BioMed research international*, *2018*. doi:10.1155/2018/4283427

Barbato, M., Liu, L., Cadenhead, K. S., Cannon, T. D., Cornblatt, B. A., McGlashan, T. H., ... & Addington, J. (2015). Theory of mind, emotion recognition and social perception in individuals at clinical high risk for psychosis: Findings from the NAPLS-2 cohort. *Schizophrenia Research: Cognition*, *2*(3), 133-139. doi:10.1016/j.scog.2015.04.004

Baron-Cohen, S., Wheelwright, S., Hill, J., Raste, Y., & Plumb, I. (2001). The "Reading the Mind in the Eyes" Test revised version: a study with normal adults, and adults with Asperger syndrome or high-functioning autism. *The Journal of Child Psychology and Psychiatry and Allied Disciplines*, *42*(2), 241-251. doi:10.1017/S0021963001006643

Badoud, D., Luyten, P., Fonseca-Pedrero, E., Eliez, S., Fonagy, P., & Debbané, M. (2015). The French version of the Reflective Functioning Questionnaire: Validity data for adolescents and adults and its association with non-suicidal self-injury. *PloS one*, *10*(12). doi:10.1371/journal.pone.0145892

Campos, C., Santos, S., Gagen, E., Machado, S., Rocha, S., Kurtz, M. M., & Rocha, N. B. (2016). Neuroplastic changes following social cognition training in schizophrenia: a systematic review. *Neuropsychology Review*, *26*(tion3), 310-328. doi:10.1007/s11065-016-9326-0

Clark, M. S., Beck, L. A., & Aragón, O. R. (2019). Relationship initiation: Bridging the gap between initial attraction and well-functioning communal relationships. In B. H. Fiese, M. Celano, K. Deater-Deckard, E. N. Jouriles, & M. A. Whisman (Eds.), *APA handbook of contemporary family psychology: Foundations, methods, and contemporary issues across the lifespan* (pp. 409–425). American Psychological Association. doi:10.1037/0000099-023.

Couture, S. M., Penn, D. L., & Roberts, D. L. (2006). The functional significance of social cognition in schizophrenia: a review. *Schizophrenia Bulletin*, *32*(suppl_1), S44-S63. doi:10.1093/schbul/sbl029

d'Arma, A., Isernia, S., Di Tella, S., Rovaris, M., Valle, A., Baglio, F., & Marchetti, A. (2021). Social cognition training for enhancing affective and cognitive theory of mind in schizophrenia: A systematic review and a meta-analysis. *The Journal of Psychology*, *155*(1), 26-58. doi:10.1080/00223980.2020.1818671

Fernández-Modamio, M., Gil-Sanz, D., Arrieta-Rodríguez, M., Santacoloma-Cabero, I., Bengochea-Seco, R., González-Fraile, E., & Muñiz, J. (2021). A randomized study on the efficacy of the Social Cognition Training Program-brief version in a sample of patients with schizophrenia. *Psychiatric Rehabilitation Journal*, *44*(1), 1. doi:10.1037/prj0000410

Fisher, M., Nahum, M., Howard, E., Rowlands, A., Brandrett, B., Kermott, A., Woolley, J., & Vinogradov, S. (2017). Supplementing intensive targeted computerized cognitive training with social cognitive exercises for people with schizophrenia: An interim report. *Psychiatric Rehabilitation Journal*, *40*(1), 21–32. doi:10.1037/prj0000244

Fonagy, P., Luyten, P., Moulton-Perkins, A., Lee, Y. W., Warren, F., Howard, S., ... & Lowyck, B. (2016). Development and validation of a self-report measure of mentalizing: The reflective functioning questionnaire. *PLoS One*, *11*(7), e0158678. doi:10.1371/journal.pone.0158678

Gattis, M. (2018). Social cognition. In M. Bornstein (Ed.), The *SAGE encyclopedia of lifespan human development* (pp. 2033–2034). Sage Publications Inc. doi:10.4135/9781506307633.n756

Gil-Sanz, D., Fernández-Modamio, M., Bengochea-Seco, R., Arrieta-Rodríguez, M., & Pérez-Fuentes, G. (2016). Efficacy of the social cognition training program in a sample of outpatients with schizophrenia. *Clinical schizophrenia & related psychoses*, *10*(3), 154-162. doi:10.3371/1935-1232.10.3.154

Horan, W. P., & Green, M. F. (2019). Treatment of social cognition in schizophrenia: Current status and future directions. *Schizophrenia Research*, *203*, 3-11.Treatment of social cognition in schizophrenia: Current status and future directions. *Schizophrenia Research*, *203*, 3-11. doi:10.1016/j.schres.2017.07.013

Iqbal, S., Farid, T., Khan, M. K., Zhang, Q., Khattak, A., & Ma, J. (2020). Bridging the gap between authentic leadership and employees' communal relationships through trust. *International Journal of Environmental Research and Public Health*, *17*(1), 250. doi:10.3390/ijerph17010250

Iqbal, S., Farid, T., Ma, J., & Mehmood, Q. (2018). Cultivating employees' communal relationship and organizational citizenship behavior through authentic leadership: studying the influence of procedural justice. *Psychology Research and Behavior Management*, *11*, 545. doi:10.2147/PRBM.S179019

Javed, A., & Charles, A. (2018). The importance of social cognition in improving functional outcomes in schizophrenia. *Frontiers in psychiatry*, *9*, 157. doi:10.3389/fpsyt.2018.00157

Khabir, L., Mohamadi, N., Rahimi, C., & Dastgheib, S. A. (2020). The Effectiveness of Group Therapy Based on Mentalization and Dialectical Behavior on Attachment Styles, Social Cognition, Mentalization: A Randomized Controlled Clinical Trial. doi:10.5812/mejrh.104149

Khorashad, B. S., Baron-Cohen, S., Roshan, G. M., Kazemian, M., Khazai, L., Aghili, Z., ... & Afkhamizadeh, M. (2015). The "Reading the Mind in the Eyes" test: investigation of psychometric properties and test-retest reliability of the Persian version. *Journal of autism and developmental disorders*, *45*(9), 2651-2666. doi:10.1007/s10803-015-2427-4

Kurtz, M. M., & Richardson, C. L. (2012). Social cognitive training for schizophrenia: a meta-analytic investigation of controlled research. *Schizophrenia Bulletin*, *38*(5), 1092-1104. doi:10.1093/schbul/sbr036

Kurtz, M. M., Gagen, E., Rocha, N. B., Machado, S., & Penn, D. L. (2016). Comprehensive treatments for social cognitive deficits in schizophrenia: A critical review and effect-size analysis of controlled studies. *Clinical psychology review*, *43*, 80-89. doi:10.1016/j.cpr.2015.09.003

Lindenmayer, J. P., Khan, A., McGurk, S. R., Kulsa, M. K. C., Ljuri, I., Ozog, V., ... & Parker, B. (2018). Does social cognition training augment response to computer-assisted cognitive remediation for schizophrenia?. *Schizophrenia Research*, *201*, 180-186. doi:10.1016/j.schres.2018.06.012

Lindenmayer, J. P., McGurk, S. R., Khan, A., Kaushik, S., Thanju, A., Hoffman, L., ... & Herrmann, E. (2013). Improving social cognition in schizophrenia: a pilot intervention combining computerized social cognition training with cognitive remediation. *Schizophrenia Bulletin*, *39*(3), 507-517. doi:10.1093/school/sbs120

Nahum, M., Lee, H., Fisher, M., Green, M. F., Hooker, C. I., Ventura, J., ... & Vinogradov, S. (2021). Online social cognition training in schizophrenia: a double-blind, randomized, controlled multi-site clinical trial. *Schizophrenia Bulletin*, *47*(1), 108-117. doi:10.1093/schbul/sbaa085

Nijman, S. A., Veling, W., van der Stouwe, E. C., & Pijnenborg, G. H. (2020). Social cognition training for people with a psychotic disorder: A network meta-analysis. *Schizophrenia bulletin*, *46*(5), 1086-1103. doi:10.1093/schbul/sbaa023

Nijman, S. A., Veling, W., Greaves-Lord, K., Vermeer, R. R., Vos, M., Zandee, C. E., ... & Pijnenborg, G. H. (2019). Dynamic Interactive Social Cognition Training in Virtual Reality (DiSCoVR) for social cognition and social functioning in people with a psychotic disorder: study protocol for a multicenter randomized controlled trial. *BMC psychiatry*, *19*(1), 1-11. doi:10.1186/s12888-019-2250-0

Palha, & Roberts, D. (2019). Palha, F., & Roberts, D. (2019). Effectiveness of Social Cognition and Interaction Training (SCIT) in community settings in Portugal. *Health*, *11*(12), 1581-1590. doi:10.4236/health.2019.1112119

Paquin, K., Wilson, A. L., Cellard, C., Lecomte, T., & Potvin, S. (2014). A systematic review on improving cognition in schizophrenia: which is the more commonly used type of training, practice, or strategy learning?. *BMC psychiatry*, *14*(1), 1-19. doi:10.1186/1471-244X-14-139

Penn, D. L., Roberts, D. L., Combs, D., & Sterne, A. (2007). Best practices: the development of the social cognition and interaction training program for schizophrenia spectrum disorders. *Psychiatric Services*, *58*(4), 449-451. doi:10.1176/ps.2007.58.4.449

Roberts, D. L., Penn, D. L., & Combs, D. R. (2015). *Social cognition and interaction training (SCIT): Group psychotherapy for schizophrenia and other psychotic disorders, clinician guide*. Oxford University Press.. doi:10.1093/med:psych/9780199346622.001.0001

Roheger, M., Hranovska, K., Martin, A.K. *et al.* (2022). A systematic review and meta-analysis of social cognition training success across the healthy lifespan. *Sci Rep* 12**,** 3544. doi:10.1038/s41598-022-07420-z

Savla, G. N., Vella, L., Armstrong, C. C., Penn, D. L., & Twamley, E. W. (2013). Deficits in domains of social cognition in schizophrenia: a meta-analysis of the empirical evidence. *Schizophrenia Bulletin*, *39*(5), 979-992. doi:10.1093/schbul/sbs080

Scoriels, L., Genaro, L. T., Keffer, S., Guimarães, A. L., Barros-Dumas, B., Mororó, L. G., ... & Panizzutti, R. (2022). Changes in emotion processing and social cognition with auditory versus visual neuroscience-informed cognitive training in individuals with schizophrenia. *Schizophrenia Research*, *241*, 267-274. doi:10.1016/j.schres.2022.02.013

Thompson, A., Papas, A., Bartholomeusz, C., Allott, K., Amminger, G. P., Nelson, B., ... & Yung, A. (2012). Social cognition in clinical "at-risk" for psychosis and first-episode psychosis populations. *Schizophrenia Research*, *141*(2-3), 204-209. doi:10.1016/j.schres.2012.08.007

Trujillo, S., Trujillo, N., Lopez, J. D., Gomez, D., Valencia, S., Rendon, J., ... & Parra, M. A. (2017). Social cognitive training improves emotional processing and reduces aggressive attitudes in ex-combatants. *Frontiers in psychology*, *8*, 510. doi:10.3389/fpsyg.2017.00510