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Intervention Programs Focusing on Social Cognition in Schizophrenia

Şizofrenide Sosyal Bilişe Odaklanan Müdahale Programları

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ABSTRACT

Social cognitive functions make it possible to correctly recognize and interpret the emotions and mental states of others in the social environment, to understand their intentions correctly and to react accordingly. Therefore, these functions arecritical for healthy social interactions and professional success in human life. Social cognitive functions are impaired in many psychiatric and neurological diseases and this impairment negatively affects almost all areas of patients' lives, albeit in different dimensions. According to research findings revealing the relationship between social cognition and social functioning, social cognition should be one of the treatment targets for many diseases. Recently, there has been increasing interest in interventions that target the improvement of these functions. In this article, these training programs, research findings and assessment tools used in these studies are discussed in the specific case of schizophrenia.
Keywords: Schizophrenia, social cognition, social cognitive training, social functioning, functional outcome

ÖZ

Sosyal çevredeki diğer kişilerin duygularını ve zihinsel durumlarını doğru tanımayı ve yorumlamayı, niyetlerini doğru anlayabilmeyi ve buna uygun tepki verebilmeyi olanaklı kılan sosyal bilişsel işlevler insan hayatında sağlıklı sosyal etkileşimler kurabilmek ya da mesleki başarı için kritik önem taşır. Sosyal bilişsel işlevler, psikiyatrik ve nörolojik birçok hastalıkta bozulmakta ve bu bozulma farklı boyutlarda olsa da hastaların yaşamlarının hemen hemen tüm alanlarını olumsuz etkilemektedir. Sosyal biliş ile sosyal işlevselliğin ilişkisini ortaya koyan araştırma bulgularına göre sosyal biliş birçok hastalık için tedavi hedeflerinden biri olmalıdır. Son zamanlarda bu işlevlerin iyileşmesini hedef olarak belirleyen müdahalelere yönelik ilgi de giderek artmaktadır. Bu yazıda şizofrenik bozukluk özelinde bu eğitim programlarına, araştırma bulguları ve bu araştırmalarda kullanılan değerlendirme araçlarına odaklanılmıştır.
Anahtar sözcükler: Şizofreni, sosyal biliş, sosyal biliş eğitimi, sosyal işlevsellik, işlevsel sonuç

Introduction

Social cognition is a cognitive process in which people perceive and interpret the thoughts, intentions, and behaviors of others and produce appropriate responses. This process involves the mental processes that underlie social interactions. It can also be defined as an individual's ability to create healthy mental representations of social interactions between themselves and others, and to use these representations to guide their own behaviour (Adolphs 2001, Fiske and Taylor 2013).

Social cognition consists of four main areas: emotion processing, social perception and knowledge, theory of mind, and attributional style (Pinkham 2014). Emotion processing, which includes emotion perception, refers to identifying, understanding, and managing emotions (Green et al. 2008). This process may be at a low perceptual level that involves perceiving and recognizing emotions based on bodily cues. It can also occur at a higher level where emotions are managed, such as understanding emotions and responding accordingly (Pinkham et al. 2013). Social perception is related to the perception of relationships between people. The processing of social information and cues about interactions between other people, including people themselves, and in the social world is also considered a function of social cognition (Beer and Ochsner 2006, Green et al. 2008). Having good social cognition skills makes it possible to understand social information characterized by social situations such as social roles, rules, and goals. The most researched subcomponent of social cognition is the theory of mind (ToM), which is defined as the ability to understand that other people may have different mental states, such as different intentions or beliefs, than oneself and that individuals may have different perspectives. Theory of mind skills includes the ability to recognize false beliefs, clues, intentions, lies, metaphors, and ironies (Brüne, 2005). There are two types of ToM: cognitive and affective. Cognitive ToM is the

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ability to infer another person's thoughts and current cognitive state, while the ability to understand others' emotions and how they feel can be defined as affective ToM (Shamay-Tsoory 2010). Attributional styles, which show how people explain the cause of an event, reflect people's tendencies to explain the causes of social events or interactions (Pinkham et al. 2013). Attributional bias is a cognitive bias that refers to systematic errors that can be made when evaluating social events or finding the causes of an event. These briefly defined subcomponents of social cognition are also used as outcome measures in intervention studies on social cognition.

These social cognitive functions are central to human life because they are interrelated with daily life and interactions. For example, facial expressions are one of the social cues. It is critical to be able to recognize the emotions and mental states of others in the social environment from their faces, to interpret them correctly, to infer their intentions, and to form appropriate responses to this information. It is essential for all aspects of life, such as healthy social interaction with family members, friends, or other close people, and success in professional life.

This article aims to summarize the efforts to improve social cognition in schizophrenia, in which social cognitive functions are significantly impaired. For this purpose, firstly, the importance of social cognition and rehabilitation in schizophrenia is emphasized, intervention programs focusing on social cognition and the common goals of these programs are mentioned, and then the findings of the research conducted in this field and frequently used social cognition tests are included.

Social Cognition in Clinical Samples

The Diagnostic and Statistical Manual of Mental Disorders - Fifth Edition (DSM-5), updated in 2013 by the American Psychiatric Association (APA), defines social cognitive functions as one of the main functional areas that may be affected in neurocognitive disorders. Impairments in these functions are found in a wide range of clinical samples, from neurological disorders such as behavioral-variant frontotemporal dementia, in which impairments in ToM skills are seen from the early stages of the disease, to developmental disorders such as autism spectrum disorder (ASD), in which social cognitive impairment is considered one of the main symptoms of the disease (Kennedy and Adolphs 2012). In addition, there has also been a focus on whether social cognitive skills are affected in other disorders such as schizophrenia (Brüne, 2005), major depressive disorder (Ladegaard et al. 2014), bipolar disorder (Montag et al. 2010), anorexia nervosa (Brockmeyer et al. 2016) and traumatic brain injury (McDonald et al. 2003). Although impairment in social cognitive functions is seen at different levels in these clinical samples, it is common (Henry et al. 2016).

Significance of Social Cognition and Rehabilitation in Schizophrenia

Schizophrenia is a chronic psychiatric illness that significantly affects an individual's thinking, perception processes, emotions, and behaviors and also leads to impairment in cognitive functions. Schizophrenia may have positive symptoms such as delusions or hallucinations, negative symptoms such as loss of willpower, emotional and social withdrawal, as well as disorganized speech or behavioral disorders (APA, 2013).

It is stated that impairment in social cognitive functions in schizophrenia is more prominent and severe than in other psychiatric diseases (van Neerven et al. 2021). Patients have significant difficulties especially in emotion recognition and ToM decisions and exhibit attribution bias, especially in the form of negative interpretation of ambiguous social cues (McDonald and Cassel 2017). Since attribution bias is an important and prominent feature of social cognition disorder in schizophrenia patients, it is one of the important targets for social cognition improvement programs (McDonald and Cassel 2017).

Impairments in social cognitive functions are strongly associated with functional outcomes, especially social skills and social problem-solving (Couture et al. 2006, Javed and Charles 2018). In other words, the interpersonal communication or social skills of a person who has difficulty with these functions may be adversely affected, and social functioning, including social behavior, may also be impaired. One of the most challenging areas for patients with schizophrenia is the difficulties they experience in terms of social functioning. According to Horan et al (2009), in order to reduce these difficulties and improve this highly treatment-resistant aspect, it is necessary to first understand the determinants that cause functional difficulties, and social cognition is an important one of these determinants.

Social cognition is thought to mediate between neurocognition and real-life social functioning (Addington et al. 2006, Brekke et al. 2005, Vauth et al. 2004). Research also suggests that social cognition is more associated with functional consequences of the disease than basic cognitive functions (Fett et al. 2011). For example, in a study

conducted with people diagnosed with schizophrenia, a significant relationship was found both cross-sectionally and prospectively between perception of emotion and functioning in working life and independent living (Kee et al. 2003). Furthermore, according to the review by Couture et al. (2006), emotion perception has a fairly consistent but mild relationship with social functioning, social skills, and social behaviors. In another study, it was shown that in clinically stable schizophrenia patients, cognitive ToM skill is strongly associated with many dimensions of social functioning such as interpersonal communication, independence, and performance, indicating its impact on real-world social functioning (Brown et al. 2014). For these reasons and because it is at the center of daily life functioning, social cognition is an important treatment target as well as other neurocognitive functions (Yamada et al. 2019).

Researchers who have long focused on the relationship between negative symptoms and neurocognitive functions in schizophrenia have recently shifted their attention to the relationship between negative symptoms and social cognition. Lincoln et al. (2011) examined the relationship between social cognition and negative symptoms in a large and heterogeneous sample of patients. In this study, the subcomponents of social cognition and their interaction with each other explained more than one-third of the variance in negative symptoms after controlling for neurocognitive functions and depression. According to Yolland et al. (2021), negative symptoms are associated with social cognition more than other neurocognitive functions, and it is thought that training programs targeting social cognition may also improve some negative symptoms. In this case, a multifaceted intervention approach that takes into account social cognitive functions and negative symptoms seems necessary, especially for patients with negative symptoms who are less active in seeking help.

Taking into consideration that it is seen in many different psychopathologies, that it has such functional importance, and the research findings on these issues, there is an increasing interest in interventions aimed at improving social cognitive functioning (Horan et al. 2009, Wolwer et al. 2005). Social cognitive training programs are programs that aim to improve social cognitive disorders associated with real-life social situations and social functioning. The contribution of these interventions to social recovery is promising, including improved functional outcomes in many psychiatric disorders, patients' more comfortable and satisfying lives in society, participation in social and professional activities, satisfying social relationships, and access to a good living environment (Javed and Charles 2018). It is very necessary to include steps related to social cognitive functions in rehabilitation programs.

However, the literature on the rehabilitation of social cognitive functions is quite limited. This may be because impairments in social cognition are not yet fully understood based on diseases, the lack of an agreed operational definition, and the relative novelty of the topic (McDonald and Cassel 2017). Moreover, while there is a strong tradition of rehabilitation for patients with schizophrenia within the scope of psychiatric disorders, this is not the case for many other disorders such as mood disorders. In the following part of the article, three different types of training programs in which interventions for social cognitive functions in schizophrenia are included in the treatment and rehabilitation process, the research findings conducted by following these programs and the evaluation tools used in these studies are discussed.

Interventions for Social Cognitive Functions in Schizophrenia

Broad-Based Interventions

In these programs, training on the subcomponents of social cognition is embedded in social skills training or intervention programs developed to improve basic neurocognitive functions such as attention and memory. The best-known example of broad-based interventions is Cognitive Enhancement Therapy (CET), which combines neurocognitive training with social cognition training (Hogarty and Flesher 1999). Long-term studies incorporating training exercises on social cognition in schizophrenia into large multicomponent programs have shown improved performance on social cognitive tests such as emotion recognition tests (Bell et al. 2001, Hogarty et al. 2004, van der Gaag et al. 2002).

Integrated Psychological Therapy (IPT) (Brenner et al. 1992) is a systematic and effective rehabilitation approach with both neurocognitive and social cognitive sub-programs. In the social cognitive sub-program, patients' social perception, emotional perception, and emotional expression skills are particularly addressed. Integrated Neurocognitive Therapy (INT), which is based on Integrated Psychological Therapy, aims to improve patients' quality of life and reintegration into society. It is also the first treatment guideline to include the areas identified by the Measurement and Treatment Research to Improve Cognition in Schizophrenia (MATRICS), which defines 11 areas of neurocognitive and social cognitive functioning related to schizophrenia (Roder and Müller, 2015).

Multi-component programs are very comprehensive. Due to the scope and intensity of their content, there are some challenges to their implementation in the clinical setting. For example, such programs usually last for 12-18 months, and two sessions per week are recommended. Moreover, due to the multi-component nature of these programs, it is difficult to specifically attribute positive outcomes to social cognitive training exercises or other interventions that comprise components of the program other than social cognition.

Targeted Programs

More recently, programs are being developed that focus on a single subcomponent of social cognition, such as emotion processing, and aim to improve that subcomponent. Training of Affect Recognition (TAR) developed by Wölwer et al. (2005) to improve the difficulties in recognizing emotions from faces that are experienced by patients diagnosed with schizophrenia can be given as an example of these programs. The TAR program is a social cognitive remediation program that consists of 12 group sessions, each lasting 45-60 minutes, and conducted twice a week. This computer-based training focuses first on recognizing certain features of faces that are associated with the most basic emotional states (facial affect perception). In the following stages, the role of more ambiguous facial expressions in social, behavioral, and situational contexts is addressed through complex social scenes.

In a randomized controlled trial conducted by Wölwer et al. (2005), significant improvements were observed in the recognition of facial affect and even working memory performance of patients diagnosed with schizophrenia who completed the training. In this study, this improvement in social cognition was not observed in patients who continued their usual treatment without receiving any special training or any other program focusing on other neurocognitive functions such as attention, memory, and executive functions for the same time as TAR training.

Comprehensive Programs on Social Cognition

These are programs that comprehensively focus on social cognition and broadly address social cognition subdomains and impairments in social cognition. For example, Social Cognition and Interaction Training (SCIT), developed by Penn et al. (2007), addresses social cognitive functions broadly, including emotion processing, ToM, and attributional styles. This 18-session intervention program is designed for small groups of 6-8 patients. It involves a series of interactive exercises such as distinguishing between fact and supposition, avoiding jumping to conclusions about suspicious situations, and obtaining information about others' feelings and beliefs. The first phase of SCIT focuses on emotion training, the second phase on understanding social situations, and the final phase on integrating what is learned in the SCIT program into real life. According to a follow-up study conducted by Combs et al. (2009), it was reported that the positive effects of SCIT on social functioning continued for 6 months.

Social Cognitive Skills Training, developed by Horan et al. (2009) by combining various skill development strategies frequently used in psychiatric rehabilitation, goes beyond the content of the SCIT program and provides the following: 1) dissection of complex social-cognitive processes into their parts, 2) initially teaching social cognitive skills at the most basic level and gradually increasing the complexity of this skill acquisition, 3) repetition and practice to automate these skills. The use of instructive presentations, the progression of exercises from simple to complex, group applications, and the high relevance of the training to the real world increase the participants' interest in the program. The training consists of two phases of six sessions. The first phase is the emotion and social perception phase (i.e. understanding what others are feeling). These sessions initially focus on identifying basic emotions from faces and voices through instructive presentations. A variety of emotion-related resources are used, such as still digital photographs, audio clips, dynamic film clips of faces (Tottenham 2002), computer-based facial emotion perception exercises (Wölwer et al. 2005), and facial mimic exercises (Penn and Combs 2000). In the later steps of this phase, which aim to improve the ability to perceive social cues and understand the social context, presentations are used that cover the recognition of non-verbal gestures (e.g., eye contact or posture) and social norms (e.g., status differences between people interacting). This training also focuses on understanding how emotions influence people's thinking and behavior in social situations. The second stage is the social attribution and theory of mind stage. This stage seeks to conceptualize paranoia as an emotion and focuses on the distinction between beneficial skepticism and harmful skepticism. The ability to distinguish between facts, assumptions, and feelings and to avoid "jumping to conclusions" about others' intentions is practiced, and how skepticism can influence believing about others' intentions is discussed. Film clips and didactic exercises from the SCIT program are also used in these sessions. This training also focuses on integrating various social cues to understand whether conversations in different social contexts contain

deception, such as sarcasm or humor, or whether conversations contain deception, such as social or blatant lies. Participants have the opportunity to reflect on all the concepts emphasized in this training through their own emotional and social experiences and are also guided to apply what they have learned in practice. These are the highlights of the program.

In Turkey, Taş (2011) added the participation of micro-level social environments such as family members and/or friends to Social Cognition and Interaction Training in his research for his specialization thesis. The role of social interaction in the acquisition and change of behaviors emphasized in Bandura's (1999) social learning theory and the positive effects of family attitudes and behaviors on the course of schizophrenia were effective in the emergence of the program. This program called the Family-involved Social Cognition and Interaction Training Program (f-SCIT), was planned as 14 sessions with patients and 3 sessions with their relatives. While the first sessions of the program contain fictional content other than the participants' own life experiences, the following sessions focus on the personal experiences of the patients to generalize the skills gained to daily life. The program, which was applied to patients with schizophrenia in a stable state, was found to improve social cognition and social functioning as well as quality of life. In addition, it has been shown that the program is suitable for Turkish social and cultural structure, effective, and applicable.

Common Goals of Programs Focusing on Social Cognition

The common goals of these programs, which can also be called outcome measures, and some of the methods they use to achieve these goals are given below.

Emotion Recognition

Emotion recognition is often the first and most important skill addressed in social cognition remediation programs. Programs often aim to improve the ability to recognize emotions independently of the disease and primarily from the facial expressions of others. For this purpose, 'bottom-up' techniques are often used through computer programs, silent videos of facial expressions, group work focused on distinguishing prototypical facial expressions of basic emotions, videos of emotions that are often confused in faces with verbal commentary indicating the distinctions between these emotions, and verbal instructions to direct attention to the eye and mouth regions of the face, which are important for emotion recognition (McDonald and Cassel 2017). Methods such as imitation, role-playing, and introspection are also used in some programs as well as media tools.

In addition to the "bottom-up" techniques often used in such programs, "top-down" metacognitive and neuropsychological strategies such as self-monitoring and self-instruction are also used to help learn emotions and generalize what is learned. Some programs become more complex as time progresses, incorporating dynamic facial visuals, auditory cues such as speech prosody that provide information about emotions (Baron-Cohen et al. 2004), and other non-verbal cues. In addition to prosodic cues, some programs use non-verbal cues such as facial mimics (Penn and Combs 2000) and body language (Frommann et al. 2003). This inclusiveness of programs enables individuals to develop and maintain emotion recognition skills in all kinds of social contexts outside the treatment setting.

There are very few programs that assess emotion recognition skills with all the cues described above and dynamically involve emotion recognition in real social and situational contexts. The previously mentioned TAR is an example of these few programs. However, according to McDonald and Cassel (2017), an important limitation of many of the frequently used programs for emotion recognition is that they are decontextualized.

In comprehensive training programs that address areas of social cognition such as ToM or attributional styles, improvements in emotion recognition are generally observed, although no change in ToM or attributional styles is observed (Horan et al. 2009).

Theory of Mind

Another goal of programs focusing on social cognition is to develop the ability to understand that people can have different mental states. Moreover, it is very difficult to translate a complex function such as predicting another person's mental state into a training exercise. For this purpose, computers are usually used to show visuals such as photographs, animations, or thought bubbles that reveal that a person may have a false belief or information about the mental states of others can be verbalized. The effectiveness of these programs can be criticized in terms of the generalizability of these types of ToM exercises in the educational environment to everyday life. For these reasons, these programs with artificial tasks have low ecological validity.

To overcome this problem, some programs use natural and visual materials, verbal stories, and some use multimodality materials such as role-playing to improve both cognitive and affective ToM skills. For example, in a longitudinal study, Bechi et al. (2013) used comic books representing developed scenarios to improve both cognitive and affective ToM skills. For a sample of patients diagnosed with schizophrenia, the tasks given through group discussions about a character's intentions became increasingly complex, and the training targeted not only first-order ToM skills but also more complex ToM skills such as deception or recognising white lies. The results of the study showed that there was a significant improvement in the ToM skills of the participants who received the training compared to the control group.

Table 1. Main programs aiming to improve social cognition in schizophrenia

Program Name	Main target group	Application type	Strengths/weaknesses of the program
Training of Affect Recognition (TAR) (Wölwer et al. 2005)	Schizophrenia	Group-based	The effect of this intervention on other social cognitive functions is not known, as it only focuses on facial emotion perception and emotion recognition.
Social Cognition and Interaction Training (SCIT) (Penn et al. 2005)	Schizophrenia	Small group-based	It addresses social cognitive functions broadly, including emotion processing, attributional styles, and theory of mind. Its effectiveness has been demonstrated in both inpatient and outpatient settings. It has been shown to contribute to functional outcomes related to social skills rather than social functioning.
Social Cognitive Skills Training (Horan et al. 2009)	Schizophrenia	Group-based	This program goes beyond the content of the SCIT program. The high relevance to the real world and the ability of the participants to think and practice the concepts discussed during the training through their own subjective experiences are the prominent aspects of the program.
Family-involved Social Cognition and Interaction Training Program (f-SCIT) (Taş 2011)	Schizophrenia	Group-based	The prominent aspects of this program are that it incorporates the micro-level social environment of the individual (for example, a family member or close friend) and facilitates the transfer of social cognitive functions to real life.
Metacognitive Training in Schizophrenia (MCT) (Moritz and Woodward 2007)	Many psychiatric disorders such as obsessive-compulsive disorder or depression, with psychosis being a priority	Individual and group based	Culturally sensitive language versions are available. In addition, access to training has been facilitated and made widespread through e-learning.
Metacognitive and social cognition training (MSCT) (Rocha and Queirós 2013)	Schizophrenia	Group-based	It is a complementary training designed to both improve social cognition and correct prejudices.

Attributional Styles

Attributional styles differ among different clinical populations. For example, regardless of the nature of the event (positive or negative), people with schizophrenia generally tend to attribute the cause of events to others rather than to themselves. This type of attributional style in patients seems to be related to the social dysfunction experienced by patients independent of symptom severity (Lysaker et al. 2004).

There is a large body of treatment research aimed at changing the cognitive biases that are seen to be prominent in schizophrenia. While not specific to schizophrenia, some of these programs have focused on the "jump to conclusions" bias, which is common in people with delusional tendencies or delusions. Jumping to conclusions refers to making rash decisions without verifying them with sufficient evidence. This bias is thought to be related to unwarranted beliefs and plays a role in forming and maintaining delusions in schizophrenia (McKay et al. 2006).

Metacognitive Training in Schizophrenia (MCT), developed by Moritz and Woodward (2007), is a program that more broadly addresses biases such as attribution bias, overconfidence in memory errors, or depressive cognitive patterns, as well as the bias to jump to conclusions. Recent meta-analyses show the improving effects of MCT, especially on positive symptoms, insight, and some cognitive biases (Moritz et al. 2023).

Metacognitive and Social Cognition Training (MSCT) is a 10-week training consisting of 18 sessions designed to address both social-cognitive biases (such as jumping to conclusions or being biased against non-confirmatory evidence) and other aspects of social cognition (such as emotion recognition, ToM, and social perception) (Rocha and Queirós 2013). In the metacognitive psychoeducation sessions of the training, participants are given exercises to demonstrate cognitive biases. The training also uses a series of case examples and slides that underline the relevance of cognitive biases in everyday life and show how biased thinking can lead to problems in everyday life, sometimes resulting in harmful doubts and misconceptions. Interactive sessions to improve social cognition, using a variety of exercises and materials, are designed to improve the processing of emotional and social cues, analyzing social situations, understanding indirect speech or deception, and the ability to see from different perspectives. For example, exercises that focus participants' attention on emotion-related facial features to improve their ability to recognize emotions, or exercises that help participants identify when others are using sarcasm, humor, or deception. Each session is complemented by guided discussion and assignments. Participants also produce a report on the application of the training to specific situations in their daily lives at the end of the training. Table 1 shows the main programs aiming to improve social cognition in adult patients diagnosed with schizophrenia.

Research Findings from Comprehensive Interventions on Social Cognition

In the first study on the applicability of SCIT, it was observed that 7 hospitalized patients showed improvements in attribution bias, ToM skills, and some clinical symptoms after the training (Penn et al. 2005). In this study, no improvement was observed in patients' emotional perception. Subsequently, a guideline for the training was prepared, and 18 patients (SCIT group) who continued their routine treatment and 18 hospitalized patients (SCIT group) were compared in terms of emotion perception and social perception, ToM, attributional styles, and cognitive flexibility in the pre-test and post-test assessments. As a result of this study, supporting the role of SCIT in improving social cognitive impairments in schizophrenia, participants in the SCIT group showed improvements in all social cognitive measures and self-reported better social relationships at post-test. It is noteworthy that these changes occurred independently of changes in clinical symptoms over time (Combs et al. 2007). Afterward, in a quasi-experimental study conducted by Roberts and Penn (2009), patients who continued the routine treatment they were receiving at that time were compared with patients who added SCIT to their routine treatment (SCIT group). In this study, the SCIT group showed improvement in emotion perception and social skills, but the training was not effective on the other two targeted social cognitive functions of the patients, i.e., ToM and attributional styles.

The randomized controlled trial conducted by Horan et al. (2009) provides information about the applicability and effectiveness of a 12-session training program that focuses comprehensively on social cognition by addressing all defined aspects of social cognition. In this study, 31 clinically stable outpatients with psychotic features were compared before and after the training in terms of social cognitive functions, other neurocognitive functions, and clinical symptoms. Patients were assigned to either a social cognition skills training condition or a time-matched control condition, such as training in illness self-management and relapse prevention skills. Facial affect perception improved in patients who received social cognition skills training, independent of changes in neurocognitive functions or clinical symptoms. Improvement was achieved in only one of the 4 targeted social cognition functions. Other aspects of social cognition, such as sarcasm, humor, and deception, were described by the researchers as difficult targets both to define and to translate into short and structured training exercises. Findings related to the perception of facial affect supported the effectiveness of this cognitive intervention.

Lahera et al. (2013) compared 16 patients with bipolar disorder and schizoaffective disorder who were receiving outpatient treatment with a standard treatment including clinical follow-up and medication with 21 patients to whom SCIT was added to this standard treatment at baseline and after treatment. Improvements in emotion perception and ToM functioning, as well as a reduction in hostile attributional bias, were shown in patients whose treatment included SCIT. This result provided preliminary evidence that SCIT can be applied in a heterogeneous sample of patients and can improve social cognition. On the other hand, contrary to the findings of Combs et al. (2007) and Roberts and Penn (2009), no improvement in social functioning was observed in this study. The researchers interpreted this finding to mean that SCIT was effective for functional outcomes related

to social skills rather than general social functioning. To the best of our knowledge, the study by Lahera et al. (2013) is the first controlled study of social cognition training in mood disorders. Based on the findings of the study, it may be recommended to adapt the SCIT for mood disorders according to the social cognitive impairment specific to this disease.

Although each of the studies mentioned here shows positive effects of SCIT on different domains of social cognition, when the results are considered together, it can be said that SCIT is a feasible and promising program for improving social cognition and social skills in inpatient and outpatient settings. A meta-analysis conducted by Kurtz and Richardson (2012) reported that programs aimed at improving social cognition were effective, with the largest effect size found for emotion recognition skills. In other words, impairments in emotion recognition can be improved in schizophrenia.

In a quasi-experimental study comparing MSCT with treatments consisting of medication and various psychosocial services, the MSCT group of patients diagnosed with schizophrenia showed improvement in social cognition measures such as ToM, emotion recognition, and social perception, and their tendency to jump to conclusions reduced (Rocha and Queirós 2013). Patients' psychosocial functioning, especially social contact and communication skills, also improved slightly but significantly. Participants need to gather and focus on contextual information before reaching and interpreting a conclusion during MSCT. The researchers believe that the improvement observed in patients' social perception after the training may be a result of this focus, which was emphasized during the training. In addition, the small increase observed in the psychosocial functioning of the patients, consistent with the literature, supports the hypothesis that improvement in social cognition provides positive functional outcomes (Fett et al. 2011).

In schizophrenia, scanpath abnormalities are observed during visual exploration of faces, characterized by a lower number of fixations and longer fixation durations in salient feature areas than in healthy individuals (Loughland et al. 2002). Research findings in this area are promising for the TAR program, which focuses only on facial emotion recognition skills. For example, Drusch et al. (2014) conducted a quasi-experimental study to test the effectiveness of the TAR program and compared patients diagnosed with schizophrenia and healthy controls before and 6 weeks after the program. In addition to the improvement in emotion recognition after the program, this type of training also led to a change in the visual exploration of faces in patients. After TAR, patients were able to pay more attention to facial regions containing information about the emotion displayed. Other research findings show that the TAR program improves emotion recognition and social relationships in patients, independent of changes in clinical symptoms and general cognitive functions (Sachs et al. 2012).

Social Cognition Tests Used in Comprehensive Interventions

As stated by the MATRICS expert panel, social cognition is one of the main cognitive domains to be assessed. The results of the systematic review by Mehta et al. (2013) similarly reveal that social cognitive and neurocognitive functions are separate cognitive factors. However, there has been discussion that neurocognition and social cognition may have independent effects on social outcomes (Fett et al. 2011). Therefore, social cognitive functions are not assessed through traditional neuropsychological tests that aim to assess other cognitive functions. There is a need to assess social cognition with sensitive and reliable measurement tools. Social cognitive testing and assessment should also become a routine aspect of intervention programs planned to improve these functions (McDonald and Cassel, 2017). Table 2 provides examples of the most commonly used assessment tools in the intervention programs discussed in this paper. These tests are generally used as pre-tests and post-tests in the programs to test whether there is improvement in the area of social cognition of interest. As can be seen in the table, one of the most important shortcomings in this field in Turkey is that there are few standardized measurement tools with normative data aimed at assessing social cognitive functions. On the other hand, social functioning measures with high ecological validity may be useful for evaluating the results of social cognitive interventions not only in our country but also worldwide. The development of tests with high ecological validity is one of the critical issues that should be emphasized in future research..

Table 2. Examples of the most commonly used assessment tools in intervention programs

Name of the test	The main domain of social cognition assessed	Test administration	Turkish adaptation
A Facial Emotion Identification Test (Kerr and Neale 1993)	Emotion recognition Emotion perception	19 black and white photographs of faces showing facial expressions of 6 basic emotions are shown in a slide	Turkish validity and reliability study was conducted by Erol et al. (2009).

		presentation. Participants examine each face and tick the emotion on the face from a list of options.	The test was found to be a valid and reliable measurement tool for schizophrenia patients in the Turkish population.
Facial Emotion Discrimination Test (Kerr and Neale 1993)	Emotion recognition Emotion perception	30 pairs of black and white photographs of 6 basic emotions are shown as a slide presentation. Participants try to determine whether the two faces in the photo are expressing the same or different emotions.	Turkish validity and reliability study was conducted by Erol et al. (2009). The test was found to be a valid and reliable measurement tool for schizophrenia patients in the Turkish population.
Penn Emotion Recognition Test (ER-40) (Gur et al. 2002).	Emotion recognition	The test contains 40 color photographs of faces expressing 4 basic and also neutral emotions. There are also 4 high and 4 low-intensity expressions for each emotion category. Participants have to identify each emotion in a sequence of 40 photographs of faces.	
Florida Affect Battery (Bowers et al. 1991)	Emotion recognition	The ability to process emotional information is assessed in 10 subtests, which use both visual (facial expressions) and auditory (prosody) stimuli.	
Facial Expressions of Emotions Task (FEEST) (Young et al. 2002)	Emotion recognition	Participants need to identify emotions from facial expressions. The facial stimuli include 6 basic and neutral emotions from the Ekman and Friesen series. The intensity of the emotions in the stimuli varies to allow researchers to create different tasks.	
Movie Stills Task (Adolphs and Tranel, 2003)	Emotion recognition	This test assesses emotion recognition from contextual cues and requires participants to identify emotions in a complex film scene. It is comparable to film scenes in which faces are digitally erased and in which facial expressions are visible.	
Pictures of Facial Affect (POFA) (Ekman and Friesen 1976)	Emotion recognition	The POFA consists of 110 black and white photographs of the faces of fourteen people (eight women and six men), each showing one of the six basic and neutral emotions. Participants are asked to indicate which of the seven expressions is present on the face in each photograph.	Turkish validity and reliability study was conducted by Tombul et al. (2023).
Ambiguous Intentions Hostility Questionnaire (AIHQ) (Combs et al. 2007a).	Attributional styles	Participants read a series of vignettes involving social situations in which the characters' intentions are	

		ambiguous. After each story, participants are asked to rate on a Likert scale the perceived hostility and intention, how angry they feel, how much they blame the character, and how aggressively they would react.	
False Belief Picture Sequencing Task (Langdon et al. 1997)	Theory of mind	This is a classic non-verbal assessment of ToM. Participants try to put picture cards in the right order in a logical sequence of events to create a story about a cartoon character acting on a false belief. It is a test of people's ability to think beyond objective information.	
Faux Pas Recognition Test (FPRT) (Baron-Cohen et al. 1999)	Theory of mind	This test consists of 20 short stories, half of which contain a faux pas. The test measures the ability to interpret the thoughts and feelings of other people in a faux pas situation. The questions are based on the content of the stories.	Turkish validity and reliability study for the short version of the test was conducted by Şandor and İşcen (2021).
The Reading the Mind in the Eyes test (Baron Cohen et al. 2001)	Emotion recognition Theory of mind	It assesses the ability to recognize complex emotions and mental states (e.g. jealous, arrogant, or hateful) through photographs showing the eye and its surroundings. Participants choose the option that best describes the mental state in each photograph from 4 options.	Turkish validity and reliability study was conducted by Yıldırım et al. (2011).
The Awareness of Social Inference Test (TASIT) – Part III (McDonald et al. 2003)	Theory of mind	A test section consisting of 16 short videotaped vignettes, each of which contains sarcasm or false statements. After each scene, participants answer questions about the characters' intentions, their beliefs about the situation in the scene, or their emotional state.	
Hinting Task (Corcoran et al. 1995)	Theory of mind	It consists of 10 short stories, each depicting an everyday social interaction between two characters. Based on the social clues in the stories, participants try to understand the real purpose of the indirect speech.	
The Empathy Quotient (Baron-Cohen and Wheelwright 2004)	Empathy	It is a 60-item self-report scale designed to measure empathy in adults.	The reliability and preliminary validity study of the Turkish form in university students was conducted by Bora and Baysan (2009).
Social Perception Scale (SPS) (García et al. 2003)	Social perception	Participants are asked to look carefully at four photographs for 2 minutes. The total number of correct details that participants identify in the	

		pictures determines their performance.	
Internal, Personal, and Situational Attributions Questionnaire (IPSAQ) (Kinderman and Bentall 1995)	Attributional styles	On a scale of 32 social items describing 16 positive and 16 negative hypothetical events, respondents are asked to indicate the reason for each event and whether this reason is due to themselves or to other people, or situational circumstances. 2 types of composite scores are calculated: externalizing and personalizing bias.	Reliability values of the subscales of the scale were calculated by Olgun Kaval (2021).
Attributional Style Questionnaire (ASQ) (Peterson et al. 1982)	Attributional styles	It is a 60-item questionnaire that measures individual differences in attributional styles by asking participants to identify and rate the reasons for 12 hypothetical situations.	The scale was adapted into Turkish by Papatya (1987).
Fish task (Moritz et al. 2010)	Jumping to conclusion	A fisherman catches fish from one of two lakes with different proportions of coloured fish and asks the participants to identify which lake the fisherman caught the fish from. In this fish task, the participants have to make a judgment by following certain rules.	
The Observable Social Cognition Rating Scale (OSCARS) (Healey et al. 2015)	Theory of mind Emotion perception Attributional styles Jumping to conclusion Cognitive rigidity	It is an 8-item interview-based measure that assesses different social cognitive domains in patients diagnosed with schizophrenia. Each item contains a question followed by an example of behavior that reflects impairment in that domain.	The Turkish validity and reliability study of the interview was conducted by Özaslan (2019). In this study, OSCARS was shown to be a valid and reliable measurement tool for assessing social cognition in patients with schizophrenia.

Limitations of Research

Some methodological differences are noteworthy in studies investigating the effectiveness of training programs on social cognition. For example, some studies included active control groups (e.g., Horan et al. 2009) matched with the time spent in the intervention program while others included passive control groups (e.g., Wölwer et al. 2005). Or, in some studies (e.g., Lahera et al. 2013), it is not known whether the effects of SCIT are sustained over time, as there has been no follow-up evaluation. In addition, the fact that the training materials used in the programs were similar to those used later in evaluating the effectiveness of these programs may have an impact on the results. Besides, factors such as the presence of affective symptoms, impairments in other cognitive domains, or medication treatment in the patients enrolled in the program appear to be the main confounding factors in the evaluation of social cognition in psychiatric disorders and the effect of these training programs. All future studies of the effectiveness of social cognition intervention programs in psychiatric disorders such as schizophrenia should address these methodological issues.

According to McDonald and Cassel (2017), whether people are socially competent in a social situation is influenced by the reciprocity between their thoughts, feelings, and behaviors, and thus social functioning, social skills, and social cognition cannot be seen independently of each other. Based on this principle of reciprocity, the authors suggest that treatments should target all of these factors together. In other words, a treatment program that targets only social skills without taking social cognition into account will be limited. Or, most treatment programs that focus on social cognition are limited because they do not focus on social skills. As a result, although training programs provide improvement in the targeted skill, they do not allow participants to

generalize what they have learned in training to their daily lives (McDonald and Cassel 2017). However, the positive effects seen in patients' functionality as a result of some of the intervention programs show that the benefits of these interventions can be generalized to their daily lives.

Conclusion

Social cognition is affected not only in schizophrenia but also in many other psychiatric and neurological disorders, and the results of research focusing on it support this idea. Although the difficulties seen in this area have different dimensions, they affect almost all areas of patients' lives. Therefore, social cognitive intervention programs can be applied not only to schizophrenia but also applied and adapted to all other psychiatric and neurological diseases.

Since some social cognitive interventions are included in multicomponent programs and their complex relationship with basic neurocognitive functions, it is not yet fully understood whether they have an interdependent effect with interventions aimed at improving neurocognitive functions (Horan et al. 2009). Comprehensive programs focusing only on social cognition seem to be effective on the subcomponents of social cognition. In addition to the pharmacological and psychotherapeutic treatments that patients receive, social cognitive training planned according to their needs is considered very necessary in order to bring benefits to the social functioning of patients. In order to achieve greater improvements in social cognition in many groups of patients, and to generalize these treatment gains to all areas of their lives, it is necessary to expand training programs and focus particularly on adaptation to daily life. At this point, recent technological developments (e.g., virtual reality or robotic applications) may contribute to the rehabilitation of all cognitive functions as in many other fields. For example, in a recent study, patients with schizophrenia who participated in a VR-based SCIT program that combined the traditional SCIT program with virtual reality (VR) technology showed significantly more improvement in emotion perception, attribution bias, metacognition, and social functioning assessments compared to patients who participated in the traditional SCIT program and were on a waiting list (Shen et al. 2022). The researchers pointed out that the patients who participated in VR-based training had better compliance and continuity with the program and associated this compliance with the gamification-oriented design of the program. In the pilot study conducted for Dynamic Interactive Social Cognition Training in Virtual Reality, which was developed for patients with psychotic disorder, a single training group was evaluated with a pretest-posttest design. As a result of the training, a significant improvement was observed in the patient's perception of emotions, but no significant change was observed in other areas of social cognition, neurocognitive function, or clinical symptoms (Nijman et al. 2020). Training in these designs may be advantageous since role-playing exercises are interactive and patients have the opportunity to practice the skills they have acquired in a realistic social situation. On the other hand, it should be kept in mind that these studies are pilot studies and should be developed methodologically for generalizable results.

Considering the strong relationship between social cognition skills and social functioning in the real world, research on this topic should be given due importance in Turkey and widely used intervention programs should be adapted to our country or culturally specific programs should be developed.

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