

SOCIAL SKILLS TRAINING FOR PEOPLE WITH SCHIZOPHRENIA: WHAT DO WE TRAIN?

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Abstract

This paper gives a broad definition of the characteristics and incidence of schizophrenia, and introduces the various deficits in social skills and social function faced by patients with this disorder. The role of Social Skills Training (SST), which can be used to improve some of these deficiencies in social skills, social function, cognition and competence, including the history and efficacy of such training, is addressed. An outline is given of the Brief Cognitive-Behavioural SST for schizophrenia patients, designed by our clinical research group (University of Barcelona and General Hospital of Igualada, Spain), along with the parameters of the study, risk factors for certain patients and results. We then indicate future directions focusing on the use of virtual reality as a modern technology to enhance treatment and highlighting potential areas for further study.

KEY WORDS: *social skills, social functioning, cognition, competence, schizophrenia.*

Resumen

Este artículo proporciona una definición amplia sobre las características y la incidencia de la esquizofrenia y presenta los distintos déficit en habilidades sociales y en funcionamiento social que sufren los pacientes con este trastorno. Se aborda el papel del entrenamiento en habilidades sociales (EHS), que puede utilizarse para mejorar algunas de estas deficiencias en habilidades sociales, en el funcionamiento social, en las cogniciones y en la competencia, incluyendo la historia y la eficacia de dicho entrenamiento. Se expone un esquema del "EHS cognitivo conductual breve" para pacientes con esquizofrenia desarrollado por nuestro grupo clínico de investigación (Universidad de Barcelona y Hospital General de Igualada, España), junto con los parámetros del estudio, los factores de riesgo para ciertos pacientes y los resultados. Finalmente, presentamos las perspectivas futuras, centrándonos en el uso de la realidad virtual como una tecnología moderna para mejorar el tratamiento y resaltar áreas potenciales para estudios futuros.

PALABRAS CLAVE: *habilidades sociales, funcionamiento social, cogniciones, competencia, esquizofrenia.*

Introduction

Schizophrenia can be described as a severe mental disorder characterised by profound deficits in thinking, perception, affect, and social behaviour (World Health Organization [WHO], 2014). It affects about seven per thousand of the adult population, especially those in the age group of 15-35. Although its incidence is low (3 per 10,000), the prevalence is high due to the chronicity of the illness (WHO, 2014). The main clinical symptoms of this mental disorder are hallucinations, delusions, thought disorder, abnormal affect and disturbance of motor behaviour. Although the most salient symptoms are hallucinations and delusions, for a significant portion of the course of the illness, the individual's social and occupational functioning is markedly below the level achieved prior to the onset (WHO, 2014). Furthermore, cognitive deficits are concomitant to this social impairment. These difficulties cannot be considered a residual manifestation of the psychopathology, because they emerge prior to the onset of the illness and they do not diminish with medication (Penadés & Gastó, 2010). Therefore, all the abnormalities that accompany the disorder have been directly associated with problems in everyday living (community functioning, interpersonal relationships, problem-solving strategies or new skills acquisition) (Addington & Addington, 1999; Bellack, Gold, & Buchanan, 1999; Bellack, Mueser, Gingerich, & Agresta, 2004; Green, Kern, Braff, & Mintz, 2000; Perlick, Rosenheck, Kaczynski, Bingham, & Collins, 2008). Many of these studies have also linked the severity of affective symptoms not only with poorer social functioning, but also with worsening of cognitive deficits (Lysaker & Salyers, 2007) and a marked decrease of the person's self-esteem.

The most common explanatory model for mental disorders in clinical psychology is the stress-vulnerability model (Zubin & Spring, 1977). This model postulates that the primary cause of schizophrenia is the psychobiological vulnerability, early determined by genetic and environmental factors (e.g. obstetric complications), which can potentially be precipitated by stress. Once the disease has developed, stressful environmental events (i.e. life events or interpersonal conflicts) directly affect this biological vulnerability, precipitating relapses. Following this model's premises, coping skills, social support or interpersonal skills can in fact reduce the effect of these life events on the individual who is suffering from the disease.

One of the main features of schizophrenia is its impact on reducing the psychosocial functioning of the individual, including self-care skills and all other skills needed for an independent and competent life style, quality of social relationships and family life, and occupational performance (Ursano et al., 2004). Antipsychotic medication is currently the base of treatment for schizophrenia, significantly reducing the severity of positive symptoms (Lieberman, 2005). However, this medication has a very poor effect on the reduction of negative symptoms, cognitive impairment and the overall functioning of the individual. The inclusion of psychosocial interventions in the treatment of people with schizophrenia is increasingly common and plays a key role in the recovery of the individual's social functioning (Kopelowicz & Liberman, 2004).

Social functioning

In addition to clinical symptoms, the diagnosis of schizophrenia includes impairment and/or function decrease in crucial aspects of the psychosocial domain, such as work skills, independence, and social functioning. Thus, the evaluation and treatment of these aspects has become a key objective when planning the recovery process. According to Kopelowicz and Liberman (2004), a global and operational definition of recovery includes standardized levels of independent living, social and occupational functioning instead of the sole remission or non-intrusion of psychotic symptoms. These authors claim that people have recovered when symptoms of their illness do not intrude on their functioning in everyday life, permitting them to work, attend school, participate in social and recreational activities and live as independently as possible in normal community environments without being segregated in enclaves of the mentally ill (Liberman & Kopelowicz, 2005).

Bromley and Brekke (2010) proposed an operational definition of social functioning of the individual with schizophrenia: The functional outcome is the result of the conjunction between capacity and performance/competence. For example, although the person shows the ability to perform the task (capacity), if he is not able to do it in the community or in his daily life (competence), the optimal performance is not achieved. It has been observed that the functional capacity is further determined by individual characteristics (such as the neurocognitive deficits) and social competence is more influenced by environmental factors (such as social support or interpersonal interaction opportunities). Following this definition, social dysfunction in schizophrenia would be composed of a deficit in social cognition (which refers to the receiving and processing actions: emotion and social cue perception social perception and theory of mind) and social competence (which includes aspects of communication and sending skills; the verbal and non-verbal communication skills that allow successful execution of interpersonal interactions) (Dickinson, Bellack, & Gold, 2007).

Social cognition

The term social cognition refers to those mental operations underlying social interactions, including perception, interpretation and response generation to the intentions, dispositions and behaviours of others (Green et al., 2008).

Following the latest report issued by the National Institute of Mental Health (NIMH), the study and treatment of social cognition in schizophrenia focus on five areas:

- Theory of mind (ToM). This defines the set of capabilities needed to understand that others' mental state is different from one's own (Brüne, 2005). Deficits in this ability have been associated with impaired functioning in community outpatient and inpatient behavioural problems (Brüne, 2005). In fact, Brüne et al. (2011) reported that mental state attribution ability could explain about 20 to 30% of the variance in social skills.

- Social perception. This is the individual's ability to identify roles and rules in the social context. Includes all the aspects of nonverbal behaviours (especially facial emotional expression), paraverbal and/ nonverbal cues (expressive behaviours, elements and characteristics that humans employ in addition to language) used to make inferences about the complexity or ambiguity of interaction situations (Penn, Ritchie, Francis, Combs & Martin, 2002). Deficiencies in this capacity have been associated with lower occupational development, poor performance in social interactions and an inappropriate personal appearance (Mueser & Bellack, 1998; Horton & Silverstein, 2008).
- Social knowledge. Sometimes also called Social Scheme, this defines more precisely the awareness of the roles, rules and goals that characterize social situations and guide social interactions. This knowledge is interpreted as a prior and essential step for social competence (Bellack, Sayers, Mueser, & Bennet, 1994).
- Attributional biases. Attributions are causal explanations; attributional style or bias shows how often people infer the causes of events, positive or negative. It has been shown that schizophrenia patients tend to attach external attributions to negative events (i.e. blaming others and inferring a negative intention) (Freeman, 2007). This attributional bias has been associated with an increased presence of persecutory delusions and negative interpretations of ambiguous social situations (Garety & Freeman, 1999).
- Emotional processing. This broadly covers all the skills necessary for the perception and use of emotions. Some authors define it as emotional intelligence (Mayer, Salovey, & Caruso, 2000) and it includes the following components: identification, facilitation, and understanding and managing emotions. The main deficits in this capacity in schizophrenia patients are a lower intensity of emotional experience, deficits in differentiating between emotions and unusual experiences, and decreased positive affect (Kohler & Martin, 2006).

The boundaries between the categories are hardly noticeable. For instance, emotion identification can be seen as a process involved in social perception which also influences the individual's emotional processing, commonly perceived as a basic aspect of theory of mind. However, differentiation between essential aspects of social cognition is necessary for both research and psychosocial interventions to address them.

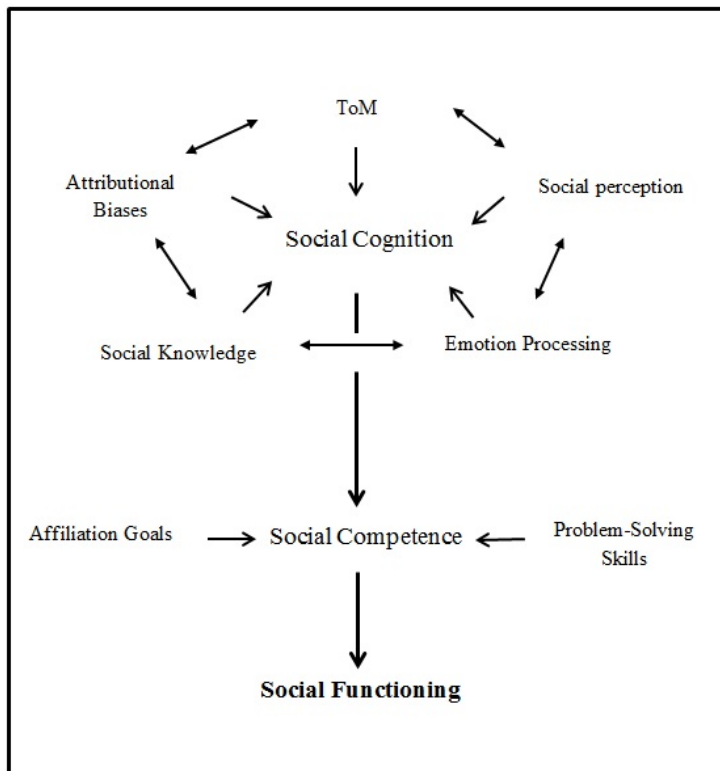
Social competence

Social competence refers to an individual's ability to solve everyday problems and achieve affiliation goals (Lieberman, Mueser, & Wallace, 1986). Social skills are key components of this competence. Thus, and to clarify the use of both terms, it can be stated that social skills refer to a specific set of skills including cognition and all those verbal and nonverbal behaviours needed to achieve effective interpersonal performance. Meanwhile, social competence is the general ability of the individual to act successfully on its social environment. Finally, adjustment or social functioning is the current confluence of instrumental and affiliation needs

that are the natural consequence of social competence (Lieberman et al., 1986) (see figure 1).

As discussed in the previous section, different studies have shown a relationship between deficits in aspects of social cognition and the poor social competence of persons with schizophrenia. However, Brüne, Abdel-Hamid, Lehmkämer, and Sonntag (2007) indicate that the inability to appreciate one's own and others' mental state (ToM) is the best predictor of social competence deficit in patients with schizophrenia, and highlight it as a "core" symptom of schizophrenia spectrum disorders.

Figure 1
Summary of the components of the individual's Social Functioning



Social skills training

Definition

Social skills training (SST) programs can be described as all those treatment approaches that aim to address deficiencies in the elements described in the previous section of this article: deficits in social cognition and social competence

that result in an unsuccessful and deteriorated social functioning. Therefore, the main objective is to improve interpersonal dysfunctions that contribute to the failure of social behaviour, which has been linked to the individual's isolation and interpersonal stress (Smith, Bellack, & Liberman, 1996).

SST interventions can be focused on one of the components (social cognition and social competence) or both in combination. Traditionally, the most important elements when training social skills are: expressive behaviours (speech content and paralinguistic elements: volume of voice, rhythm, intonation, body movements and gestures, interpersonal distance, etc.); responsive behaviours (social perception, attention, emotion recognition and interpretation); interactive behaviours (response and reaction times, conversational turns and use of social reinforcements); and situational factors (knowledge of cultural factors and specific contextual demands). Although there are different formats of training, depending on the specific therapy protocol and patient characteristics, most of them usually include similar cognitive-behavioural techniques: instructions, role-playing, reality tests, successive approximation, modelling, positive feedback and reinforcement. They are usually highly systematized and structured programs in order to facilitate learning and the development of the skills that each patient needs.

Currently, SST programs are usually conducted by clinical psychologists and their duration can vary from 10 to 22 sessions. They are usually applied in group sessions led by a therapist and co-therapist, with specific objectives for each session and in-between-sessions activities in order to improve the generalization of the learned responses to the individual's daily life.

Implementation of SST in the clinical setting

Of the psychosocial interventions for schizophrenia, social skills training has probably the longest history, having been used to help patients to learn to cope with interpersonal relationships since the 1960s (Chien, Leung, Yeung, & Wong, 2013). Following important studies about psychotherapy for schizophrenia (Gunderson et al., 1984; May, 1968; Stanton et al., 1984), psychodynamically oriented psychotherapy was deemed to be largely ineffective to treat schizophrenia and related psychoses and to have no beneficial effect on cognitive functioning and interpersonal relationships (Klerman, 1984; Smith et al., 1996).

Some authors consider the *institutionalised token economy*, based on operant conditioning, as the first psychological intervention focusing on the social behaviour of people suffering from a psychiatric disorder (McMonagle & Sultana, 2000). Those interventions generally led to reliable empirical results and managed to activate chronic patients with negative symptoms and restore some degree of social behaviour. At present, this form of intervention is still limited to institutionalised patients, characterised by a very poor level of social functioning, severe negative symptoms and other types of resistance to therapeutic interventions.

But the rise of SST interventions comes at the beginning of the 1970s. The American psychiatrist R. P. Liberman can be considered the main driver of the systematization and implementation of this approach in the clinical setting

(Lieberman & Eckman, 1989; Lieberman, King, DeRisi, & McCann, 1975). This second stage in the social skills training begins with the introduction of *role playing* as the main technique used to improve both "molecular" skills (like eye contact, verbal fluency, intonation or gestures) and "molar" skills (such as assertiveness and expression of emotions of various kinds). The efficacy of this technique was moderate in terms of social adaptation and generalisation of responses, and low regarding psychopathological changes; having also less clear results on patients' work adaptation and quality of life.

Around the 1990s, some neurocognition findings, focusing on the role of attention capability when teaching conversational skills, helped with the establishment of new SST interventions. According to that model, training sustained attention in patients with poor social skills can benefit their learning of new conversational skills (Silverstein et al., 1998; Wong et al., 1993). Therefore, basic conversational skills can be taught through repetition in discrete trials wherein behavioural learning techniques are used to gain correct responses, or longer attention periods are reinforced where patients are learning the skills. The integrated psychological therapy (IPT) proposed by Brenner et al. (1994) is a very good example of the cognitive model applied to the improvement of social functioning in the clinical setting. This approach emphasized that cognitive interventions should take place within a meaningful social context. Thus, by training attention, learning, memory and social perceptions, the acquisition of new social and independent living skills will be achieved. The cognitive enhancement therapy (CET) (Hogarty & Flesher, 1999), an integrated approach to the remediation of social and non-social-cognitive impairments, is another good example of concomitant training of neurocognitive and social cognitive abilities as well as social skills.

However, it should be pointed out that most of the SST interventions are based on the problem-solving approach: inadequate execution of skills in social situations may come from deficits in problem-solving capabilities (Vallina-Fernández & Lemos-Giráldez, 2001). The most widely studied social skill training intervention following this approach is the module-structured program named the UCLA Social and Independent Living Skills (SILS modules) developed by Lieberman and colleagues in 1993. It consists of ten training modules to practice specific disorder-related social and instrumental skills. This training is based on a previous model, postulated also by Lieberman et al. (1986), which posits that there are three essential components for social competence: receiving skills, processing skills and sending skills. This study has been translated into 23 languages and is used in six continents (Kopelowicz, Lieberman, & Zarate, 2006). The application of these modules proved to be much more effective with regard to the ability to generalise the results and to social adaptation. This program requires focus on the individual's needs, preferences and abilities (training in cognitive and emotional skills), and helps them to make decisions in each of the three areas: housing, work, and leisure, providing support to implement the decision (practical implementation skills). At the same time, it requires teaching the participants to anticipate and solve specific problems that can take place in the new state of residence, work or leisure.

Nowadays, SST has become a treatment of choice for people suffering from psychosis, recommended by important clinical guidance and international mental health institutions, such as the American Psychiatry Association (United States) and the National Institute for Health and Care Excellence (United Kingdom).

Efficacy of SST over other treatment approaches

Recent efficacy studies have shown improvements in the social functioning of patients with schizophrenia treated with SST (Bellack, 2004; Bowie et al., 2012; Granholm et al., 2008, 2009; Horan et al., 2009, 2011; Robert & Penn, 2009; Valencia et al., 2007). These studies have observed a greater reduction of social impairment and functional disability with SST when compared with other treatments, such as TAU (Granholm et al., 2008, 2009; Robert & Penn, 2009; Valencia Rascón, Juárez, & Murow, 2007), neuroleptic treatment only (Cirici, García, & Obiols, 2001) social disinterest attitudes (Granholm et al., 2009), illness self-management and relapse prevention skills training (Horan et al., 2009), and neurocognitive remediation (Horan et al., 2011). Other studies have also shown that CET (Hogarty et al., 2004) can be also effective to improve the cognition and functioning of early schizophrenia patients (Eack, Pogue-Geile, Greenswald, Hogarty, & Keshavan, 2011) when it is compared with individually enriched support therapy (Hogarty, 2002).

However, meta-analysis studies published within the last twenty years, showed inconclusive results on the efficacy of SST. Main results are depicted in table 1.

Table 1
Main findings of recent Meta-analyses regarding social skills training effects

Meta-analysis	Studies included	Outcome variable	N	Effect size
Pilling et al. (2002)	9 RCT	Relapse	235	0.17 (-0.14 to 0.46)
		Social functioning	63	N/A
Pfammatter, Junghan, & Brenner (2006)	19 RCT	Skills acquisition	688	0.77 (0.62 to 0.93)
		Social functioning	342	0.39 (0.19 to 0.59)
		Skills acquisition (1-year FU)	295	0.52 (0.28 to 0.77)
		Social functioning (1-year FU)	210	0.32 (0.08 to 0.56)
		Relapse (hospitalization) (1-year)	110	0.48 (0.11 to 0.86)
Kurtz & Mueser (2008)	23 RCT	Content mastery	N/A	1.20 (0.96 to 1.43)
		Living skills	N/A	0.52 (0.34 to 0.71)
		Community functioning	N/A	0.52 (0.31 to 0.73)
		Negative symptoms	N/A	0.40 (0.19 to 0.61)
		Relapse (1-year)	N/A	0.23 (0.04 to 0.41)

Note: RCT= randomized clinical trial; FU=Follow-up; N/A= Not applicable.

These results suggest that, although SST interventions can have positive consequences for patients, there is still room for improvement to increase the

immediate effect of the intervention but, above all, to improve long-term clinical outcomes.

Brief cognitive-behavioural SST for schizophrenia

Kopelowicz, Liberman, and Zarate (2006) stated recently that the main skills that should be trained in an SST program are: social perception, social information processing, responding and sending skills, affiliation skills, instrumental role skills, and behaviours governed by social norms. Following this recommendation, a novel and brief cognitive-behavioural SST addressing the seven target behaviours proposed was designed by our clinical research group (University of Barcelona and General Hospital of Igualada, Spain) and tested in a sample of outpatients suffering from schizophrenia or schizoaffective disorder (Rus-Calafell Gutiérrez-Maldonado, Ortega-Bravo, Ribas-Sabaté, & Caqueo-Urizar, 2013). According to this proposal, the program was divided into seven blocks, with two sessions planned for each block. An introduction at the beginning session and a final session were also included. Thus, the entire program consisted of sixteen sessions (see table 2). A therapist's manual (Rus-Calafell, 2009, unpublished manual) and PowerPoint slides for every session were created. At the beginning of the program, each subject also received a user manual that included both the slides and activities between sessions. Additional graphic material, audio-visual material (movie clips), and specific role-playing scripts were designed and created for the training sessions. Each session was structured and consisted of a brief review of the material presented during the last session, a brief discussion about the between-sessions activity (if there had been any), a theoretical/didactic presentation of the session material, and group-practice and individual exercises. Due to the structure of the intervention, the learning of the skills was scaffolded: First, the more basic skills were consolidated (e.g. facial emotion recognition and social processing), and finally the more complex skills (such as maintaining conversations) were achieved.

The results of the clinical trial corresponded to previous research that also investigated the efficacy of this kind of training in outpatients (Granholtm et al., 2009; Horan et al., 2009; Roberts & Penn, 2009). It was applied in a group format to provide the patients with opportunities to practice the newly learned skills with other subjects. Results at post-treatment showed an improvement in the self-statements during social interactions, in the negative symptomatology and negative psychopathology, and in quality of life regarding mental health. Informants (mainly family members) reported a perceived positive change in terms of social withdrawal and communication for those patients who benefitted from SST. There was also a very positive effect of the treatment on the SST group regarding subjects' emotional and social cognition. The authors assume that the treatment's content, which was focused on social perception and social attribution, resulted in a significant impact on these outcome measures, specifically in the emotional self-regulation statements during social interactions.

Table 2
Brief description of the seven blocks of the program

Block	Summary	Sessions
* Introduction and closing sessions	First and last sessions used 1) to introduce the training and meet the group, and 2) to close the intervention and complete qualitative assessment	1 and 16
1. Social perception	Discriminating between basic human expressions and the accuracy if facial emotion recognition.	2-3
2. Social information processing	To explore attributional styles when interpreting others' expressions and behaviours.	4-5
3. Responding and sending skills	Two parts: nonverbal (e.g. eye contact and personal distance) and verbal communication (distinctions among passive, aggressive and passive communication styles).	6-7
4. Affiliative skills	Family and friend relationships. Requesting privacy, expressing affection or opinions, or offering compliments were dealt with.	8-9
5. Instrumental role skills	To practice specific instrumental abilities (requesting information, asking for a favour, and setting limits in an assertive manner).	10-11
6. Interactional skills	Initiating, maintaining, and ending a conversation.	12-13
7. Behaviour governed by social norms	To discuss the rights and responsibilities of community living. Effect of social relationships over physical and mental health.	14-15

Future directions

Risk groups

Larsen et al. (2001) suggested that both pharmacological and psychosocial treatment, offered early to people presenting with schizophrenia and other psychotic disorders, can improve their prognosis and even help prevent their illness chronicity. One year after treatment for a first episode, 75% to 90% achieve remission from positive symptoms (Addington, Leriger, & Addington, 2003). However, functional (e.g. social, vocational, interpersonal) recovery remains a major challenge since symptom improvement is not always matched with functional improvement (Voges & Addington, 2005). SST intervention should be adapted and offered to first-episode patients in order to prevent isolation and avoid subsequent psychotic episodes triggered by social anxiety or lack of social skills. Although some clinical working groups have already tested the efficacy of integrated psychosocial intervention including social skills training for patients with first-episode psychosis (Rosenbaum et al., 2006; the Danish OPUS trial, Thorup et al., 2005), the implementation of SST interventions in the daily care routine of this type of patients remains a challenge for the clinical community.

Similarly, people with dual diagnoses (Schizophrenia and co-occurring substance use disorder) can also benefit from programs integrating social skills training modules to learn, for example, how to say "no" or to combat social

pressure to use drugs (Shaner, Eckman, Roberts, & Fuller, 2003; Bellack et al., 2006). However, existing support services do not often include these types of modules, and consumers and caregivers struggle to cope with dual diagnoses. Thus, the integration and establishment of SST intervention as part of the care routine of these patients could improve the number of relapses and quality of life.

Clinical advanced technologies

As mentioned before, SST interventions are usually applied in group format, which allows the participants to practice with others. However, social anxiety, negative symptoms and poor insight may hamper the involvement of schizophrenia patients in group therapy. Another treatment characteristic of the SST is that it is delivered, like most interventions in mental health, in the clinical setting (e.g. consultation, day hospital), which lacks the “real” characteristics of the social situations (e.g. environmental stimuli, sounds or unknown people). Although practitioners formerly included the intervention between-session exercises, the evidence supporting the generalization of psychosocial skills training from the clinical setting to everyday life is far weaker and has received less attention than it deserves (Scott & Dixon, 1995). Virtual reality (VR) has been suggested as a new technology that can overcome this limitations and some research has already shown its effects on the interventions’ outcomes.

The first well reported application of VR to improve social skills in patients with schizophrenia was the clinical trial conducted in Korea by Ku et al. in 2007. The authors designed a VR-based conversation program which consisted of 10 tasks involving several types of conversational skills (e.g. beginning a conversation, silence-breaking or catching the avatar’s expression). Results showed that the system was sensitive to patients’ symptomatology (symptom variation) and cognitive decline, and that it was useful for conversation training. In their 2009 clinical study, Park et al. included a VR program in addition to an SST intervention. The authors compared SST using VR role-playing (SST-VR) to SST using traditional role-playing (SST-TR). Both interventions were applied in group format, and the main purpose was to enhance motivation and enrolment in the group therapy. After 10 sessions, patients in the SST-VR group showed greater interest in SST and greater generalization of the skills than the SST-TR group. At post intervention, participants receiving the SST-VR also showed a greater improvement in conversational skills and assertiveness than the SST-TR group. The authors concluded that the application of VR in role-playing might be a useful supplement to traditional SST (Park et al., 2009).

Similarly, our research group in the University of Barcelona (New Applied Technologies in Clinical Psychology Research Group, VR-Psy Lab) designed and developed a virtual reality-integrated programme to train social skills in people suffering from schizophrenia (Rus-Calafell, Gutiérrez-Maldonado, & Ribas-Sabaté, 2014). The programme was tested in a sample of stabilized outpatients instead of inpatients, because it is with outpatient cases and in stability periods that SST and other group-based social interventions are more effective and can assist the individual in correctly implementing and practicing social competence skills. The

programme was created as an adjunct technique of a manualised brief cognitive-behavioural SST designed and tested previously by our research group (Rus-Calafell et al., 2013). Although it was a pilot study, after the intervention, negative symptomatology and general psychopathology decreased and these gains were maintained at follow-up after four months. In terms of social cognition and social performance, results at post-treatment showed that participants improved in social skills mastery and new assertive behaviours were implemented in daily life. Crucially, the results also showed that participants exhibited a pattern of learning responses of emotion recognition, emissions and identification of assertive behaviours, and time expended in a conversation after the use of the *Soskitrain* (objective measures provided by the system).

Conclusions

Social disability affects the individual's occupational and school performance, impacts on self-care, and hinders family relationships and interpersonal interactions. Social skills interventions are the treatment of choice to improve this disability. Although there are a wide variety of programs that aim to improve social functioning in people suffering from schizophrenia, it seems clear that these programs must address directly the essential components of both pillars of functional outcome: social cognition and social competence. Furthermore, depression and social anxiety are common concomitants of schizophrenia that have been treated almost exclusively with medication. However, by integrating social skills training procedures into evidence-based psychological treatments for these comorbid disorders, mood and anxiety disorders will be more effectively treated (Kopelowicz et al., 2006). This integration should take into account the stage of the illness: family interventions and psychoeducation for crisis therapy; the pure behavioural approaches (token economy) for negative symptoms in chronic patients; and CBT for positive symptoms, poor insight and poor compliance, in the early stages of the disorder. Thus, a pragmatic combination of psychosocial interventions, such as SST plus CBT or SST plus psychoeducation, could clearly enhance the treatment outcomes and the patient's recovery process.

Although the fifth edition of the Diagnostic and statistical manual of mental disorders introduces no change on the diagnostic B criteria (social/occupational dysfunction) for schizophrenia, some changes made in the A criteria should be taken into consideration when planning to offer SST to a person presenting negative symptoms and poor social functioning. Experts have found that avolition and diminished emotional expression are key aspects of negative symptoms; and they consider that diminished emotional expression describes better the nature of the affect abnormality in schizophrenia than the affective flattening. Thus, the A criteria's fifth characteristic is now negative symptoms, i.e. diminished emotional expression and avolition (Tandon et al., 2013).

Finally, the generalization of social skills to clients' natural environments is clearly one of the main challenges for clinicians when applying SST interventions. In fact, they can be further supplemented by community-based in vivo skills training (Glynn et al., 2002) and by enlisting "indigenous supporters" to prompt

the use of skills in real-life situations (Tauber et al., 2000), as well as by the use of advanced technologies like VR (Rus-Calafell et al., 2014).

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