

REVIEW ARTICLE

Psychological treatments in schizophrenia: II. Meta-analyses of randomized controlled trials of social skills training and cognitive remediation

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ABSTRACT

Background. Social skills training and cognitive remediation are psychological techniques with considerable face validity for the treatment of negative symptoms of schizophrenia and their consequences. This paper provides a meta-analytical review of these treatments. It includes an appreciable number of randomized controlled trials, using comparisons against both standard care and other active interventions. However, the assessment of particular outcomes sometimes had to be based on single studies.

Method. A detailed search strategy was used to identify randomized controlled trials of social skills training and cognitive remediation, primarily employing electronic databases. Randomized controlled trials (RCTs) that met predefined criteria were then subjected to meta-analysis on a variety of outcome measures.

Results. There was no clear evidence for any benefits of social skills training on relapse rate, global adjustment, social functioning, quality of life or treatment compliance. Cognitive remediation had no benefit on attention, verbal memory, visual memory, planning, cognitive flexibility or mental state.

Conclusions. Social skills training and cognitive remediation do not appear to confer reliable benefits for patients with schizophrenia and cannot be recommended for clinical practice.

INTRODUCTION

Interest in the impact of the social environment of large mental hospitals (Wing & Brown, 1970) provided the impetus for the development of psychological interventions in schizophrenia. In the United States, this resulted in a particular approach, that of social skills training (see Wallace *et al.* 1980, for a review). A more recent development has been that of cognitive remedi-

ation; this is based on the long-standing recognition of the complex neuropsychological deficits present in schizophrenia (Brenner *et al.* 1992).

A number of reviews of social skills training exist, for example Corrigan (1991) and Heinssen *et al.* (2000). They have drawn not only on randomized controlled trials but on the large number of non-randomized controlled trials. The results of these reviews have been positive, concluding that the social skills training is generally well validated. However, a number of recent studies have drawn renewed attention to

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the problem of generalization of social skills training (a problem noted some time ago by Shepherd, 1978).

Cognitive remediation in contrast is a relatively new area of development and has not been the subject of formal meta-analysis, although it was reviewed by Vauth *et al.* (2000). These authors concluded that methodological problems in the area needed to be resolved.

The current paper is one of a pair devoted to specific psychological treatments in schizophrenia, and is based on research carried out by the joint British Psychological Society/Royal College of Psychiatrists working party for the development of psychosocial guidelines for the treatment of schizophrenia. The methods used are described in more detail in the first paper and in the technical report (Pilling *et al.* 2001, 2002). We have attempted to improve on previous systematic and meta-analytic reviews by confining ourselves to high quality randomized controlled trials that provide comparisons against standard care or other active interventions. No other systematic review or meta-analysis of these psychological treatments has focused specifically on randomized controlled trials. The current paper presents results in relation to social skills training and cognitive remediation.

METHOD

Search strategy

Electronic searches of *Biological Abstracts* (1980–1999), *CINAHL* (1982–1999), *The Cochrane Library* (Issue 2, 1999), *The Cochrane Schizophrenia Group's Register of Trials* (August 1999), *EMBASE* (1980–1999), *MEDLINE* (1966–1999), *PsycLIT* (1887–1999), *SIGLE* (1990–1999), and *Sociofile* (1980–1999) were undertaken. A more detailed description of the search strategy is available from the authors. All reference lists of the selected articles were searched for further relevant trials. Review articles were also scanned.

Study selection

Papers were checked for methodological rigour and validity by two reviewers (S.P. and G.O.), who independently inspected all citations, adhering to guidelines for conducting literature reviews (Mulrow & Oxman, 1997). We

attempted to resolve by discussion the allocation of a citation to a particular category of intervention and its relevance to the report. If this failed, a further reviewer was asked to review the article and decide.

Only randomized controlled trials were considered for inclusion. Trials where subjects were not restricted to people with schizophrenic spectrum disorders and where it was impossible to extract results for this group were excluded.

Due to problems in the literature concerning the definition of psychosocial interventions and of diagnosis, explicit inclusion criteria were specified. For social skills training, the necessary criteria for inclusion in the analysis were that the treatment was a structured psychosocial intervention (group or individual) intended to enhance social performance and reduce distress and difficulty in social situations. The intervention also had to include behaviourally-based assessments of a range of social and interpersonal skills, with importance placed on both verbal and non-verbal communication, and the individual's ability to perceive and process relevant social cues, and to respond to and provide appropriate social reinforcement.

To be classified as cognitive remediation, an intervention had to form a programme focused on improving cognitive function using a procedure implemented with the intention of bringing about an improvement in the level of that specified cognitive function.

The included studies were based on samples of people with schizophrenia or related disorders, including delusional disorder, schizophreniform disorder and schizoaffective disorder. Participants were often reported to have co-morbid mental disorders, such as depression and anxiety disorder. The individual trials excluded subjects for a variety of reasons such as organic brain syndromes, substance misuse and failing to reach a minimum IQ score. Outcomes such as death, mental state, relapse, and acceptability of treatment were considered. These outcomes were chosen because they were common to most studies, thought to be good indicators of treatment effectiveness, and regarded as clinically important.

Analysis of data

Intention-to-treat analyses were performed on all data i.e. a 'once randomized-always-analyse'

basis. This assumes that those participants who ceased to engage in the study – from whatever group – had an unfavourable outcome (with the exception of the outcome of ‘natural death’). While recognizing that most psychosocial therapies focus on those with severe illness, the reviewers felt that attrition of greater than 50% would call into question the value of the study. Such studies were therefore excluded, even if they reported relevant outcomes.

Odds ratios are reported with 95% confidence intervals. Similar analyses were undertaken for continuous data, using an effect size (Cohen, 1977). Where different measures were used in different trials e.g. where the Brief Psychiatric Rating Scale (BPRS) (Overall & Gorham, 1962) and the Comprehensive Psychopathological Rating Scale (CPRS) (Montgomery *et al.* 1978) were used to estimate the same underlying effect, or where there was a likelihood of poor inter-rater reliability, standardized effect sizes were calculated, based on the procedures of Glass (1981). However, a pooled standard deviation was used instead of the comparison group standard deviation.

As well as inspecting the graphical presentations, reviewers checked whether the differences between the results of trials were greater than would be expected by chance alone, using the *Q* statistic of Hedges & Olkin (1985). A significance level of < 0.05 on this statistic was taken to indicate significant heterogeneity. In such cases, random effects models, which allow for variation in the effect among the populations studied, were analysed to take this into account.

In addition to the above statistics, the ‘number need to treat’ (NNT) was also calculated. This refers to the number of patients it is necessary to treat in order to prevent one outcome (e.g. relapse) that would not have been prevented in the control group. A more detailed description of these analyses is provided by Pilling *et al.* (2002).

From our searches, a total of 20 studies of social skills training were identified, but 11 of these were excluded, due to their inability to meet our quality criteria. The main reasons for exclusion were: insufficient randomization in allocation to groups; a failure to fit the criteria for ‘social skills’; and an absence of usable outcomes (e.g. insufficient data reported to allow the results to be entered into a meta-analysis).

The remaining nine studies contained a total of 471 patients. In cognitive remediation we found a total of seven studies. Three were excluded due to the absence of usable data, the inclusion of patients with conditions other than schizophrenia, or failure to fit our criteria for cognitive remediation. Four studies, featuring 170 patients, were suitable for use in the meta-analysis. This small number of studies (and subjects) inevitably introduces some caution when interpreting the results. However, the absence of any significant heterogeneity does support the use of meta-analytic techniques for synthesising the results of these studies.

Comparisons

Due to the variety of comparison groups, it was necessary to rely on several different comparisons. For social skills training, a global comparison was initially conducted, including all studies that reported an outcome regardless of the nature of the comparison group. If there was significant heterogeneity, we then analysed studies that compared interventions only with standard care or only with other active treatments.

RESULTS

Social skills training

Participant characteristics

The main characteristics of trials included in the social skills analysis are listed in Table 1, while the details of the analyses are given in Table 2. Nine studies, comprising 471 patients, were included in the social skills meta-analysis. The mean age (based on the seven studies that reported it) was 36 years, with a range of 18–58. In the studies where the sex of participants could be gleaned, 85.2% were male. Four studies reported mean duration of illness, which was 12.5 years overall.

Relapse

Relapse in the first year of treatment was recorded in four studies, involving 235 patients (Wallace & Boone, 1983; Bellack *et al.* 1984; Hogarty *et al.* 1986; Marder *et al.* 1996). These demonstrated no beneficial effect of social skills, compared to all other treatments including standard care, in reducing relapse.

Table 1. *Characteristics of social skills studies*

Study	N	Intervention	Method	Duration	Comparison groups	Suitable outcome measures
Bellack <i>et al.</i> 1984	64	Basic social networking improvement and interpersonal stress reduction	Instruction, modelling, role-play, feedback and homework – adherence to treatment manuals	3 h/week, 12 weeks, 1 year follow-up	Day-hospital programme – relaxation and group and individual supportive therapy	Readmission Treatment non-compliance
Dobson <i>et al.</i> 1995	33	Communication skills, assertiveness training	Instruction, modelling, role-play, feedback and homework	4 h/week, 9 weeks, 6 months and 1 year follow-up	Social milieu-structured activities: discussion, exercise and activity groups	Readmission, length of stay in hospital Treatment non-compliance
Hayes <i>et al.</i> 1995	63	Interpersonal skills, social problem solving, positive time use skills	Instruction, modelling, role-play, feedback and homework	2 × 75 min/week, 18 weeks, 9 booster sessions over a 6 month follow-up	Discussion group – topics of interpersonal relations and purposeful use of time	BPRS GAS Social skills changes
Hogarty <i>et al.</i> 1986	75	Enhancing verbal and non-verbal communication behaviour & developing more accurate social perception and social judgement	Instruction, modelling, role-play, feedback and homework	12 h/week, 2 year treatment, 18 months follow-up	Nursing support – individual, didactic, supportive relationship	Relapse Treatment non-compliance Medication compliance
Lieberman <i>et al.</i> 1998	84	Basic conversation, recreation for leisure, medication and symptom management	Discussion, instruction, feedback	12 h/week for 6 months, 18 month follow-up	Occupational therapy – expressive, artistic and recreational activities	Treatment non-compliance Quality of life Adaptation of life: efficacy
Lukoff <i>et al.</i> 1986	28	Assertive behaviour, anger control, problem solving and weekly behavioural family therapy	Role playing, feedback, homework, modelling, instruction	Daily morning sessions and bi-weekly role-playing for 10 weeks, 2 year follow-up	Holistic health programme – exercise, yoga, meditation, stress education	Relapse at follow-up, mental state (SCL – 90) Global adjustment scores (nurses scale) Treatment non-compliance
Marder <i>et al.</i> 1996	80	Compensation for schizophrenic symptoms and cognitive deficits	Cognitive restructuring behavioural rehearsal, video modelling, social reinforcement, homework	180 min/week for 6 months and then 90 min/week for 18 months	Supportive group psychotherapy – goal-setting and harnessing group dynamics and exploring problems and obstacles	Relapse Social adjustment Treatment non-compliance
Peniston, 1988	28	Group assertive training focused on threatening interpersonal situations	Rehearsal, modelling feedback and reinforcement	1 h/week for 9 months	Standard care	Harm to others Harm to self Treatment non-compliance
Wallace & Boone, 1983	16	Discussing difficult interpersonal situations	Modelling, role-play, feedback and homework	3 h/week for 4 weeks	Standard care	Unable to be discharged

Table 2. Details of analysis for social skills trials

Outcome	Time period	Comparison v.	Fixed effects OR (95% CI)	Random effects OR (95% CI)	Studies N	Patients N	NNT (95% CI)	Q (P)
Relapse	1st year of treatment	All other treatments	0.74 (0.43 to 1.29)	0.74 (0.40 to 1.39)	4	125	-16 (-∞ to -6)	3.71 (0.29)
Relapse	1 to 2 years into treatment	Active therapies	3.03 (1.11 to 8.33)	3.88 (0.22 to 69.67)	2	264	18 (5 to ∞)	5.06 (0.02)
Relapse	Up to 1 year after treatment	Active therapies	0.62 (0.29 to 1.33)	0.62 (0.29 to 1.35)	3	155	-24 (-∞ to -5)	1.25 (0.54)
Treatment non-compliance	N/A	All other treatments	1.31 (0.79 to 2.17)	1.31 (0.78 to 2.20)	6	235	10 (5 to ∞)	3.36 (0.64)
Global adjustment	N/A	Active treatments	Effect size = -0.153 (-0.56 to 0.26)	Effect size = -0.153 (-0.56 to 0.26)	2	92	N/A	0.35 (0.56)

Q, heterogeneity statistic ($P < 0.05$ indicates heterogeneity); NNT, number needed to treat (negative number denotes treatment less effective than comparison group, + / -∞ indicates non-significant result); N/A, not applicable.

Two studies including 155 patients provided information about relapse rates between 1 and 2 years into treatment (Hogarty *et al.* 1986; Marder *et al.* 1996). Some evidence was derived from the analysis to suggest that other active therapies were of greater benefit than social skills in reducing relapse and readmission between one and two years into treatment. The pooled odds ratios lay between 3 and 3.1 for both the fixed effects and the random effects model.

Three studies compared social skills training with other active therapies (Bellack *et al.* 1984; Lukoff *et al.* 1986; Dobson *et al.* 1995). They reported data at the follow-up stage, up to 12 months after the end of treatment. There is no evidence to suggest that social skills training is more effective than other active therapies. The analyses are fully described in Table 2.

Treatment non-compliance

Six studies reported drop-out rates for 366 patients in trials comparing social skills to all other treatments (Bellack *et al.* 1984; Hogarty *et al.* 1986; Lukoff *et al.* 1986; Dobson *et al.* 1995; Marder *et al.* 1996; Liberman *et al.* 1998). There was no significant difference between social skills and the comparison treatments on drop out rates. However, the majority of trials report higher drop-out rates in the social skills condition.

Global adjustment

This outcome was reported in terms of two different measures in two studies (Hayes *et al.* 1995; Lukoff *et al.* 1986), the Global Adjustment Scale (GAS) and the Nurses Global Impression Scale. No benefit was observed for social skills training on these global adjustment measures. The analysis yielded an effect size of -0.15 for both fixed and random effects (see Table 2).

Social functioning

The studies varied greatly in the measures they used, making the task of meta-analysis a difficult one. Data were available from single studies on a wide range of measures, and we think it is useful to report some of these in order to give a broader picture of the potential effectiveness of social skills training.

The study of Hayes *et al.* (1995) provided information on changes in social skills, tapped

Table 3. *Main characteristics of cognitive remediation trials*

Study	N	Intervention	Duration and frequency	Outcome measures used in this analysis
Tompkins <i>et al.</i> 1995	24	Cued condition – providing general organizational schema or goal for each measure – altered task formats	N/A	Verbal memory Visual memory
Medalia <i>et al.</i> 1998	54	Orientation remedial module (ORM) = computer-based attentional remediation program	18 sessions of 20 min over 6 weeks	Attention Mental state (BPRS)
Benedict <i>et al.</i> 1994	38	Guided practice on six computer-based attentional tasks	14 sessions of 50 min	Attention Verbal memory
Medalia <i>et al.</i> 2000	54	Memory remediation using 'Memory Package' computer software	10 sessions, twice weekly for 5 weeks	Verbal memory
Wykes <i>et al.</i> 1999	33	Therapist led manualized training in the component processes of problem solving and complex planning	1 h/day for 40 days	Mental state (BPRS) Visual memory Verbal memory Cognitive flexibility planning

by the simulated social interaction task (Curran, 1982) and the conversation with a stranger task (Wallace & Liberman *et al.* 1985). There was no significant change in the group trained in social skills in comparison to the other treatment group, in this case a discussion group focusing on interpersonal issues. There was, however, a trend favouring the treatment group, with a standardized effect size of 2.1.

A significant improvement in social adjustment was found by Marder *et al.* (1996) in the social skills training group compared to a supportive psychotherapy group, gauged by the Social Adjustment Scale (Schooler *et al.* 1979). The standardized effect size was -0.14 .

Quality of life

There was no significant difference in scores on the 'profile of adaptation of life' in the one study that reported this measure (Liberman *et al.* 1998), with a standardized effect size of -0.03 . The same study found a significant improvement in quality of life on the Lehman Quality of Life Scale, with those in the social skills group rated as having a higher quality of life than those in the other treatment group, in this case psychosocial occupational therapy. This yielded a standardized effect size of 0.09.

There was no clear evidence of any difference between social skills and comparison treatments on the above meta-analyses. Some trials, how-

ever, did demonstrate benefits of social skills training on unique outcome measures (for example, Liberman *et al.* 1998, on Quality of Life), but these findings are not as robust as those of the main meta-analysis.

Cognitive remediation

The main characteristics of studies included in the cognitive remediation analysis are listed in Table 3. The comparison group in each study was matched with the experimental group, and differed only in that they were not receiving cognitive remediation.

Participant characteristics

Five studies comprising 170 participants were included in the analysis (Benedict *et al.* 1995; Tompkins *et al.* 1995; Medalia *et al.* 1998, 2000; Wykes *et al.* 1999). The mean age of participants was 36.7 years. From three trials the mean percentage of males included was 74%. The mean number of years spent in education, reported in all four trials, was 11.4. The diagnosis of schizophrenia or schizoaffective disorder was reached in three trials by using DSM-III-R criteria, and in one by using DSM-IV criteria. The effect sizes for the cognitive remediation analysis are presented in Table 4.

Attention

Two trials including 87 subjects compared patients trained on attentional tasks with a

Table 4. Details of cognitive remediation analyses

Outcome	Fixed effects Standardized effect size (95% CI)	Random effects Standardized effect size (95% CI)	Studies N	Patients N
Attention	0.11 (–0.31 to 0.53)	0.11 (–0.31 to 0.53)	2	87
Verbal memory	0.14 (–0.23 to 0.50)	0.14 (–0.23 to 0.50)	4	117
Visual memory	0.34 (–0.23 to 0.92)	0.35 (–0.46 to 1.16)	2	48
Mental state	–0.23 (–0.66 to 0.20)	–0.23 (–0.66 to 0.20)	2	84

matched control group (Benedict *et al.* 1994; Medalia *et al.* 1998). Neither of the individual studies identified a substantial advantage for cognitive remediation. Accordingly, meta-analysis provided no evidence of any benefit of cognitive remediation compared to the control group (see Table 4).

Verbal memory

Four trials with 117 patients, presented results for performance on verbal memory tasks (Benedict *et al.* 1984; Tomkins *et al.* 1995; Wykes *et al.* 1999; Medalia *et al.* 2000). The calculation of the standardized weighted mean effect size failed to demonstrate any benefit for cognitive remediation over matched controls.

Visual memory

Two trials reported data from 48 patients concerning the effect of cognitive remediation on visual memory (Tomkins *et al.* 1995; Wykes *et al.* 1999). Overall, there was no reliable difference in visual memory between the cognitive remediation group and the matched controls.

Mental state

Mental state was rated using the BPRS in two trials including 84 patients (Medalia *et al.* 1998; Wykes *et al.* 1999). Analysis of the results of these trials shows no reliable advantage attributable to cognitive remediation.

Executive functioning

As with the social skills training, the cognitive remediation trials we identified often had a large number of measures unique to each study. Wykes *et al.* (1999) used 17 such measures. It was thought appropriate to present the results from this study relating to planning and cognitive flexibility, as they cover important areas often discussed when considering cognitive deficits in schizophrenia.

Wykes *et al.* (1999) tested 24 patients on a computerized version of the Tower of London Task (Shallice, 1982), to investigate planning. No significant difference between patients who had undergone cognitive remediation and controls was found. The standardized effect size was 0.21 (95% CI = –0.49 to 0.92). Data were presented by Wykes *et al.* (1999) on a version of the Stroop test (Trenerry *et al.* 1989). This was used to test cognitive flexibility. Cognitive remediation showed no advantage over intensive occupational therapy (the control condition) in the completion of the Stroop task. The standardized effect size was 0.23 (95% CI = –0.49 to 0.95).

While there were positive individual results on some trials (for example, cognitive flexibility, Wykes *et al.* 1999), none of the meta-analyses showed any clear differences between cognitive remediation and the control group.

DISCUSSION

Social skills training

Many controlled trials and systematic reviews of social skills training claim positive results, and they have accordingly influenced current treatment guidelines (PORT Guidelines, Herz *et al.* 1997; APA, 1998). However the conclusion of our meta-analytic review of randomized control trials must be that the evidence is unconvincing. There were few observed benefits of social skills training in a range of settings. Given the long availability of social skills training, it is surprising that similar positive results to those obtained with family interventions have not emerged. In light of this, it is hard to recommend the use of social skills training in routine clinical practice. Our exclusive use of randomized controlled trials has contributed to the significant differences in the conclusions reached here, compared to many other reviews in the field. This is consistent with reports in the literature

which suggest that RCTs are often associated with less positive findings, due to their ability to address selection bias (Schultz *et al.* 1995). Additional reasons for the discrepancy between these findings and those of other reviews and meta-analyses could be the inclusion of newer trials, and the lack of truly robust effects in the original trials. Furthermore, the use of more refined meta-analytical techniques could account for differences between this review and some of its predecessors.

The absence of any clear evidence from the trials reviewed here raises questions about the future direction of research in social skills training. While there is current debate about the degree of preference that should be accorded to evidence from RCTs (Healy, 2001; Slade & Priebe, 2001), the unimpressive results from our analysis certainly make a case that requires to be answered by clinicians who support the use of social skills training. It could be argued that there is a need for a large pragmatic trial to demonstrate the effectiveness of social skills training in routine care, although it might be hard to justify the considerable resources such a trial would require. It might be more effective if social skills training were to be significantly redeveloped, as suggested in recent reviews (e.g. Huxley *et al.* 2000), with the object of improving functioning across a much wider range than was previously attempted. These developments may address some of the functional problems that are associated with the neuropsychological deficits of schizophrenia.

The assessment of social skills training would be assisted by the use of uniform outcome measures. While it is important to evaluate performance directly related to the skills that were trained, the crucial set of measures relate to the higher levels of function required for improved social adjustment. Our analyses showed no advantage in terms of relapse, but this is a less appropriate outcome measure. It is possible that improved social skills might insulate patients against relapse, but this is not a necessary consequence.

Cognitive remediation

The position with regard to cognitive remediation is also disappointing. The data reviewed in this paper, compiled from the small series of recent randomized controlled trials,

provided no consistent evidence of appreciable positive effects of cognitive remediation. In these circumstances, we agree with the conclusion recently reached by Bellack (1995) that the concentration of efforts on the direct remediation of specific cognitive deficits in schizophrenia is unlikely to prove beneficial. Instead, he argues, efforts should be directed to wider psychological and environmental interventions that take account of the cognitive deficits present in schizophrenia but focus their therapeutic efforts on the improvement of functional deficits. The present results certainly do not justify the incorporation of cognitive remediation into clinical practice. In the development of further research in cognitive remediation serious consideration should be given as to whether the focus of such research should be on the direct remediation of cognitive deficits or on the improvement of functional deficits associated with cognitive impairments. In our view the second approach is likely to prove a more fruitful course for the development of both research and clinical practice.

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