FOCUSED QUESTION
In clients with schizophrenia, is cognitive remediation useful in improving cognitive symptoms, including attention, memory, and problem-solving abilities, and in decreasing negative symptoms that interfere in the client’s social and occupational functioning?


CLINICAL BOTTOM LINE:
The focus of this study is the effectiveness of computer-assisted cognitive remediation in clients with schizophrenia. Neurocognitive deficits presented by clients with schizophrenia have been shown to be resistant to antipsychotic medication and explain 20% to 60% of the variance in measure of clinician-rated community function, social problem-solving, and progress in rehabilitation programs (Green et al., 2000; Kurtz et al., 2005; Revheim et al., 2006, as cited in Kurtz et al., 2007). Occupational therapy lists areas such as social participation (including community functioning and successful social communication) in the Occupational Therapy Practice Framework: Domain and Process (2nd ed.; American Occupational Therapy Association, 2008). As such, occupational therapists may be interested in this approach to behavioral remediation to address the cognitive issues seen in clients with schizophrenia.

Whether cognitive-assisted computer remediation is a valid, evidence-based option requires further research that takes into account factors such as length of illness, concurrent pharmacologic therapy, and prior level of functioning. Further research also should address the mechanism behind the change seen in subjects’ working memory and whether the difference seen was due to the experimental intervention or to interaction with the clinician. However, this study shows promise for the future, and occupational therapists should implement this strategy as a part of a comprehensive plan to improve clients’ social and occupational functioning.

RESEARCH OBJECTIVE(S)
List study objectives.

The objective was to contrast the effects of a treatment with computer-assisted cognitive remediation. This includes explicit training in attention, verbal and nonverbal working and
episodic memory, and language-processing exercises. The comparison condition included an equivalent duration of exposure to and operation of a computer, equivalent interaction with a clinician, and nonspecific cognitive challenge (acquiring skills in basic computer literacy through multi-modal, computer-based lessons and completion of content exams on an ongoing basis), but without repetitive practice in specific neurocognitive functions.

**DESIGN TYPE AND LEVEL OF EVIDENCE:**

- Randomized controlled trial (RCT)
- Level I evidence
- Single-blind, random assignment

Limitations (appropriateness of study design):
Was the study design type appropriate for the knowledge level about this topic? *Circle yes or no, and if no, explain.*

**YES/NO**

- The study’s small sample size obscured small- to medium-sized effects.
- Participants in this study were chosen from a convenience sample.

**SAMPLE SELECTION**

How were subjects selected to participate? Please describe.

Participants were found via continuous recruitment (over 5 years, from 2001 to 2005) from two sites. The majority of patients in the study (91%) were recruited from and enrolled in an intensive outpatient program for patients with schizophrenia at the Institute of Living in Hartford, CT; a smaller cohort (9%) was recruited from a community mental health center in Meriden, CT.

**Inclusion Criteria**

Participants met the *DSM–IV* criteria for schizophrenia or schizoaffective disorder as determined by the Structured Clinical Interview for *DSM–IV*.

**Exclusion Criteria**

Auditory or visual impairment, evidence of mental retardation, traumatic brain injury with a sustained loss of consciousness, presence or history of any neurologic illness other than schizophrenia, lack of proficiency in English, and/or criteria met for concurrent substance abuse or dependence.

**SAMPLE CHARACTERISTICS**

* N = 42.

<table>
<thead>
<tr>
<th>% Dropouts</th>
<th>38%</th>
</tr>
</thead>
<tbody>
<tr>
<td>#/ (%) Male</td>
<td>67%</td>
</tr>
<tr>
<td>#/ (%) Female</td>
<td>33%</td>
</tr>
<tr>
<td>Ethnicity</td>
<td>NR</td>
</tr>
</tbody>
</table>
Disease/disability diagnosis: Schizophrenia or schizoaffective disorder

Check appropriate group:

<table>
<thead>
<tr>
<th>&lt; 20/study group</th>
<th>20–50/study group</th>
<th>51–100/study group</th>
<th>101–149/study group</th>
<th>150–200/study group</th>
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<td>✓</td>
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**INTERVENTION(S) AND CONTROL GROUPS**

*Add groups if necessary*

**Group 1**

**Brief Description**
Cognitive remediation: 100 hours of training in the following tasks: simple visual reaction time; simple auditory reaction time; simple choice reaction time visual; simple choice reaction time auditory; progressive attention training—respond to a selected color; progressive attention training—alternate black and red by a signal; simultaneous multiple attention; sequenced recall digits auditory—forward and backward; simultaneous recall digits visual—forward and backward; sequenced recall words visual; graphics visual—forward and backward; verbal memory categorizing; and speed reader. These exercises were designed to improve attention, verbal and nonverbal memory, and language processing.

**Setting**: NR

**Who Delivered?**: Pre-doctoral and doctoral-level clinicians

**Frequency?**: NR

**Duration?**: 100 hours over 12 months

**Group 2**

**Brief Description**
Computer skills training: 12-month course of computerized tutorials in general computer literacy and specific skills using Microsoft Office. Treatment consisted of a sequence of training on general word-processing skills, spreadsheet management, Internet use, and other skills directly applicable to an entry-level office position in the community.

**Setting**: NR

**Who Delivered?**: Pre-doctoral and doctoral-level clinicians

**Frequency?**: NR

**Duration?**: 100 hours over 12 months

**Intervention Biases**: Circle yes or no and explain, if needed.

**Contamination**

**YES/NO**
Patients received their intervention in the same room at side-by-side computers.
Co-intervention
YES/NO It is assumed that patients in this study were receiving concurrent pharmacologic intervention.

Timing
YES/NO

Site
YES/NO NR

Use of different therapists to provide intervention
YES/NO NR

MEASURES AND OUTCOMES
Complete for each relevant measure when answering the evidence-based question:
Name of measure, what outcome was measured, whether the measure is reliable and valid (as reported in article—yes/no/NR [not reported]), and how frequently the measure was used.

Working memory: The Digit Span and Arithmetic and Letter–Number Sequencing subtests from the Wechsler Scale of Adult Intelligence (WAIS–III) were administered before and after treatment. Reliability and validity NR.

Verbal episodic memory: Logical Memory I and II subtests from the Wechsler Memory Scale III (WMS–III), and California Verbal Learning Test II (CVLT–II) Total and Long-Delay Free Recall were administered before and after treatment. Reliability and validity NR.

Speed of information processing: Digit Symbol and Symbol Search subtests of WAIS–III, Trailmaking Test, Grooved Pegboard, and Letter Fluency were administered before and after treatment. Reliability and validity NR.

Visual episodic memory: Rey Complex Figure Test was administered before and after treatment. Reliability and validity NR.

Reasoning and problem-solving: Block Design subtest from WAIS–III, the Penn Conditional Exclusion Test, and the Booklet Category Test were administered before and after treatment. Reliability and validity NR.

Measurement Biases
Were the evaluators blind to treatment status? Circle yes or no, and if no, explain.
YES/NO
Recall or memory bias. *Circle yes or no, and if yes, explain.*

**YES/NO**

Others (list and explain):

**RESULTS**

List results of outcomes relevant to answering the focused question
Include statistical significance where appropriate \((p < 0.05)\).
Include effect size if reported.

<table>
<thead>
<tr>
<th>Control and Intervention Groups: Main effects of time for</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Working memory ((p &lt; 0.001))</td>
</tr>
<tr>
<td>• Verbal episodic memory ((p &lt; 0.001))</td>
</tr>
<tr>
<td>• Spatial episodic memory ((p &lt; 0.002))</td>
</tr>
<tr>
<td>• Processing speed ((p &lt; 0.001))</td>
</tr>
<tr>
<td>• Reasoning/executive function ((p &lt; 0.001))</td>
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<tr>
<th>Intervention Group: Significant time × group interaction for working memory domains, including</th>
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<tbody>
<tr>
<td>• Digit span ((p &lt; 0.001))</td>
</tr>
<tr>
<td>• Arithmetic ((p = 0.001))</td>
</tr>
</tbody>
</table>

Although the above results indicate that both the experimental and control conditions, by virtue of providing stimulation and clinician interaction, improved cognitive function, subjects in the experimental condition showed a significant improvement in measures of working memory. Due to the significant cognitive impairments associated with chronic schizophrenia, it is hypothesized that the neurocognitive and negative symptoms of the disorder place large restrictions on patients’ social and occupational life. Therefore, any type of sustained, goal-directed cognitive activity in the presence of supportive clinicians has the potential to elevate neuropsychological function significantly in this population.

Was this study adequately powered (large enough to show a difference)? *Circle yes or no, and if no, explain.*

**YES/NO** Small sample size, and results are limited by lack of power.

Were appropriate analytic methods used? *Circle yes or no, and if no, explain.*

**YES/NO** Analyzed in a 2 × 2 mixed design ANOVAs with time (pre- vs. post-training assessment) as a within-subjects variable and group (cognitive remediation vs. computer-skills training) as the between-subjects variable.
Were statistics appropriately reported (in written or table format)? Circle yes or no, and if no, explain.

YES/NO

CONCLUSIONS
State the authors’ conclusions that are applicable to answering the evidence-based question.

Cognitive remediation appears effective in improving the working memory of patients with psychosis. However, nonspecific computer skills training also was effective in improving some components of neurocognitive functioning in the study’s participants. An implication is that the neurocognitive deficits and negative symptoms of the disorder place such large restrictions on patients’ social and occupational functioning that any type of sustained, goal-directed cognitive activity in the presence of supportive clinicians, regardless of its content, has the potential to elevate neuropsychological function significantly in this patient population.

References


This work is based on the evidence-based literature review completed by Kristine J. Wei, OTS; Carly Zaid, OTS; and Salvador L. Bondoc, OTD, OTR/L, FAOTA, Faculty Advisor, Quinnipiac University.


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