Motivational Interviewing to Increase Cognitive Rehabilitation Adherence in Schizophrenia

Joanna M. Fiszdon*1,2, Matthew M. Kurtz2,3, Jimmy Choi4, Morris D. Bell1,2, and Steve Martino1,2
1Department of Psychology, VA Connecticut Healthcare System, West Haven, CT; 2Department of Psychiatry, Yale University School of Medicine, New Haven, CT; 3Department of Psychology and Program in Neuroscience and Behavior, Wesleyan University, Middletown, CT; 4Olin Neuropsychiatry Research Center, The Institute of Living, Hartford Hospital, Hartford, CT

*To whom correspondence should be addressed; Psychology Service (116B), VA Connecticut Healthcare System, 950 Campbell Ave., West Haven, CT 06516, US; tel: (203) 932-5711, ext. 2231, fax: (203) 937-3542, e-mail: Joanna.fiszdon@yale.edu

Adherence to treatment in psychiatric populations is notoriously low. In this randomized, controlled, proof-of-concept study, we sought to examine whether motivational interviewing (MI) could be used to enhance motivation for, adherence to, and benefit obtained from cognitive rehabilitation. Dual diagnosis MI, developed specifically for individuals with psychotic symptoms and disorganization, was further adapted to focus on cognitive impairments and their impact. Sixty-four outpatients diagnosed with schizophrenia spectrum disorders completed baseline assessments and were randomized to receive either the 2-session MI focused on cognitive functioning or a 2-session sham control interview focused on assessment and feedback about preferred learning styles. Next, all participants were given 4 weeks during which they could attend up to 10 sessions of a computer-based math training program, which served as a brief analog for a full course of cognitive rehabilitation. As hypothesized, MI condition was associated with greater increases in task-specific motivation along with greater training program session attendance. Moreover, postinterview motivation level predicted session attendance.

Key words: psychosis/cognitive remediation/compliance/treatment/motivation

Introduction

Schizophrenia is characterized by substantial and persistent reductions in motivation (Bleuler, 1911; cf Moskowitz and Heim1), which in turn hamper attempts to engage individuals in psychosocial rehabilitation and directly impact the efficacy of any such treatments.2,4 At present, multiple efforts are under way to better understand these motivational impairments and develop treatments to lessen their impact.5-8 Herein, we describe the adaptation and evaluation of motivational interviewing (MI) as a method of enhancing treatment-specific motivation and increasing adherence to cognitive rehabilitation in individuals with schizophrenia spectrum disorders.

With the well-established link between cognition and functional outcomes in individuals with schizophrenia,9 interest has flourished in developing and validating cognitive rehabilitation interventions for this population. While laboratory-based studies indicate efficacy along with high treatment adherence,10,11 the real-world effectiveness of this and other treatments is compromised by poor treatment engagement and adherence. For example, in an intensive community outpatient psychosocial rehabilitation program offering cognitive rehabilitation along with other psychosocial interventions, 37% of those enrolled (47 of 127) dropped out within the first month of treatment.12 Other reports based on general psychiatric samples indicate nonpharmacological treatment nonadherence rates ranging from 25% to 75%.13-16 These reports are quite troubling, given the link between adherence and outcomes,17-19 and suggest that beyond developing effective psychosocial interventions, more focus is needed on ensuring that these interventions are accepted and fully utilized by individuals for whom they are developed.

Often treated as a unitary construct, there are in fact many different aspects of motivation, each with separate theoretical underpinnings.20 Likely the best known distinction is that between extrinsic and intrinsic motivation,7 however further demarcations can be made between global trait motivation, global state motivation,
task-specific (aka intrinsic) motivation. Importantly, these motivational processes are at least in part distinct, and some may be more amenable to intervention. In our own work, for example, we found that individuals with psychosis who were not motivated for general, everyday activities could still exhibit motivation for specific tasks, such as cognitive training. More so, this task-specific motivation is malleable, suggesting that it may be an appropriate target for manipulations aimed at increasing adherence to specific psychosocial treatments.

A complementary line of research on MI and related interventions also indicates that treatment-specific motivation can be enhanced. Until now, the bulk of this research has examined the efficacy of this approach in either general psychiatric, substance-using, or nonpsychiatric samples. A number of researchers have also adapted this approach to targeting medication adherence in individuals with psychosis, though the results of these trials have been equivocal. We are aware of only one study that focused on psychoeducation to increase insight into cognitive impairment; however, this very brief intervention did not improve self-reported receptiveness to cognitive rehabilitation.

In the current randomized, controlled proof-of-concept study, we sought to examine whether MI could be used to enhance motivation for, adherence to, and benefit obtained from cognitive rehabilitation (CR). A brief cognitive rehabilitation analog was used in lieu of a full course of cognitive training. We hypothesized that compared to sham control interviews (CI) matched for duration and interaction with a clinician, individuals randomized to 2 sessions of MI would evidence: (1) greater adherence to the CR program as demonstrated by number of training sessions attended, (2) higher levels of intrinsic motivation for CR both immediately after the MI sessions and after a brief program of CR, and (3) greater content acquisition of skills taught in the CR program. Additionally, we sought to evaluate the role of motivation level in adherence to CR and hypothesized that post-interview motivation level would predict number of sessions attended.

Methods
Participants
Adults with schizophrenia spectrum disorders were recruited by flyer and word of mouth from outpatient VA Medical Center clinics and community settings. Inclusion/exclusion criteria were: DSM-IV diagnosis of schizophrenia or another psychotic disorder, including affective disorder with psychotic features and psychosis not otherwise specified; not meeting criteria for substance dependence in past 30 days; psychiatric stability as evidenced by minimum of 30 days since last psychiatric hospitalization and minimum 30 days since last change in psychiatric medications; no evidence of developmental disability in chart or on baseline assessment; no diagnosis of any medical or neurological illness known to impair brain function including dementia, history of head trauma with loss of consciousness > 1 hour, or clear cognitive sequelae from other illness or injury, per medical chart review; no auditory or visual impairment that would impact ability to participate in computerized training; ability to provide legal written informed consent (ie, the participant does not have a legally authorized representative/conservator); and not currently enrolled in another trial targeting treatment engagement or cognitive performance. Recruitment occurred between June 2013 and May 2014.

Study Design
This was a randomized, controlled, proof-of-concept trial using a math-learning program as an analog for learning that occurs during a full course of cognitive rehabilitation. Upon completing baseline assessments, participants were randomized to receive either a 2-session MI focused on cognitive functioning or a 2-session sham CI focused on assessment and feedback about preferred learning styles. Session length was 30–45 minutes, and both sessions were conducted within a week’s time of each other. To preserve equipoise, both interviews were presented to participants as different methods of helping people learn new information. All interviews were administered by the same therapist and videotaped to allow for subsequent fidelity ratings. Next, all participants were given 4 weeks during which they could attend up to 10 sessions of the cognitive training analog (math-learning program). Participants were provided with multiple time slots each day during which training could be completed. No payment was offered for attending the math-learning sessions, though payment was offered for study assessments. The study was approved by local IRB committees. All participants provided written informed consent.

Experimental Interventions
Motivational Interview
Dual Diagnosis Motivational Interviewing (DDMI), a 2-session intervention targeting substance misuse in individuals with psychotic disorders, was used as a starting point for the current MI intervention. DDMI was specifically designed for individuals with psychosis who may exhibit negative or disorganized symptoms and includes accommodations for cognitive impairments, including the following: asking questions and reflecting in simple and concise terms, repeating information and summarizing session content, providing greater structure during interview, being sensitive to emotional material, using simple, concrete materials, presenting information in multiple modalities including using visual aids and writing things down, frequent restating, slower interview pace, and pauses to allow participants to process material. These modifications are consistent with some of the suggestions made by experts in rehabilitation for...
individuals with serious and persistent mental illness.\textsuperscript{34,35} For the current trial, DDMI was further adapted to focus on the problem area of cognitive impairment and its consequences. The first session focused on exploring the participant's views about his or her cognitive functioning, providing personalized feedback about cognitive function (based on baseline cognitive performance), providing information on how cognition can be improved through cognitive training, and conducting a decisional balance activity to weigh the pros and cons of pursuing a goal and to build motivation for change. In the second session, content from the first session was summarized, including stated reasons for change. Next the participant and therapist developed and discussed a change plan for improving cognitive functioning, including the option of participating in the cognitive training analog. The cognitive training analog was also demonstrated.

**Control Interview**

During the first session, achievement motivation and learning style were assessed by collaboratively filling out 2 inventories, the Achievement Motivation Profile (AMP)\textsuperscript{36} and the Learning Styles Inventory (LSI)\textsuperscript{37}. The AMP is a 140-question, Likert-format assessment of motivational factors that contribute to underachievement and which also provides specific recommendations for improvement. Scale items produce information on 4 domains: motivation for achievement, inner resources, interpersonal strengths, and work habits, which themselves contain additional subscales. The LSI is 30-item, multiple choice measure of general learning preferences, which provides information on preferred conditions for learning, areas of interest, modes of learning, and expectations for performance. Participants received detailed feedback about their pattern of scores on the 2 inventories during the second session, at which time they were also familiarized with the cognitive training analog.

**Cognitive Rehabilitation Analog**

A brief, computerized math-learning program was used as an analog for a full course of cognitive rehabilitation. This particular arithmetic-learning paradigm has been successfully used in past studies\textsuperscript{34-35} and is sensitive to motivational manipulations. Similarly to full-length CR interventions, it requires the use and practice of several cognitive skills, including attention, working memory, and mental flexibility, and allows for direct domain-specific assessments of learning (arithmetic test) that can quantify the degree of material absorption. Skills taught during the training include single-digit subtraction, division, multiplication, use of parentheses, and order of operations. The task is delivered as a computerized "math game," the object of which is to advance a token from the start line (1) to the finish line (60). In order to advance the token, the participant must attempt to combine 3 numbers generated by the computer into a valid arithmetic expression using operations of addition, subtraction, division, multiplication, and parentheses. The resulting value of the created expression is the number of spaces the participant can advance on the board game. If the participant cannot provide a valid arithmetic expression using the generated numbers, the computer provides instructional feedback and offers the correct answer. The participant is not allowed to advance unless s/he provides a correct answer. For additional information about the math-learning program, please refer to Choi and Medalia.\textsuperscript{3} In the current trial, the standard version of the math-learning program was used.

**Measures**

Baseline assessment consisted of demographic, psychiatric, cognitive, arithmetic skill (trained during CR) and task-specific intrinsic motivation evaluations. Task-specific intrinsic motivation was assessed again immediately after the second session of MI or CI, and once again at the end of the study, once participants either finished all 10 training sessions or 4 weeks from the end of MI/CI interviews had elapsed. Assessments were conducted by personnel blind to condition assignment.

**Task-Specific Motivation**

The Intrinsic Motivation Inventory for Schizophrenia Research (IMI-SR)\textsuperscript{38}, a 21-item self-report, Likert-format measure, was used to assess domains related to motivation for cognitive training: interest/enjoyment, perceived choice, and value/usefulness. The IMI-SR has been designed to assess the subjective experience of a learning activity specifically in an experimental setting and has been shown to have good internal consistency and test-retest reliability.\textsuperscript{38} It has also been shown to be associated with treatment attendance and treatment efficacy, as well as to be sensitive to motivational manipulation.\textsuperscript{38} Scores for each of the 3 subscales can range from 7 to 49, with full IMI scores ranging from 21 to 148 and higher scores reflecting greater motivation. A measure of internal reliability for the scale was in the excellent range (Cronbach’s alpha = .907).

**Additional Measures**

At baseline, schizophrenia spectrum diagnoses were confirmed using the Structured Clinical Interview for DSM-IV\textsuperscript{39} administered by the first author (J.M.F.). Positive and Negative Syndrome Scale (PANSS)\textsuperscript{40} was used to characterize participants by assessing the presence and severity of positive, negative, and general psychiatric symptoms. Premorbid intelligence was assessed with the Wechsler Test of Adult Reading (WTAR)\textsuperscript{41}. Additional baseline measures included the Brief Assessment of Cognition in Schizophrenia (BACS)\textsuperscript{42,43}, a battery assessing working memory, motor speed, attention, executive functioning, and verbal fluency, and the Medication
Management Ability Assessment (MMAA\textsuperscript{44}), a proxy measure of functioning that has been shown to correlate highly with cognitive ability.\textsuperscript{45} These latter 2 measures were used to provide personalized feedback during the MI sessions. Arithmetic skill was assessed with the Columbia University Teacher’s College arithmetic test, administered before and after CR. Alternate versions of the measure were used for pre and post-CR assessments. Adherence was defined as total number of sessions attended.

Treatment Fidelity
Therapist adherence to and competence in strategies consistent or inconsistent with the delivery of motivational interview (eg, reflective listening vs closed-ended questions) was assessed by blind ratings of 20\% of the videotaped sessions, using an adapted version of a fidelity measure previously developed for DDMI fidelity ratings (see Chen\textsuperscript{16}). Previous research using this fidelity scale indicated high (intraclass correlation coefficient [ICC] > 0.80) rater agreement on items assessing therapist adherence to and competence in delivering the treatment. Separate ratings were computed for adherence and competence for each of the rated domains and averaged for subjects in each condition. Prior to making any ratings, our blind rater was trained and calibrated to our gold standard MI master trainer (author S.M.), with ICCs >0.90 for adherence to MI consistent items. Average adherence and competence were calculated for the following types of items: MI-consistent (ie, open-ended questions, reflective statements, etc.), MI-inconsistent (unsolicited advice, asserting authority, etc.), and general interview components (ie, expected to be presented in both conditions, such as providing a description of cognitive training principles and hands-on demo). Ratings were made on a 1–7 Likert scale, with higher scores reflecting greater adherence and competence.

Data Analysis
We applied an intent-to-treat analysis to our study, including data from all participants who were randomized to the MI or sham condition. The distribution of scores for each variable in each group was inspected for normality and compared to relevant comparison groups for homogeneity of variance. In instances in which dependent measures were not normally distributed (ie, attendance data from CR sessions), relevant nonparametric tests were substituted. First, the 2 groups were compared at baseline on clinical, demographic, and neurocognitive variables using independent sample \textit{t} tests or chi-square consistent with the nature of the dependent measure. Second, treatment fidelity was assessed by conducting between-group \textit{t} tests for mean adherence and competence ratings of MI consistent strategies, MI-inconsistent strategies, and session content that should be common to both interview conditions. Third, to assess the impact of the MI intervention on motivation, we compared all clients on a measure of intrinsic motivation (IMI) before administration of the MI intervention, immediately after the MI intervention, and at a follow-up after administration of the 1-month, 10-session CR program in a mixed design 2 (group) × 3 (time) ANOVA. The 2 groups were also compared on number of sessions attended in CR using the nonparametric Mann-Whitney \textit{U} test. To assess acquisition of math skills (arithmetic test) taught in the CR intervention we used a mixed design 2 (group) × 2 (time; before and after CR) ANOVA on arithmetic scores. Cohen’s effect sizes were computed for between-group effects when evident. To examine the impact of motivation level on session attendance, we computed Spearman correlations between postinterview IMI scores and number of sessions attended. All statistical tests were 2 tailed and alpha was set at .05.

Results

Participant Characteristics
Four participants dropped out of the interviews (\textit{n} = 1 MI condition and \textit{n} = 3 CI condition) and none of these participants completed any assessments after the interview (see CONSORT diagram, figure 1). There were no significant differences between the MI and sham interview groups on any variables at baseline (see table 1), with the exception of the summary composite \textit{t} score from the BACS (\(t(62) = −2.11, \ P < .05\)). The MI group showed better performance on this summary neurocognitive measure. Hence, baseline cognitive performance was used as a covariate in subsequent analyses, as appropriate.

Treatment Fidelity
MI tapes were rated significantly higher than CI tapes on MI-consistent strategy adherence (6.05 [0.33] vs 2.58 [1.91], \(t = −4.39, \ P = .001\)) and MI-consistent competence (4.48 [0.26] vs 3.66 [0.52], \(t = −3.45, \ P = .006\)). Both MI and CI tapes were rated low on MI-inconsistent adherence (1.00 [0] vs 1.11 [0.17], \(t = 1.58, \ P = .18\)) as there were no rated instances of MI-inconsistent strategies in the MI condition, a comparison of competence ratings on these strategies was not possible. As should be the case, there were no significant differences between MI and CI tapes on common, general interview components adherence (6.33 [0.70] vs 5.56 [0.72], \(t = −1.90, \ P = .09\)) or competence (4.11 [0.27] vs 3.94 [0.14], \(t = 1.34, \ P = .21\)).

Between-Group Analyses
The mixed-design ANCOVAs for the IMI and math test scores revealed main effects for time on the IMI only (\(F[2, 114] = 4.12, \ P < .05\)), suggesting participants pooled across both conditions showed improved motivation during the trial. Main effect of time was not significant for the math test (\(F[1, 56] = 0.48, \ P = .49\)). With respect to differential effects of the interview condition on intrinsic motivation levels, the ANCOVAs for the IMI revealed improvements
MI for Cogrehab

for participants in the MI condition compared to the sham intervention with a significant condition × time interaction ($F[2, 114] = 13.21$, $P < .001$). Please refer to figure 2 for a graphical representation of motivation change over time. Cohen’s effect sizes comparing the MI condition to the sham intervention were in the large range immediately after the interviews, $d = 1.49$, and after the CR training 1-month later $d = 1.19$. For the MI condition, within-group Cohen’s effect size ($d$) was 0.91 for pre-post interview IMI scores and 0.83 for pre to end of training scores. For CI condition, pre-post effect size was −0.27, decreasing to −0.14 when examining pre to end of training scores.

With respect to attendance in CR, there was a significant difference between conditions in number of sessions attended; participants in the MI condition attended more sessions than those assigned to the sham interview (Mann-Whitney $U = 3.75$; $P < .001$, $d = 1.10$). Please refer to figure 3 for graphical representation of this effect. Lastly, the condition × time interaction for arithmetic scores was not significant ($F[1, 56] = 0.70$, $P = .41$).

Table 1. Participant Demographics

<table>
<thead>
<tr>
<th>Variables</th>
<th>MI Condition ($n = 33$)</th>
<th>CI Condition ($n = 31$)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Age</td>
<td>46.52 (9.96)</td>
<td>49.26 (11.23)</td>
</tr>
<tr>
<td>Education</td>
<td>13.06 (1.92)</td>
<td>12.42 (1.89)</td>
</tr>
<tr>
<td>Gender (% male)</td>
<td>48%</td>
<td>65%</td>
</tr>
<tr>
<td>WRAT Reading $t$ score</td>
<td>43.03 (9.45)</td>
<td>42.03 (8.73)</td>
</tr>
<tr>
<td>WASI IQ</td>
<td>90.12 (14.88)</td>
<td>88.74 (15.28)</td>
</tr>
<tr>
<td>Age of onset</td>
<td>23.27 (12.84)</td>
<td>21.23 (7.58)</td>
</tr>
<tr>
<td>Schizophrenia (%)</td>
<td>70</td>
<td>87</td>
</tr>
<tr>
<td>No. hospitalizations</td>
<td>11.24 (13.15)</td>
<td>8.19 (9.49)</td>
</tr>
<tr>
<td>GAF</td>
<td>41.72 (11.05)</td>
<td>40.30 (8.75)</td>
</tr>
<tr>
<td>PANSS</td>
<td>49.88 (12.37)</td>
<td>51.27 (12.89)</td>
</tr>
<tr>
<td>IMI Total</td>
<td>114.58 (23.10)</td>
<td>105.71 (21.80)</td>
</tr>
<tr>
<td>BACS $t$ score*</td>
<td>35.25 (10.89)</td>
<td>29.17 (14.65)</td>
</tr>
</tbody>
</table>

Note: BACS, Brief Assessment of Cognition in Schizophrenia; GAF, Global Assessment of Functioning; IMI, Intrinsic Motivation Inventory; PANSS, Positive and Negative Syndrome Scale; WASI, Wechsler Abbreviated Intelligence Scale; WRAT, Wide Range Achievement Test.

*t(t(62)) = −2.11, $P < .05$. 

Fig. 1. CONSORT flow diagram.
Motivation Level and Session Attendance

The Spearman correlation between postinterview total IMI score and number of sessions attended was significant ($\rho = 0.59, P < .001$). Individual correlations between attendance and each of the IMI subscales were also significant (all $P < .05$) and ranged from 0.33 (IMI Perceived Choice) to 0.47 (IMI Perceived Value) to 0.68 (IMI Interest).

Discussion

This is the first study, to our knowledge, to adapt MI for application with CR in a sample of people with psychosis. Our findings indicate that MI, adapted for use with individuals with schizophrenia spectrum disorders and cognitive impairments, can be used effectively to increase both task-specific motivation and adherence to cognitive training. While the literature on the efficacy of MI for psychosis has been mixed,\(^46\) we speculate that our positive findings may have been influenced by the adaptations made to MI as well as the focus on a nonpharmacological intervention, where risk for side-effects and adverse events is low. The observed relationship between postinterview motivation level and session attendance suggests that motivation likely was the key factor driving adherence, a finding consistent with expert opinion and prior research.\(^34,47\) and we will examine the degree to which MI-related increases in intrinsic motivation mediate session attendance in a future report. Baseline motivation levels, which were somewhat, though not significantly higher for individuals in the MI condition may have also had some impact on the efficacy of MI and should be further examined.

While we did not find a significant difference in improvement on our measure of cognitive training analogue between the 2 experimental groups despite marked differences in attendance, we expect this was likely due to the abbreviated training and nature of the analogue exercise. Those in the MI condition attended on average only 5 sessions, which is considerably lower than the 2–5 sessions/wk over a standard course of a 3- to 6-month CR. Moreover, the arithmetic program is not designed to improve cognitive functioning\(^2\) but serves as merely a proxy of learning, where improvements have been noted in past studies when attendance reached a threshold of 10 sessions.

Though our study was a rigorous randomized controlled trial with a reasonable sample size, it was a proof-of-concept trial with brief math training in lieu of a full course of CR and will require replication with a full course of cognitive rehabilitation, as we have just begun to do in a new trial. Given a longer treatment timeframe, 2 brief sessions of MI delivered at start may not be sufficient, and booster sessions may be necessary, though that will also require evaluation. Additionally, while our MI intervention included feedback on cognitive performance, feedback is not always a component of MI. Our current design did not allow us to disentangle the impact of just the feedback to that of feedback presented in the context of motivational enhancement, and additional trials would be needed to answer this question. Finally, while we did not collect pre-post interview ratings of insight, this variable has previously been linked to treatment adherence.\(^34\) Future trials could examine whether MI leads to any changes in insight, and if so, the overlapping and unique contributions of motivation and insight on treatment adherence.

MI is a low-tech, fairly easy to disseminate intervention that can be adapted to address a range of problem behaviors. If found efficacious in improving CR adherence in people with schizophrenia spectrum disorders, it could easily be incorporated into existing CR programs, and perhaps into other behavioral interventions and programs, leading to greater participation in treatment, and hence better outcomes for individuals with this disabling, chronic illness.

Funding

This study was supported by grant from Department of Veterans Affairs Rehabilitation Research and Development Service (I121RX000598-01A1 to J.M.F.).

Acknowledgment

The authors have declared that there are no conflicts of interest in relation to the subject of this study.
References


34. Rüscher N, Corrigan PW. Motivational interviewing to improve insight and treatment adherence in schizophrenia. Psychiatr Rehabil J. 2002;26:23–32.


