Comparison between Static and Dynamic Forms of the Rey Osterrieth Complex Figure Test (ROCF) and Their Impact on the Self-Efficacy of People with Mental Illness in the Community*

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*The Hebrew version of this article can be found on the ISOT website.

Key Words: Rey Osterrieth Complex Figure (ROCF), static evaluation, dynamic evaluation, mediation, learning propensity, mental health, rehabilitation

Abstract

Rationale: The aim of rehabilitation is to enhance a person's ability to function satisfactorily in their community. Occupational therapists have an important role in the rehabilitation of people with mental illnesses, some of whom also have cognitive impairments that limit their ability to adapt to community living. The assessment of people with mental illnesses with dynamic cognitive tools can provide a better understanding of their learning propensity, and therefore contribute to improving their rehabilitation outcomes. **Purpose:** This study compared the static and dynamic forms of the Rey Osterrieth Complex Figure Test (ROCF) assessment of cognitive functioning and examined the efficacy of the dynamic form of the test. In addition, the participants rated their sense of self-efficacy following the completion of the test. **Method:** The research was conducted at the Enosh social clubs. The 60 participants (ages 23-69) were divided into two groups. The control group received the static form of the test, with an additional exposure to the complex figure (5-stage process). In contrast, the experimental group underwent the dynamic form of the test, administered according to the instructions in the Learning Propensity Assessment Device (LPAD) manual. Following the completion of the test, all the participants were asked to rate their feelings of self-efficacy. **Results:** The findings revealed that the copy-2 and memory-2 scores, degree of improvement and self-efficacy ratings following the test were significantly higher among the members of the experimental group than among the members of the control group. **Conclusions:** The dynamic form of the ROCF provides a more comprehensive understanding of a client's learning propensity and abilities. The use of the dynamic form of the test can assist occupational therapists develop treatment plans that better meet the individual needs of their clients, increase their feeling of competence, motivate them and consequently, improve the efficacy of their rehabilitation programs.

Introduction

"I don't perceive my job as making people happier. That job is in the hands of God. My job is to present man with more options that weren't previously available and thus expanding his choices" (Feuerstein).

The ultimate goal of occupational therapy is to promote patients' engagement in occupations and enable increased participation in the fabric of life in meaningful occupations such as employment, education and leisure (Yalon-Chamovitz et al., 2006). Cognitive skills, learning and

adaptation processes are necessary in order to take part in these occupations. The individual's level of cognitive functioning has a significant impact on his/her potential level of independence (Hadas Lidor, Lachman, & Shafir Keisar, 2007). Community rehabilitation is designed to enhance the individual's ability to adapt and function in a way that is meaningful? and satisfactory for him/her. Occupational therapists who work with people with mental illnesses play an important role in advancing their community integration, since impairments in cognitive functioning often restricts adaptation to community life (Hadas Lidor & Weiss, 2005; Shafir Keisar & Hadas Lidor, 2007). Therefore, this population was chosen for the study due to our belief in the importance of promoting the process of their rehabilitation and integration in the community. The assessment process in occupational therapy has a very important role and it is the basis for intervention. Occupational therapists relate to their clients' occupational performance in the different environments in which they participate, to their ability to function according to the environmental requirements and to their functional difficulties. In this way, they help promote their clients' function and improve their ability to cope with their various roles (Hadas Lidor, Weiss, & Kozulin, 2005).

Most of the current occupational therapy assessments are either static or dynamic, and are used to predict function (Toglia, 2005). Dynamic assessments used to assess population with mental illnesses include the Toglia Cognitive Assessment (TCA; Toglia, 1994) and the Executive Functions Performance Test (EFPT; Baum & Edwards, 1998). The test used in this study is the Andre Rey and Paul Rey Osterrieth Complex Figure (ROCF) evaluation (Osterrieth, 1946). It was utilized by Feuerstein and colleagues (Feuerstein, Feuerstein, Falik, &Rand, 2002) and is part of a battery of dynamic evaluations referred to as the Learning Propensity Assessment Device (LPAD). The LPAD was developed by Feuerstein in 1979 to evaluate learning propensity and it is the first dynamic evaluation to be produced anywhere in the world (Feuerstein et al., 2002).

This research is based on the Dynamic Cognitive Intervention (DCI), developed by Hadas Lidor and Weiss (2005) and is based on the Structural Cognitive Modifiability approach (SCM) introduced by Feuerstein (Feuerstein & Lewin-Benham, 2012). The DCI is unique in that it originated from a therapeutic, rather than an educational perspective (Hadas Lidor & Weiss, 2005; Shafir Keisar & Hadas Lidor, 2007). Thus, it is utilized by occupational therapists and therapists from other disciplines when working

with mentally ill populations in the community. Generally, the mental health system relates to the current low functional level in this population, overlooking the individual's capacity for change (Hadas Lidor, Lachman, & Shafir Keisar, 2007). Cognitive dynamic evaluations describe the patient's difficulties in task performance through the use of the cognitive map - a tool used to analyze a patient's thought processes while he/she is performing a task (Feuerstein & Lewin-Benham, 2012). In this way, the cognitive map can help improve learning and functioning abilities, and by doing so improve the patient's ability to adapt to community life. In addition, by addressing a person's abilities, the dynamic version of assessment makes use of a mediation process that promotes his/her development of self-efficacy and motivation to change, (Feuerstein et al., 2002).

To evaluate the difficulties and determine the learning propensity of a patient in rehabilitation, the assessment tools being used should be adapted to suit the patient's individual needs. There has been increasing recognition over the recent decades of the need to develop and use dynamic diagnostic tools so that therapists and patients alike can track the progress of the rehabilitation process and empower patients by demonstrating their propensity to learn and grow (Feuerstein et al., 2002). Despite this, there are insufficient assessments and evaluations based on dynamic methodologies that are suited for use with the populations coping with mental illness (Green, Kern, Braff, & Mintz, 2000). Thus, it behooves us to compare the efficacy of a static tool, such as the ROCF that was chosen for this study, by comparing its static and dynamic versions. The static form of the ROCF can enable therapists to evaluate various cognitive functions, while the dynamic version provides a more comprehensive understanding of the patient's capacity to learn (Shin, Park, Park, Seol, & Kwon, 2006). The use of the dynamic version of the ROCF assessment on a population coping with schizophrenia is described in the study by Hadas Lidor et al. (2001). The findings showed that the improvement in the test group (after mediation) was significant, supporting the validity of the assessment in the study population (Hadas Lidor, Katz, Tyano, & Weizman, 2001).

Dynamic cognitive intervention has several goals, one of which is to direct the individual's awareness to the processes occurring within him/her during activity performance. This can be done at the beginning the assessment - by asking those being tested how successful they expect their task performance will be, and at the completion of the assessment - by asking how well they felt they executed it. One of the principles of

mediation is to assist the client gain an increased feeling self-efficacy regarding their ability to perform a difficult and/or novel activity. This gives rise to an increase in the person's motivation and encourages him/her to continue on with the task and experience a sense of achievement (Feuerstein & Lewin-Benham, 2012; Shafir Keisar & Hadas Lidor, 2007). Thus, one of the goals of mediation is to bring about a change in the individual's perception of self – from one who passively receives services, to a person who is active in society, and to provide the person with a sense of self-efficacy that reflects his/her abilities (Hadas Lidor, Lachman, & Shafir Keisar, 2007; Hadas Lidor & Weiss, 2005). Studies among different populations have shown that the cognitive dynamic assessment does indeed enable the development of self-efficacy and the motivation to change (Hadas Lidor & Weiss, 2007). Hence, this study also examined the self-efficacy of the participants in both study groups.

The current study examines whether the performance scores of the ROCF assessment would be higher in the experimental group, to which the dynamic version of the assessment was administered (which included a mediation stage), compared to the control group, to which the static version was administered (with an additional exposure to the stimuli, but without mediation) amongst adults dealing with mental illness in the community. In addition, this study investigated whether the experimental group achieved a greater increase in their sense of self-efficacy than the control group, when the assessment was completed. The researchers hypothesized that no significant difference would be found between the scores of the two groups during the first stages of the assessment (prior to the mediation stage). They also hypothesized that the scores of the group undergoing the administration of the dynamic version would be significantly higher than those of the control group in the second copying and second drawing from memory stages. Furthermore, the researchers hypothesized that the level of self-efficacy in the experimental group would be significantly higher than that of the control group following the assessment.

Method

Participants

The study included 60 patients (M=36, F= 24; mean age 42, SD=11.5) from the social clubs for adults with mental illness operated by the Enosh Association in central Israel. The participants were randomly divided into two equal groups of 30 patients each. To verify the groups' random distribution and ensure matching with respect to the

demographic and basic functional variables, 2-tailed t-tests for independent samples were conducted for continuous variables (age, number of years in Israel, years of education, age at first hospitalization, number of hospitalizations, elapsed time since last hospitalization) and chi-square tests for the categorical variables (gender, country of birth, marital status, type of residence, who the patient lives with, level of education, is or is not treated with medicine). The inclusion criteria included good knowledge of Hebrew, ages between 20-70 and attendance at one of the social clubs for people with mental illness. The exclusion criteria included patients who had undergone the ROCF assessment within the past 6 months, visual impairment (that is not corrected by glasses), pencil grip impairment and/or learning disabilities. In addition, patients hospitalized in a psychiatric ward or those whose medication changed during the month preceding the data collection were also excluded.

Instrumentation

Demographic questionnaire. The questionnaire was developed by the researchers and included 16 items in order to obtain general background information about each patient (age, sex, years of education, etc.).

Rey Osterrieth Complex Figure Test (ROCF; Osterrieth & Rey, 1944). This assessment is based on a novel geometric figure containing 18 geometric shapes arranged around and within a central rectangle (see Figure 1). The ability to organize the shape into a meaningful perceptual unit is a complicated cognitive task (Lezak, 2004). The dynamic version of the ROCF represents one of the 14 tools within the LAPD battery of dynamic assessments used to assess learning propensity (Feuerstein, Feuerstein, & Gross, 1997; Shin et al., 2006). The purpose of the evaluation is to assess the patient's ability to organize and remember a complex visual field, and use strategies that relate to the process; and the quality and accuracy of the complex shape that he/she draws. During the mediation stage the principles and strategies needed to achieve the task are taught by helping the patient analyze the components of the figure after which the patient's ability to change is assessed (Feuerstein, Feuerstein, & Gross, 1997; Feuerstein et al., 2002). Chen and Cermak (1998) describe the research done to establish the test norms as well as different aspects of the tool's validity and reliability (inter-rater reliability and discriminant validity). Studies that examined the tool's reliability and validity and the various tool modifications are described in Knight and Kaplan's (2003) test handbook.

In this study, the dynamic version

was administered according to the LPAD guidelines. In addition, all patients received level two mediation, which includes a verbal analysis of the figure's components. This included having the patients name the various components and focusing their attention on how to plan and organize the copying sequence (the duration of the exposure to the form during mediation was unlimited). In the static administration, the assessment included five stages: first copy, first drawing from memory, exposure to the form without mediation (approximately 3 minutes), second copy and second drawing from memory.

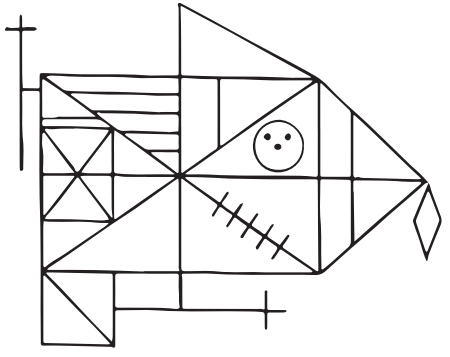


Figure 1. The Complex Figure

Self-efficacy rating. Following the assessment the patient was asked: "How successful do you think you were in performing this assessment? Rate how competent you feel after your performance on this assessment on a scale from 1 (very low) to 5 (very high)?"

Procedure

Permission for the study was obtained from the Helsinki committee, and the director of the Enosh social clubs granted the researchers permission to approach their members for the purpose of data collection. The researchers provided the club members with an explanation of the study, and those individuals who agreed to participate were asked to sign an informed consent form and complete the demographic questionnaire. Sixty participants were randomly divided into two groups (experimental and control). The static version of the ROCF was administered to the control group and the dynamic version was administered to the experimental group. The testing process lasted approximately 20 minutes for the control group and approximately 40 minutes for the experimental group. The results and data obtained were collected and analyzed using version 18 of the Statistical Package for the Social Sciences (SPSS V-18). Pearson's correlation test was employed as well as t-tests to determine the relationships between the variables (paired t-tests, between-groups t-tests). The flowchart illustrating the study process can be seen in Figure 2 below:

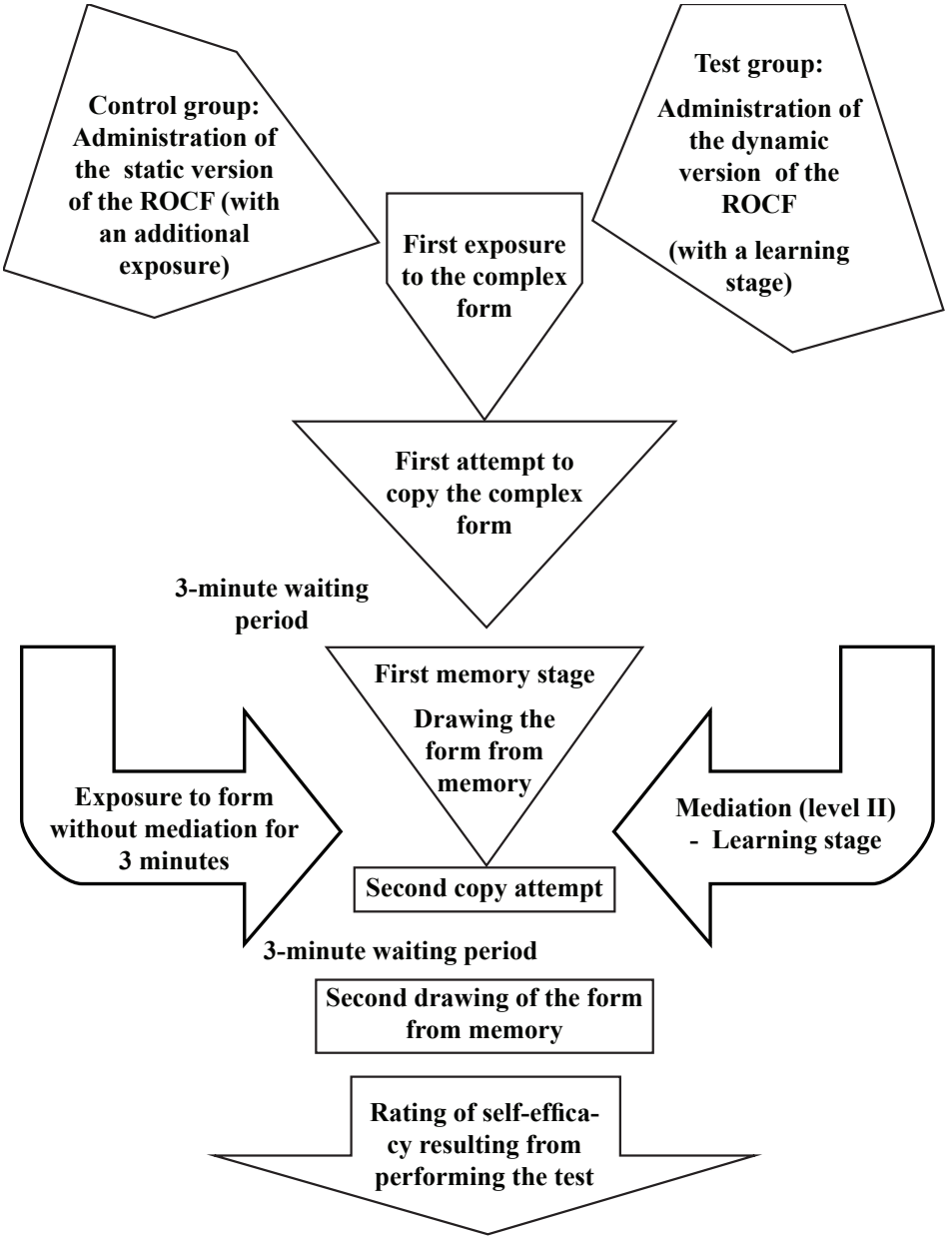
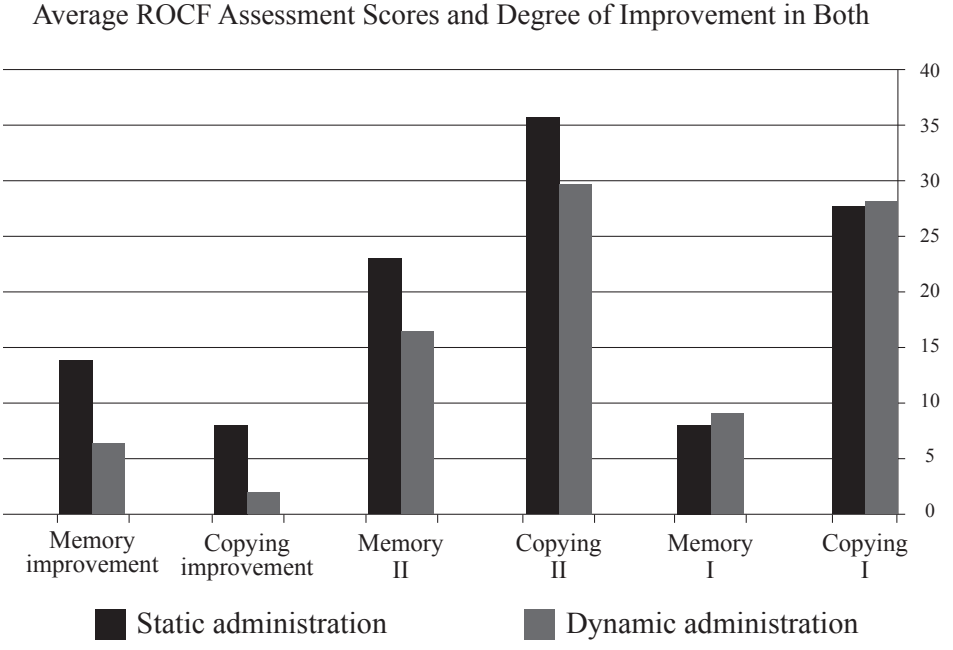


Figure 2. Study Procedure Flow Chart

Results

No significant differences were found in the demographic and functional variables between the groups (see Graph 1and Table 1).



Graph 1. Average ROCF Assessment Scores and Degree of Improvement in Both Groups

Table 1
Means and Standard Deviations of Scores during the ROCF Assessment in Both Groups

Average and standard deviation	Experimental group	Assessment phase
M=27.57, SD=10.268	Dynamic administration	Copying 1
M=27.90, SD=9.657	Static administration	
M=8.47, SD=7.771	Dynamic administration	Memory 1
M=9.57, SD=8.529	Static administration	
M=35.33, SD=5.809	Dynamic administration	Copying 2
M=29.5, SD=10.425	Static administration	
M=22.7, SD=9.192	Dynamic administration	Memory 2
M=15.80, SD=11.839	Static administration	
M=7.77, SD=9.69	Dynamic administration	Copying improvement
M=1.60, SD=4.58	Static administration	
M=14.23, SD=7.77	Dynamic administration	Memory improvement
M=6.23, SD=5.61	Static administration	

The first study hypothesis postulating that the first copying scores in both groups would be similar was examined in order to determine the construct validity of the assessment. To this end, two-tailed t- tests for

independent samples were conducted. The results demonstrated that, as hypothesized, no significant difference in scores was found between the experimental (M=27.57, SD=10.57) and the control group (M=27.90, SD=9.6) (t(58)=0.130, N.S) for the first copying stage. Similarly, no significant difference in test scores was found for the first memory stage between the test (M=8.47, SD=7.77) and control group (M=9.57, SD=8.53), (t(58)=0.522, N.S). Next, a two-tailed t-test for paired samples was performed to examine whether the second copying scores were higher than the first, in both groups. The results indicated that the second copying scores (M=32.42, SD=8.87) were indeed significantly higher than the first copying scores (M=27.73, SD=9.88) in both groups (t(59)=-4.463, p<0.001). The results of a second two-tailed t-test for paired samples supported the hypothesis that the second memory scores (M=19.25, SD=11.07) in both groups would be significantly higher than the scores for the first memory stage (M=9.02, SD=8.11) (t(59)=-10.116, p<0.001). These findings show that the study task elicited the results expected for the participants in both groups, indicating that no biases were in play throughout the administration of the study task.

To test the hypothesis that the second copying scores following mediation in the test group would be higher than the second copying scores in the control group, a one-tailed t-test for independent samples was conducted in which equal variances were not assumed. The test scores showed that the second copying scores in the experimental group (M=35.33, SD=5.81) were significantly higher than the second copying scores in the control group (M=29.50, SD=10.42) (t(45.427)=-2.677, p<0.01). To test the hypothesis that the second memory scores in the experimental group would be higher than the second memory scores in the control group a one-tailed t-test for independent samples was performed. The results revealed that the second memory scores in the experimental group (M=22.70, SD=9.19) were significantly higher than the second memory scores in the control group (M=15.80, SD=11.84) (t(58)=-2.521, p<0.05).

In order to examine whether the two groups would differ in the degree of improvement in copying scores between the first and second administration, a two-tailed t-test for independent samples was conducted, in which equal variances were not assumed. The test results demonstrated a significant difference (t(41.327)=-3.153, p<0.01) between the improvement in the copying scores in the experimental group. That is, the improvement in the experimental group was higher (M=7.77, SD=9.69) than in the control

group (M=1.60, SD=4.58). Similarly, to examine whether there were significant group differences with respect to the relative degree of improvement in the memory scores between the first and second administrations, a two-tailed t-test for independent samples was performed. Results revealed a significant difference ($t(58)=-4.573$, $p<0.001$) in the improvement in memory scores between the experimental group (M=14.23, SD=7.77) and the control group (M=6.23, SD=5.61). Specifically, the results indicated that a greater improvement occurred among the members of the experimental group.

A non-parametric Mann Whitney test was employed to test the hypothesis that, following the assessment process, the rating of self-efficacy of patients in the experimental group would be higher compared to the control group. This hypothesis was confirmed such that the self-efficacy ratings in the experimental group (M=3.37, SD=0.99) was significantly higher than the ratings in the control group (M=2.00, SD=1.17) ($z=-4.309$, $p<0.001$).

Further, a multiple regression model was built to better understand the nature of the relationships between the different variables and determine whether the self-efficacy ratings changed as a result of the mediation alone, or whether the degree of improvement was also a contributing factor. In this model, the competence rating represented the dependent variable and the independent variables included the mediation, the improvement in the copying task (between copy 1 and 2), and the improvement in the memory tasks (between memory 1 and 2) (see Table 2). The model explained approximately half of the variation (Adj $R2=0.479$). The degree of improvement between the first and second memory task ($\beta=0.521$, $p<0.001$) was found to have the most significant impact on the ratings of self-efficacy. The variable with the second most significant effect was the mediation variable ($\beta=0.333$, $p<0.01$). The variable defined as the degree of improvement in the copying task did not have a significant effect on the rating of competence ($\beta=-0.167$, N.S).

Table 2
Testing the Relationship Between the Research Variables

	Competence ratings	Copying I	Memory I	Copying II	Memory II	Memory improvement	Copying improvement	Mediation
Competence ratings	-	.429**	.292*	.468**	.669**	.652**	.022	.561**
Copying I		-	.549**	.604**	.618**	.310*	-.417**	-.002
Memory I			-	.465**	.710**	.056	-.068	-.040
Copying II				-	.706**	.532**	.386**	.270*
Memory II					-	.693**	.116	.320*
Memory improvement						-	.267*	.517**
Copying improvement							-	.349*
Mediation								-

* $p < 0.05$, **$p < 0.01$.

Discussion

The purpose of this study was to compare the effectiveness of the dynamic version of the ROCF (which included a mediation stage), to the static version (which included an additional exposure but no mediation), when administered to people with mental illness in the community. In addition, perceptions of self-efficacy were examined after the completion of the assessment in both groups. The researchers hypothesized that no differences would be found between the groups' scores in the first stages of the assessment (before the mediation stage). Moreover, they posited that the experimental group (using the dynamic version of the assessment) would achieve higher scores in the second copying and memory tasks than the control group (using the static version). Finally, it was felt that the ratings of self-efficacy in the experimental group would be significantly increased following the completion of the assessment.

The study findings revealed significant improvement in both the second copying and second memory scores and in the degree of improvement of the experimental group. Moreover, the self-efficacy rating of the experimental group was significantly higher than the rating of the control group following the completion of the assessment.

The results showing no group differences in the pre-mediation stages support the construct validity of the ROCF. This finding indicates that no bias was involved in the administration of the assessment tasks.

The next hypotheses dealt with the expected differences between the two study groups. It was found that the second copying and the second memory scores of the experimental group were significantly higher than the scores in the control group. Subsequently, it was found that there was a significant difference in the improvement in the copying scores (the first and the second) and in the improvement in the memory scores (the first and the second) between the experimental and control group subjects. Specifically, the improvement in the experimental group was greater than the improvement in the control group. These findings can be explained by the mediation that was given to the experimental group. The mediation consisted of a verbal analysis of the figures' components by naming them and directing the patients' focus on planning and organizing the copying task in a consistent manner (second level mediation). The mediation, which is a learning process, helped the participants improve their performance in the second copying and remember the figure better, thus resulting in better scores in the second memory stage.

These findings, demonstrating the relative benefits of using the dynamic as opposed to the static version, are consistent with the literature on the subject of dynamic assessments with a mediation component. Studies have reported that the dynamic testing approach can bring about a change in subjects' thinking functions during the course of the assessment, and promote the optimal use of the assessment stimuli to learn and perform the tasks (Feuerstein et al., 2002).

Effective learning processes are based on normal cognitive functioning. When these functions are impaired or absent, the individual perceives reality as episodic. Impairments can be expressed during the stimuli processing stage, by difficulties in attempting to compare and analyze the stimuli; by a lack of orientation in searching for information; and by difficulty understanding the significance of associations, grouping, organizing and summarizing information (Feuerstein & Lewin-Benham, 2012). These cognitive functions, which are essential to the performance on the ROCF, are acquired by the participant while engaged in the dynamic version of the assessment. In addition, the findings of this study support those of previous studies, in which the participants achieved better scores on the dynamic assessment, compared to the static assessment (Hadas Lidor, Katz, Tyano, & Weizman, 2001).

Results also showed that the self-efficacy ratings in the experimental group were significantly higher than in the control group following the completion of the assessment. The variable that was shown to have the most significant impact on the participants' perceived self-efficacy was the degree of improvement in the second administration of the memory task relative to the first administration. As described above, the improvement in memory may be attributed to the mediation. Given that self-efficacy is a subjective self-report measure, it is possible that the subjects experienced their improved memory performance as a meaningful personal experience (Feuerstein & Lewin-Benham, 2012). The multiple-regression model revealed that the second most effective variable contributing to improved self-efficacy was the mediation variable. Even though the mediation wasn't the most effective variable with respect to self-efficacy rating, it did have an indirect effect through the improvement in memory and directly by being the second most significantly effective variable. These findings are in accord with the literature, which describes mediation as a means of helping individuals change their self-perception, thus enabling the development of a level of self-efficacy that matches their abilities (Shafir Keisar & Hadas Lidor, 2007).

In contrast to the findings related to the memory tasks, it was found that the degree of improvement in the copying task did not significantly influence the ratings of self-efficacy. In addition, the self-efficacy rating was only moderately correlated to the first and second copying scores. In other words, when the degree of improvement between the copying stages is not great, the subjects' rating of self-efficacy following the assessment process was low. It is possible that the reason that the impact of improvement in the copying task was not significant in contrast to the impact resulting from an improvement in memory, may be attributed to a more conscious awareness among the participants of the improvement made in the memory task. Drawing the figure from memory requires more effort than copying the figure, because in doing the former, the figure's components must be redrawn independently The participants' were more affected by their ability to perform independently and their improved performance in the memory stage, both of which contributed to their increased sense of self-efficacy. This probably results from the fact that it is easier to interpret the memory improvement as a demonstration of increased competence than improvements in the copying performance, and thus it had a greater impact on the participants' sense of self.

It was also found that the first performance of the copying task was moderately but negatively correlated with the copying improvement variable. This may be because of the fact that the higher the score on the first copying task, the more limited the degree of possible improvement was in the second copying score. A small improvement between the first and second copying can be interpreted as less significant by the subject (deficient self-efficacy experience); which may result in a reduced feeling of self-efficacy once the assessment is completed, compared to someone who experienced a greater improvement between the first and second copying scores.

On a personal note, during the subject recruitment in the Enosh social clubs we met wonderful people who were willing to participate and were passionate about helping us with the study. Moreover, they shared their lives with us and allowed us to see into their personal world. As students, meeting people who were attempting to cope with community living was meaningful and educational. The experience included some touching moments, which enabled us to share the good feelings experienced by the participants upon completion of the dynamic assessment. In some cases, the participants expressed their thanks for providing them with greater insight and revelations regarding their abilities.

An especially touching moment for one of the researchers occurred following the administration of the dynamic version of the assessment when one subject, a woman who was about 40 years old. The woman, who had previously an accountant and today works in a sheltered factory, shared her feelings: "…it's been many years since I've worked there [accountancy] since I've had to use my head… there's improvement from the beginning to the end [before and after the mediation], I feel capable… you inspired me to go somewhere to learn something, a course… thank you!". Such cases reinforce the understanding that it is important to empower people within this population to be able to appreciate their capabilities and discover their learning propensity, even as they are undergoing the assessment.

Study Limitations

1. The control group participants were given 3 minutes to examine the figure during the additional exposure stage (according to the directions of the assessment). It is not possible to state with certainty that the relative duration of the exposure of the figure to the control group was exactly the same as the duration of exposure for the research group provided during the mediation stage (the exposure to the figure during the mediation stage is not restricted in time). Hence, it is possible that participants in the experimental group were exposed for longer periods of time, which may have resulted in their performing a better reproduction.
2. All the participants in the experimental group received similar levels of mediation in order to standardize the protocol, which is appropriate for the purposes of the study. However, this might have affected the participants' success in the assessment. When research conditions need not be adhered to, such as when the ROCF is administered in the clinic, each person should receive mediation at the specific level that is suitable to his/her needs.

Clinical implications and recommendations for further research

The results show that the dynamic version of the ROCF assessment provides a more comprehensive and deeper understanding of the subject's abilities and learning propensity, compared to the static version. In addition, it contributes to an increased feeling of self-efficacy. Consequently, it is recommended to increase the use of the dynamic version of this tool by occupational therapists working with people coping with mental illness in the community. Future research is recommended to further examine the contribution of the use of the dynamic

version to the subject's sense of self-efficacy by adding additional questions before and after the administration of the assessment, and to examine the impact of differing levels of mediation in this population, on the performance of the assessment.

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