

International Handbook of Occupational Therapy Interventions

Chapter 21

Metacognitive Mental Imagery Strategies for Training of Daily Living Skills for People with Brain Damage: The Self-Regulation and Mental Imagery Program

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The use of meta-cognitive strategies has demonstrated the positive effects to improve clients' relearning and performance of simple motor function as well as complicated daily tasks.

Abstract Meta-cognitive strategies are thought to assist people suffering from brain damage in relearning daily living tasks. The use of self-regulation and mental imagery as metacognitive strategies used in an intervention program is described. The program requires the clients' active participation. The evidence is gathered from two case reports, four randomized clinical trials, one controlled clinical trial, and one review paper.

Keywords Brain damage • Metacognition • Mental imagery • Occupational performance • Self-regulation.

Definition

Occupational performances and task performances include all daily activities and are interchangeably used in this chapter.

Strategies are the teaching techniques used by OTs to promote clients' active participation and problem solving during their occupational performances. *Metacognitive strategies*, such as self-regulation and mental imagery, refer to the efficient use of self-awareness to self-regulate occupational performances (Shimamura, 2000).

Self-regulation refers to the identification and correction of one's own deficits through self-reflection (Liu et al., 2002; Lucas and Fleming, 2005). Individuals applying the self-regulation strategy are able to govern their own learning by acknowledging the requirement of effort in success, apply appropriate means to utilize their efforts, and regulate their activities. Clients employing self-regulation are able to learn actively to achieve the set goals. Self-regulation is used as a cognitive strategy for (1) helping clients identify problems encountered in doing the tasks after brain damage, (2) seeking appropriate solutions based on their previous

experience of the task requirement, and (3) revealing their present understanding of their dysfunction. These strategies help clients to relearn impaired functions.

Mental imagery is a process in which a performance is rehearsed mentally as if the person is actually performing it. It is believed to enhance relearning by involving the client in actively memorizing the information of how the performance is performed (Liu et al., 2004a,b).

Purpose

Clients with brain damage use metacognition, that is, cognitive strategies of self-regulation and mental imagery, for performing daily living tasks to enhance relearning, maintenance, and generalization of occupational performances.

Method

Candidates for the Intervention

Clients who have experienced problems in occupational performance due to brain damage and mainly have poor mobility functioning or a low energy level are the potential candidates for the Self-Regulation and Mental Imagery Program.

In our studies, clients suffering from a brain damage, and who meet the following inclusion criteria, are recruited to participate: (1) diagnosed as having suffered a first unilateral cerebral infarction as confirmed by a computed tomography scan, (2) over the age of 60, (3) independent in carrying out daily activities prior to the brain damage, and (4) able to communicate effectively as screened by the Cognistat (Chan et al., 2002).

Epidemiology

In Hong Kong, there are more than 20,000 clients admitted to the hospital for brain damage treatment each year. About 40 brain damage clients had entered the studies since year 2000. Thus far, approximately 200 brain damage clients have participated in the Self-Regulation and Mental Imagery Program.

Settings

The Self-Regulation and Mental Imagery Program is carried out in a rehabilitation hospital with a major brain damage unit. The intervention program is performed at the occupational therapy department.

The Role of the Occupational Therapist

The occupational therapist (OT) provides guidance to clients in developing strategies to overcome deficits in occupational performance. Throughout the intervention, the OT acts as a teaching facilitator, who engages the client into the process of the Self-Regulation and Mental Imagery Program.

Results

Clinical Application

The Rationale of the Self-Regulation and Mental Imagery Intervention Program

The rationale underlying the Self-Regulation and Mental Imagery Program is that it enables the clients to (1) evaluate his or her *ability*, and (2) *plan* how the actions of a task should be executed before it is performed in reality. This strategy is similar to *stop, think, and act*, which is commonly used by therapists working with children with special needs (Post et al., 2006).

Self-regulation involves clients' identifying the steps for a complete performance of a task, occupation, or activity. With these steps clients identify the perceived problems in the performance when compared with their ability before the brain injury occurred. The client is guided to find the solutions to these problems by looking at the issues arising with each of the steps and then brainstorming the possible solutions.

For example, a client with right hemiplegia identifies "losing balance" as the problem. This problem occurs in the "fold the laundry" task (Table 21.2), that is, when he reaches out to take a laundry item from the laundry basket. If the client is unable to identify a solution, the OT guides the client by offering various possible suggestions for the client to try out. Based on the usefulness of these various suggestions, the OT guides the client to identify the most effective solution. After trying different ways, the solution would be effective if the client puts the basket closer to his left side or holds the abdominal muscles tight when reaching for the basket. The client then practices using this solution to solve the laundry task and other tasks. Through this process, the client learns to self-regulate the task performances, which enables him to develop a deeper insight in the functioning.

Mental imagery is the platform with which clients rehearse the processes of analyzing the task, identifying problems, generating solutions, and mentally practicing the self-rectified performance on the task. Each of the steps of this process is listed in Table 21.1.

Table 21.1 Use of mental imagery in occupational performance training of clients suffering from brain damage or brain damage

Task analysis	Tell the participant the task to be trained.
enhancement	Get the participant to identify the steps in the task through mentally imagining the task. Present the participant with the computer-generated task steps for verification of self-identified steps.
Problem identification	Get the participant to visualize his or her own performance with the help of the steps shown in the computer program on the steps of the task. Get the participant to identify the problems encountered and solutions in each step by going through the mental process.
Task performance	Get the participant to imagine his or her own task performance with the rectified steps. Get the participant to actually perform the task and videotape the performance. Get the participant to evaluate the performance on the videotape so as to adjust the problems and solutions. Repeat the above steps until the participant learns the tasks with the proper method

The Self-Regulation and Mental Imagery Intervention Program

This program focuses on clients' active self-education for performing daily living tasks that they performed smoothly before the brain damage occurred. The client learns to perform the daily tasks (Table 21.1) by using the strategies of self-regulation and mental imagery. The OT guides the client to develop appropriate strategies to overcome the problems.

The program takes 3 weeks. The clients receive training in five 1-hour sessions each week. The client performs the specific daily tasks included in each session. These tasks include, for example, functioning of mobility, balance, and upper limb coordination. The level of difficulty of each set of tasks is organized in a demand-ascending order (Table 21.1). However, among these tasks the demands are overlapping. The training of the easiest task set (e.g., folding laundry) is practiced in the first week, while the most difficult task set (e.g., shopping and use of transportation) is practiced in the third week. This design aims to enhance generalization of skills learned from one stage to another (Liu et al., 2004a,b).

The *first* week is used for training of the clients' skills in using *self-regulations*. The client identifies the deficits in performing the various sequential steps of a task (e.g., for tearing the tea bag). Once identified, the client would need to generate the best alternatives to complete the task. Examples of the best alternatives would be stabilizing the tea bag with the weaker arm or using the better hand to manipulate the tea bag while tearing the tea bag. Tasks used in the program are presented in Table 21.1.

The second and third weeks are used for training the clients' ability to perform tasks based on mental imagery. Here, the clients mentally rehearse the solutions generated from the self-regulation, as if the task is to be executed with the process. The work process for use of mental imagery is presented in Table 21.2.

Table 21.2 The daily tasks used for training, assessment, and the evaluation criteria

	Daily tasks for training
Week 1	Put clothes on hanger Fold the laundry Prepare a cup of tea Wash the dishes Carry out a money transaction
Week 2	Prepare fruit Make the bed Take medication Use the telephone See the doctor
Week 3	Sweep the floor Tidy the table after a meal Fry vegetables with meat Go to a park/outdoors Go to the canteen

Previous studies indicate that mental imagery was composed of sequential mental processes, which include attention, memory, and visualization of images and generalization (Chow et al., 2007).

Evidence-Based Practice

The self-regulation is widely applied (1) in the field of education for behavioral management and problem solving (Post et al., 2006), (2) to enhance self-awareness of impairments (Lucas and Fleming, 2005), and (3) for conducting occupational performance tasks for a client with brain damage (Liu et al., 2002). Mental imagery is most often used in training of motor function (moving blocks, reaching for and grasping an object). An audiotape (Page, 2000; Page et al., 2001, 2005) or occupational performances (Liu et al., 2002, 2004a,b) were used to guide the imagery process. The results of a literature review showed positive effects on recovery of arm function after stroke (Braun et al., 2006; Dijkerman et al., 2004; Page, 2000; Page et al., 2001, 2005). Liu et al. (2002, 2004a,b) showed that using metacognitive strategies had positive effects on improving performance on tasks learned in the program and generalization effects to other occupations apart from those used during the training sessions. This positive effect lasted 1 month after discharge from the program.

Discussion

People with brain damage participate in rehabilitation programs. The role of OTs is to teach clients to relearn occupational performance of daily living tasks. Here, various teaching methods are used.

The most common method is demonstration and then practice. After analyzing the clients' behavioral problems, OTs generate ways of rectifying the problem and demonstrate the rectified behavior for the client, who learns through imitation. The effectiveness of this teaching method is called into question.

Instead, metacognition using the strategies of the self-regulation and mental imagery, that is, the clients' active awareness of the process of learning, is a critical ingredient in successful learning. This learning approach initiates the clients' ways of solving the problems and planning for the action. The results last over time and even generalize to new tasks.

Mental imagery is more effective if those who practice the technique have a thorough understanding of their own body capacity. This principle is applied when the strategy of the self-regulation is used to help clients to recapture their own capabilities and become familiar with their "new" body functioning.

Mentally rehearsing the performance can serve as a supplement to carrying out the task among clients who find performance of tasks too demanding because they have poor mobility functioning or a low energy level.

Conclusion

Previous studies have demonstrated the positive effects of using the meta-cognitive strategies to improve clients' understanding, relearning of performance, and motor function. This research offers further evidence concerning the role of active cortical control, which can be mediated by self-regulation and mental imagery to enhance the relearning potential of clients with brain damage.

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