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The Role of Art Therapy in Building Up Working Memory: A Neuroscientific Perspective

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Creativity is used in art therapy to process ideas, express feelings, and improve cognitive abilities. Making collages out of newspapers is an easy and entertaining method. From a neuroscientific standpoint, this chapter examines how newspaper collage art therapy enhances working memory. This chapter is based on qualitative evidence through Wechsler Adult Intelligence Scale (WAIS). Sample of 122 undergraduate students were selected from universities, colleges, and institutes in and around Agra city, Uttar Pradesh by using a random sampling method. Students aged 17 to 22 years were included. Out of 122 sample, a purposive sample of around 10 students showing low Working Memory were selected for the intervention (Art Therapy). Wilcoxon Sign Rank test was used to analyse the data. Art Therapy would be an effective technique in enhancing Working Memory of students is accepted at 0.05 level of significance. Many Researchers found that cognitive function on neuropsychological tests, the main endpoint, demonstrated notable memory domain improvements that persisted after nine months of art therapy. The findings provide practical applications for therapists, educators, and researchers seeking innovative ways to support working memory and other cognitive aspects.

Key words: Art Therapy; Working Memory; Newspaper; Cognitive Aspects; Neuroscientific Perspective.

Art therapy uses creativity to enhance cognitive capacities, analyze ideas, and express emotions. Newspaper collages are a simple and enjoyable way to create art. Drawing, painting, and craft therapy, dance movement psychotherapy, body psychotherapy, music therapy, and theater therapy are all considered forms of art therapy (Priebe S, 2016). Visual art therapies are art interventions that aim to improve a person's mental, cognitive, and/or psychological well-being by providing them with opportunities for creative expression through visual tasks like collage clay modeling, painting, drawing, and visual art analysis/cognitive evaluation (Beard, R. 2012 & Zhao, J 2018). This chapter explores how newspaper collage art therapy improves working memory from a neuroscientific perspective.

Newspaper collage art therapy is an imaginative and approachable method to improve working memory, promote self-expression, and explore emotions. People can process emotions, externalize ideas, and get fresh insights into their own experiences by carefully choosing and organizing words, pictures, and text passages. This approach is beneficial as a therapeutic tool because it promotes attention, lowers tension, and permits symbolic storytelling. It is an inclusive and entertaining practice that uses artistic exploration to foster understanding and healing with little material requirement.

Newspaper collages offer a nonverbal form of self-expression that is particularly beneficial for those who struggle to communicate their emotions due to stress, trauma, or feelings of insecurity. Creating art enhances executive functioning, lowers mental stress, and encourages creative problem-solving, all of which help to increase working memory. The cognitive mechanism known as working memory is in charge of momentarily storing and processing data required for intricate processes including learning, thinking, and decision-making.

As a non-pharmacological treatment that improves working memory, episodic memory, attention, visual spatial cognition, global cognition, and delayed recall in both individuals with and without cognitive disorders, visual art therapy (VAT) has drawn a lot of interest (Masika, Doris, et al., 2020).

A cognitive system known as working memory allows for the simultaneous manipulation, storing, and recall of information while performing ongoing tasks (Li, 2023). Working memory has a limited capacity, but it can be improved by using techniques like chunking, visualization, and mindfulness. Malinovitch et al. (2021) claim that practice can raise working memory performance to the appropriate level and that it is strongly related to learning tactics. Working memory has a major influence on pupils' learning processes that lasts throughout adulthood, according to other studies (Abbasi & Tabatabaee, 2022). It is possible to conclude that metacognitive learning techniques improved university students' working memory. (Farazandeh, F., 2023)

Through route navigation and involvement in a variety of sports and physical activities, spatial abilities are essential in daily life and have an indirect impact on well-being (Ishikawa & Newcombe, 2021), academic performance in reading and math (Liu et al., 2021), and job performance in specific professions like mechanics, surgery, and design (Hegarty & Wallen, 2005). Enhancement of spatial skills may have an impact on daily life enjoyment and quality.

From a neuroscientific standpoint, art therapy involves working memory by stimulating the prefrontal cortex, promoting working memory, and integrating sensory-motor processing. Making art, such as a newspaper collage, helps people focus better, control their emotions, and build stronger neural connections. By promoting neuroplasticity, this process enhances executive function, memory retention, and general cognitive resilience.

One of the biggest problems facing aging people is cognitive loss and impairment by United Nations (2015). These issues are linked to substantial medical co-morbidity and psychological aftereffects in addition to physical and functional loss. The necessity for researchers to concentrate on "more intense or different therapeutic approaches" is highlighted by the fact that improvements were occasionally not appreciably better than active controls (Martin *et al.,* 2011). One such strategy that has been demonstrated to successfully treat dementia symptoms is art therapy (Chancellor et al., 2014). In Singapore, art therapy is widely acknowledged. There is, however, a dearth of local data on the efficacy of art therapy in older persons with MCI.

Lee, R., et al. (2019) Cognitive function on neuropsychological tests, the main endpoint, demonstrated notable memory domain improvements that persisted after nine months of art therapy. Attention, working memory, executive function, and visuospatial skills all showed further gains. Students in the experimental and control groups performed significantly differently in working memory, according to the results (pd".05). When compared to the control group, the experimental group's working memory exhibited notable alterations. The results

actually show that drama therapy can help with working memory, which is one of the consequences of ADHD (Kejani & Raeisi, 2022).

Forsberg, A. et al. (2023) found that There was no discernible transfer of the improved WM binding performance to LTM during sub-span encoding loads. Overall, age-related and individual WM constraints limited LTM item memory performance, with varying binding implications.

In 2020, Masika, Yu & Li, enhancing cognitive abilities and the related psychological disorders may be possible using visual art therapy. As a result, it can be used as a successful non-pharmacological strategy to stop dementia and cognitive decline. Art therapy can be used as a supplemental treatment for cancer patients and has been shown to improve their quality of life and symptoms (Chen *et al.,* 2020).

Drawing ability did not correlate with spelling or dyslexia in either Study 1 or Study 2, nor did it correlate with any of our extensive background measurements. Nonetheless, Study 2 demonstrated that drawing proficiency was linked to both visual memory and the ability to replicate basic angles and proportions. Poor drawers were less proficient in both immediate and delayed recall of the Rey Oster Rieth complex figure (McManus *et al.,* 2010).

Objective:

To explore the impact of Art Therapy on enhancing working memory from a neuroscientific perspective of students.

Hypothesis:

Art Therapy would be an effective technique in enhancing Working Memory of students.

Method

Sample

Out of the sample of 122 students, those students who identified as having less working Memory, a purposive sample of approximately 10 willing students selected. The age range of the students was 17 to 22 years. Data was garneted from both rural and urban areas. Students irrespective of their gender, caste, creed, religion was be included in the sample. Students having any psychological problem as declared by the medical practitioner were not considered in the sample.

Tools:

Wechsler Adult Intelligence Scale (WAIS) IV: The Working Memory Index (WMI) of the Wechsler Adult Intelligence Scale, Fourth Edition (WAIS-IV), developed by psychologist (Wechsler, 2008), utilized in this study. The WAIS-IV subtests demonstrate high reliability, with Cronbach's alpha/split-half reliability coefficients ranging from .87 to .98. The scale also shows good concurrent validity.

Art Therapy: Art Therapy involves using activities such as creating collages from newspapers to express hidden feelings and cognitive processes. It serves as a method for individuals to explore their emotions and thoughts.

Procedure:

First researcher built a rapport with the subjects. Then as a part of the pre measure of the study, Working Memory test was administered by the researcher on the subjects to obtain the pre measure scores. Then those students who have identified as having less working memory, a purposive sample of approximately 10 willing students was selected. Researcher told subjects about task as intervention: participants were provided with a blank sheet, newspaper, and Fevicol. They were instructed to create a

collage using newspaper cutouts based on their creativity. No predefined theme was given to encourage spontaneous expression. The session was performed daily for 10-20 minutes on a selected group of subjects. Thus, the intervention continued for six weeks. Post measure of working memory was then applied. The measurement conditions maintained before the measurement were also valid after the measurement

Results

Wilcoxon T test was applied to find the impact of art therapy on working memory by comparing the mean scores of subjects' working memory before and after the intervention. The obtained results are presented in Table 1.

Table: 1 Displaying Mean, SD and Z values of Pre -measure and Post measure of Art Therapy for Working Memory (N=10).

Working Memory	Mean	SD	Z	Significance Level
Pre Measure	76.20	5.54	-2.02	0.04*
Post Measure	97.20	9.03		

$p<0.05$

Table 1 shows the mean score for pre 76.20 and post 97.20 and the SD score for pre 5.54 and 9.03 for post of Art Therapy. Z score = -2.02 which is significant at 0.05 level of significance. H_1 Art Therapy would be an effective technique in enhancing Working Memory of students is accepted at 0.05 level of significance. This indicates that there is sufficient statistical evidence to support the claim that engaging in art therapy significantly improves individuals' ability to adapt to information for long time. The results suggest that participants who undergo this therapy enhanced working memory.

Discussion

Based on the findings of the current experimental research, H_1 Art Therapy would be an effective technique in enhancing Working Memory of students is true. Soomin, (2023) found that art therapy in psychological counselling enhances awareness, self-worth, and confidence. Additionally, it improves their capacity to express themselves, interact with others, and work in general. In other places, it lessens stress and sadness and enhances pain management. In 2021, Yu *et al.,* comparing the AT group to the control group, notable improvements in working memory span and immediate memory were noted. Right middle frontal gyrus (MFG) CT was significantly higher in the AT group than in the control group. Additionally, there was a strong and positive correlation between changes in immediate memory and CT alterations in this cluster.

Lee et al., 2019 found cognitive function on neuropsychological tests, the main endpoint, demonstrated notable memory domain improvements that persisted after nine months of art therapy. Attention, working memory, executive function, and visuospatial skills all showed further gains. Hu, J. el al.(2021) argues that art therapy can be used as a complementary treatment for disease diagnosis to help medical professionals gather information that is different from traditional testing, in addition to being a helpful therapeutic approach to help patients open up and share their feelings, opinions, and experiences. Hass-Cohen & Findlay, (2019) showed that in addition to reducing habitual reactions, arts treatments provide a creative and fulfilling way to access nonverbal autobiographical memories. Therapeutic MR dynamics are supported by art therapy relational neuroscience (ATR-N) methods that are informed by the neuroscience of MR. Hamza & Helal (2021) found that there were notable variations in the degree of depression-related thoughts (high versus low) on the working memory assessment test. According to the current

research, working memory capacity is not impacted by the combination of stressful life events, gender, and academic major, nor is it impacted by the combination of depressive thoughts, gender, and academic major.

All things considered, the evidence points to art therapy as a successful intervention for improving students' cognitive abilities, especially working memory. Following art therapy, studies have demonstrated increases in executive functioning, memory span, concentration, and emotional regulation. Studies on brain imaging also show an association between cognitive improvements and structural alterations in memory-related regions. Art therapy improves psychological well-being, encourages self-expression, and lowers stress and depressive thoughts—all of which have a good impact on cognitive function. These results demonstrate the therapeutic benefits of art in educational and mental health contexts, making it a potentially useful instrument for fostering students' emotional and cognitive growth.

Conclusion

The results demonstrate that art therapy is a successful method for improving pupils' working memory. According to neuroscientific theory, creative activities like collage-making increase brain connections by stimulating the hippocampus and prefrontal cortex. Overall cognitive improvement is fostered by this cognitive engagement, which enhances memory retention, cognitive flexibility, and emotional regulation.

This study has important ramifications for therapeutic and educational approaches. It offers factual backing for incorporating art-based therapies into mental health programs and school curriculum. The study promotes holistic approaches to cognitive development by bridging the gap between applied educational psychology and neuroscience by emphasizing the neurological advantages of creative involvement. The results can help teachers, school counsellors, and therapists create creative plans to help pupils who struggle with memory.

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