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RESEARCH ARTICLE

A Study on Improving MetamemorSy through Cognitive Language Activities Worksheets among Individuals with psychosomatic symptoms

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Abstract

Psychosomatic condition refers to mental and physical dysfunction arising from physical and psychological symptoms. This research aims to employ cognitive language activities to increase and improve the participants' metamemory who have a psychosomatic illness. Engineering students from the Vellore region studying at the tertiary level were selected as the study participants. Participants in late adolescence were chosen for the study because they displayed a high level of psychosomatic condition. The study employs a non-equivalent control group Design (NEGD), which incorporates both qualitative and quantitative analysis, as the study involves non-randomization, and contest the variables. The sampling method employed in the study is purposive sampling hence, non-parametric test was performed in SPSS. Unstructured interview was also employed after each session and their symptoms were inquired and marked in PSQ. Participants were given and instructed to employ coping startegies and memory strategies to reduce the impact of memory decline, psychosomatic symptoms, stress and anxiety. The intervention took place over eight weeks, and participants were given four sets of worksheets like chunking and embroidery. To assess the participants' progress, eight successive tests were administered. Ninety-three people were chosen to participate in the current study. The pre-test and post-test scores' significant value was 0.000. The results indicate a substantial difference between the metamemory pre-test and post-test scores. Cognitive activities have significantly triggered the pre-frontal cortex region of the brain (responsible for memory and have negative effect due to psychosomatic condition) and improved the metamemory and memory strategies.

Keywords: Metamemory; cognitive activities; psychosomatic symptoms; retention; late adolescents

INTRODUCTION

Symptoms of Psychosomatic condition is defined as the psychosomatic dysfunction of the mind and body involving both physical and psychological symptoms. These psychological tensions can create psychological or physical sickness, aggravating the pre-existing disorders in the body. Hence it is called a psycho-physiological disorder. According to the report of Khetrapal (2022), the psychosomatic condition could be aggravated due to genetic reasons, inconsistent biological function, and stress levels of the individuals. There are three different types of psychosomatic symptoms. In the first, a patient has a physical and mental illness whose signs and symptoms are complicated by one another. The second group includes those who have mental problems due to their illness and the medications they are prescribed. Somatoform symptoms are the third category. It occurs when the individual has a mental illness displays one or more physical symptoms.

Tamara lacourt (2013) has divided psychosomatic symptoms into various categories, which include digestive symptoms, muscular symptoms, respiratory illnesses, symptoms related to physical exhaustion, cognitive symptoms and mental symptoms. However, these physical illness affects the brain areas and cause mental and psychological illnesses. Lane et al. (2009) also assert that prevailing psychosomatic condition affects the cortex and pre-frontal cortex areas and cause memory disabilities and cognitive dysfunctions. Many researchers have also

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affirmed that (Maclean, 1949; Kano, 2013; Lane, 2009), psychosomatic condition or underlying physical condition in the body affects the brain regions like the hippocampus, temporal lobe, parietal lobe, and working memory. Hence, individuals with the psychosomatic condition often experience cognitive dysfunction, memory disabilities, and attentional capabilities, which create problems in working memory. Deschenes et al. (2015) have confirmed that individuals with the psychosomatic condition have ongoing medical illnesses are more likely to experience mental disorders, with symptoms of depression, stress and anxiety being the most common.

Cameron (2009) stated that somatoform has a deep root with memory disabilities and cognitive dysfunctions. Baum et al. (1993) and Van den Bergh (1998) affirmed that individuals with the psychosomatic condition often have symptoms like memory loss, forgetfulness, repeating the same information and information loss. However, these symptoms pave the way for a negative impact on the individual's perception of their memory. Ponds (1996) puts forth that individual with depression, stress, and low memory capabilities displays low metamemory. The psychosomatic condition affects the brain region as Janowsky et al (1989) concludes that individuals with frontal lobe dysfunction and low memory level often display low metamemory and metamemory accuracy. The term metamemory branches from metacognition

Metacognition is the process of recognising and controlling one's cognitive capacity and experience. Metamemory, Meta-attention, and Meta-learning are the three subtypes of metacognition. According to Pannu (2005), metamemory is defined as "both the introspective knowledge of one's memory capabilities (and strategies that can aid memory) and the processes involved in memory self-monitoring". According to Weed et al (1990), ‟metamemory was described as knowledge of individual, activity, and approach impacting recall, self-regulation and set of instructions integrating executive function aspects or metacognitive acquisition techniques″.

Meta-memory plays a crucial part in cognitive processing and a person's daily life and activities, which will aid them in carrying out their tasks effectively. Meta-memory plays a critical role in a person's cognition and enhanced confidence, which is essential for knowledge to be stored in long-term memory during language learning. Those who suffer from psychosomatic illnesses have reduced confidence, cognition, and learning consistency. Lacourt (2013) concluded that individuals with psychosomatic condition display significant physical pain. Glass (2005) also affirms that individuals with physical pain or fibromyalgia often display less metamemory. Metternich et al. (2019) assert that individuals with functional memory disorders display memory problems and low metamemory. Ponds (1996) affirmed that mental illness affects memory function and affects metamemory in adulthood. Ponds also identifies that metamemory strongly correlates with mental illness, age, gender and sex. Metamemory play a vital role in a person's cognition and confidence, helping the individual to attentively learn and improve proficiency in the language so that information gets stored in the long-term memory. Psychosomatic patients display less confidence, cognition, and consistency in learning during their daily activities due to physical and psychological symptoms. The psychosomatic condition leads to memory disabilities and cognitive dysfunctions. Due to cognitive disability, psychosomatic patients′ perception of their memory and attention was relatively less, with cognitive language learning activities and memory strategies, metamemory increases.

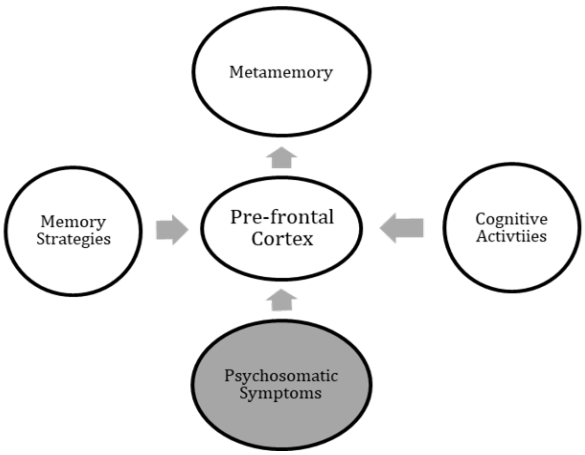

Figure 1. Significance of pre-frontal cortex

Psychosomatic condition negatively affects individuals' pre-frontal cortex, and individual memory might be relatively less. Many investigators confirmed that cognitive language learning activities and memory strategies positively trigger the pre-frontal cortex. Due to this, the pre-frontal cortex functions better and improves metamemory, strategic thinking and applying strategies. ‟Functional Magnetic Resonance Imaging″ (FMRI) was used to investigate the regions of the brain involving metacognition and discovered that ‟the anterior medial pre-frontal cortex″ was engaged and activated during metacognition, indicating that this region of the brain is involved in complex reasoning and thinking (Burgess and Wu, 2013). According to Seminowicz et al. (2013), Cognitive language learning activities effectively triggers the pre-frontal cortex region of the brain. Cognitive language learning activities aims to remodel the brain by generating newer neuron connections through the high-order thought process, thus improving language acquisition. Lane et al. (2009) add that current psychosomatic conditions affect the cortex and prefrontal regions of the brain, resulting in memory impairments and behavioral disorders. As a result, individuals with psychosomatic symptoms commonly exhibit memory impairment, cognitive abnormalities, and selective attention deficiencies, leading to memory retention issues. According to Cameron (2009), Psychosomatic condition and symptoms of psychosomatic condition are deeply rooted in memory impairments and mental disorders. Baum et al. (1993) and Van den Bergh (1998) confirmed that people with psychosomatic illnesses frequently exhibit memory loss, forgetfulness, previously learned knowledge repetitions and information loss. However, these conditions impact the individual's memory perception unfavorably. According to Ponds and Jolles (1996), people with depressive disorders, anxiety, and poor memory have poor metamemory. The psychosomatic disease impacts the brain region, as Janowski et al (1989) finds that people with a dysfunctional frontal cortex and low memory levels frequently have poor metamemory and metamemory accuracy. Metternich et al. (2019) state that patients with functional memory impairments have memory difficulties and poor metamemory. Mental illness impacts memory function and metamemory in adults, as confirmed by Ponds (1996). Ponds also reveals high correlations between metamemory and mental disease, age, gender, and sex. Thus figure 1 clearly explains that psychosomatic symptoms have negative effect while cognitive activities and memory strategies have positive

trigger effect on pre-frontal cortex which eventually result in metamemory.

The present study aims to improve metamemory through cognitive language activities. The term "cognitive language activities" refers to a language-based psychological activities employed to improve learners' specific concerns like anxiety, memory and cognitive issues. Cognitive language activities increases the metamemory through evaluative and critical language activities. Williams et al. (2000) investigated the effect of cognitive activities in improving memory and metamemory. Williams concluded that there is a strong correlation between cognitive activities and memory enhancement. Elliott (2014) employed memory rehabilitation activities focusing on developing cognition, thereby improving memory capabilities. Van Vugt et al. (2012) affirm the positive impact of cognitive activities in improving memory recall and meta-attention.

Hence the reviews assert that those with psychosomatic illness often possess retention, memory and mental disabilities due to underlying physical symptoms and mental issues with memory, attention and depression. Hence, cognitive language activities can be employed as rehabilitation treatment to develop the memory level of the individual and reduce the impact of psychological distress caused by the psychosomatic condition. The present study aims to improve the metamemory of the individuals affected by the psychosomatic condition through cognitive language activities. Activities like embroidery and chunking were given to the participants to improve their memory as cognitive activities. Embroidery is a vocabulary-based game which improves memory. Derakshan (2015) and Bavi (2018) affirm that games aid vocabulary retention. Students who play games during their studies retain vocabulary more quickly and effortlessly as it affects the occipital lobe of the brain is involved in processing visual information. The brain's left temporal lobe, which is connected to the hippocampus, is involved in language, verbal memory, and information retrieval. Chunking is a cognitive activities for classifying and organising data to make it simpler to understand and recall. Through Grouping or "chunking" activity, information can move from short-term to long-term memory if a learner employs chunking techniques. Participants who consistently used chunking during symbolic sequence learning displayed more substantial performance gains and a more significant decline in cognitive load over time (Solopchuk, 2016).

Metamemory in Adulthood questionnaire (MIA) was employed in the present study as an intervention. The study employs the MIA questionnaire of McDonough et al (2020), which was earlier adapted from Dixon et al. (1988) and has 107 items. McDonough has adapted and revised the MIA to twenty items. McDonough et al. (2020) employ Metamemory in Adulthood Questionnaire (MIA) to analyse the "subjective memory function", which has a higher level connected with age-related cognitive decline. McDougall et al. (2019) used MIA to train adults with "mild cognitive impairment" and found that MIA was effective in analysing the memory level of individuals with cognitive disabilities. McDougall et al. (2019) employed MIA to analyse the consequence of stigma in improving memory levels.

Objective and Hypothesis of the Study

The study's objective is to improve and enhance the metamemory of the individuals who has two to three symptoms of psychosomatic illness through cognitive language activities.

Based on the objective one null hypothesis was formulated,

H01: There is no significant improvement in the participants' metamemory due to the intermediation of cognitive language activities.

The variables of the study are pre-test and post-test scores, metamemory and psychosomatic condition. The following null hypothesis was formulated based on the objectives and variables of the study.

METHODS

Samples and Sampling Method

The participants who were selected for the current study were tertiary-level engineering students in the Vellore district. Late adolescent participants were selected for the study as they display a high level of psychosomatic condition compared to early and middle adolescents. Purposive sampling method was employed in the study. Pre-requisite permission has been obtained from Tamara Lacourt et al(2013) for using the psychosomatic symptom questionnaire which has 39 items. PSQ-21 was used as a sampling questionnaire for the present study. The participants who displayed two or more psychosomatic symptoms were selected as the study participants. According to the union government report of India, Vellore district has been listed as an educationally backward district. Adolescence is the complex transitional age group for mental development. World Health Organisation reports that one in seven adolescents has a psychosomatic condition(WHO,2021). According to UNICEF(2019), one in seven experience psychological illness among adolescent age. WHO Committee on mental health (1964) confirmed that individuals with psychosomatic symptoms experience high stress, anxiety and it affect education and language acquisition of the individuals. Henckens et al,(2009) asserts that over secretion of stress hormone among psychosomatic condition cause acute and chronic changes in memory and attention by causing poor language comprehension and acquisition.

Decaro et al (2016) confirms that low memory and attention has direct impact on language and cause poor language comprehension as it affects the working memory and sensory memory. The criteria for selecting a sample from the population are the individual learner should be an ESL learner, late adolescent learners. The learner should have two to three psychosomatic symptoms and they should from Urban Engineering college from Vellore as the Psychosomatic symptoms were thrice higher in urban than rural. Arvind et al, (2019) put forth that mental and physical disorders are thrice higher in urban areas than in rural Indian areas. Vats and Sharma (2017) researched that engineering students suffer from mental health problems more than the other programs due to the syllabus pattern, class pattern and assessment methods.

Research Method

The research method employed in the present study is the experimental method. Experimental methods are investigation methodologies that involve the investigator consciously and deliberately introducing the effects of changes and treatment in order to aid inferences and conclusions. Generally, experimental techniques involve a random schedule, curriculum or treatment. However, experimental design has been divided into three types based on the criteria like having a control group and

experimental group, randomising the participants and manipulating the variables. Since the study does not involve randomising the participants, the study incorporates a quasi-experimental design. A quasi-experimental design is subdivided into various types. The study employs the following three criteria,

- Grouping the participants into a control group and experimental group
- Use non-probability sampling procedures (Purposive Sampling)
- Manipulates the Independent variable to analyse its effect on dependent variables.

Considering the above criteria, Non-Equivalent Group Design (NEGD), one of the quasi-experimental design types, was selected as a research design for the study. Non-Equivalent Group Design is defined as a blend of both true experimental and quasi-experimental designs. Because it utilizes both of their characteristics. Similar to a true experiment, NEGD employs treatment and control groups that are identical and comparable. Nevertheless, it lacks the randomization that defines a quasi-experiment. The criteria mentioned above fit effectively in NEGD.

Sampling Method

The sampling method employed in the present study is purposive sampling method under Nonprobability sampling method. Psychosomatic Symptom Questionnaire (PSQ) were used as the sampling questionnaire to identify the participants for the current study. A psychosomatic Symptom questionnaire was distributed to the population through google form, and ninety participants were selected as the participants of the current study. The psychosomatic Symptom Questionnaire was circulated to late adolescent tertiary-level of Learners. The questionnaire was circulated to 230 participants. Ninety participants were selected as the samples for the present study as they displayed two to three psychosomatic symptoms. Almost 43% of the participants displayed symptoms related to respiratory illnesses, and 37% of the participants displayed digestive symptoms. Over 26% of the participants displayed pain in muscles and muscular symptoms. Almost 53% of the participants displayed symptoms related to physical exhaustion. 38% of the participants displayed cognitive symptoms like low cognition, memory and attention. 63% of the participants displayed mental symptoms like dizziness, nausea, and fainting illness. Participants with two or more symptoms were selected as the study participants. Ninety-two participants were selected for the present study.

Research Design

Metamemory in Adulthood (MIA) questionnaire, which was adapted from Douglas, was used to analyse the participants' metamemory level as a pre-questionnaire and post-questionnaire. Metamemory in Adulthood Questionnaire (McDonough, 2019) was modified and revised from Dixon, Hultsch, & Hertzog's (1988) "Metamemory in Adulthood questionnaire", which has 105 items. McDonough (2019) has adapted the 105 items and condensed the MIA questionnaire into 20 items. McDonough has divided the twenty-item questionnaire into two factors, "Factor 1 consists of age-related changes in memory, and Factor 2 consists of current memory capacity". MIA was circulated as a pre-questionnaire to analyse the individuals' perception of their memory and metamemory. Participants with psychosomatic conditions displayed relatively less memory and metamemory. The memory-based pre-test was conducted for twenty marks to analyse the memory level. Cognitive language activities was employed as an intervention for eight weeks. Activities like chunking and embroidery were given to the participants in four sets. Eight consecutive tests were performed to evaluate progression in the memory level of the learners. Scores and discussion sessions were held with the learners to motivate them and engage them in the thinking process. A 30 marks consecutive test was conducted to analyse the learners' progression. After the intervention, MIA was circulated again to identify the metamemory level of the participants after the intervention study and collected data were tabulated. Memory-based analytical reading comprehension activity (Intermediate level) was given to the participants as post-test

The collected data were analysed using IBM SPSS Software. Tests like the reliability test (Cronbach alpha test) and validity tests (bivariate analyses) were conducted to check the reliability and validity of the PSQ-47 and MIA-20 Questionnaires. Paired sample statistics was used in finding the pre-questionnaire and post-questionnaire data differences due to the intermediation of the cognitive language activities. Frequency tests and descriptive statistics were performed to analyse the standard error mean, standard deviation, mean, descriptive statistical data and frequency of the pre-and post-questionnaire data. Non-Parametric tests like Wilcoxon signed rank test was performed to analyse the pre-test and post-test score.

Factor 1: Age-related changes in memory
• Memory for names • Remembering capacity/ less efficicency in rememebering/ • Memory for dates • Misplacing Things • Remembering content of the news article/Things/titles of the books
Factor 2 consists of current memory capacity
• Remembering the plots of stories and novels • Remember exactly what I read or heard a specific thing. • Remembering the places/Content of newspaper article/Newspaper/ • No difficulty remembering factual information • Remembering titles of books, films, or plays/Recipes/Birthdays/Trivia

Figure 2. Factors of MIA Questionnaire

RESULTS AND DATA INTERPRETATION

The rationale for selecting PSQ for the present study is because Tamara Lacourt has divided the psychosomatic symptoms in to respiratory illnesses, digestive symptoms, muscular symptoms. physical symptoms cognitive symptoms and mental symptoms. The questionnaire will easily distinguish the symptoms and it will be easy for the researcher to identify the individuals with psychosomatic symptoms. The rationale for selecting the metamemory questionnaire is because the MIA has two major factors which is "Factor 1 consists of age-related changes in memory, and Factor 2 consists of current memory capacity".

The psychosomatic symptom questionnaire (PSQ), devised by Tamara Lacourt, was employed in the present study as a sampling questionnaire. It has forty-seven items, and a reliability test was performed using Cronbach's alpha. The reliability table was tabulated in table 1. The Cronbach alpha coefficient of the Psychosomatic Symptom Questionnaire was 0.932 for 93 participants. Metamemory in Adulthood (MIA) questionnaire, devised by McDonough (2019), was employed as a pre-and post-questionnaire in the present study. The Cronbach alpha coefficient of MIA which has twenty items was 0.863. As the data of the study is not normally distributed the researcher has used non-parametric test to analyse the bivariate analysis. Bivariate analysis using the Spearman Correlation method was run to analyse the validity of the PSQ and MIA questionnaires. The data result of the bivariate analysis indicates that the Spearman Correlation value was between 0.321-0.679 and the significance value (p-value) is below 0.05(ranging from 0.045-0.000). Hence, from the data analysis, it is concluded that the data is reliable and valid.

Table 1
Reliability of PSQ and MIA Questionnaire

Questionnaire	No. Items	Cronbach Alpha Coefficient
PSQ-Psychosomatic Symptom Questionnaire	47 Items	0.832
MIA- Metamemory in Adulthood	20 Items	0.863

After the sampling process, the participants were selected for the study. A Pre-questionnaire and pre-test were conducted to analyse the participants' memory and metamemory level. The pre-questionnaire data was tabulated in table 2. Ninety-three participants were selected as the participants for the present study. Almost thirty participants have affirmed that their memory for names has deteriorated significantly in the past ten years. However, 65% of the participants agreed that the older they get, the harder it is to remember and recall the information. Nearly 35% of the participants affirmed that their memory for dates has remained strong in the past ten years. Almost 60% of the participants confirmed that they have become less active at retaining the information now than they used to remember ten years. Over 69% of the participants affirmed that they are good at remembering information for a short time. Almost 39% of the participants agreed that when they compare their memory now and ten years ago, they have significantly worsened in remembering the titles of books, prose, movies, drama or plays. Over 50% of the participants agreed that they misplace items more often now than when they were younger. Over 30% of the participants agreed that their memory has worsened in remembering information like appointments, news articles, and broadcasts over ten years.

The second category discusses the learner's perception of their memory or metamemory. Over 57% of the participants affirmed that remembering the storyline or plots of short stories and fiction was not easy for them. Further, the participants confirmed that they could not remember the read or heard information precisely or specifically. Over 60% of the participants assert they need to improve at remembering information about places, news magazines, tv shows, and recent day-to-day conversations. Almost 58% of the participants affirmed that they find it challenging to remember factual information, trivia, birthday dates, titles of movies, books, and recipes. After obtaining the pre-questionnaire responses, a pre-test was conducted for 25 marks. The mean value obtained in the pre-test was 12.0000. The standard deviation of the pre-test was 2.22266. The paired sample statistics value has been tabulated in table 3.

Table 2
Descriptive and Frequency Analysis of Pre-questionnaire (N=93)

Items	Mean	Std.Dev	St. Error mean	Frequency				
Factor 1: Age-related changes in memory				1	2	3	4	5
Item 1	2.5914	1.43887	.14920	20	20	13	18	12
Item 2	3.7312	1.13386	.11758	6	8	15	40	24
Item 3	2.9032	1.35986	.14101	20	16	24	19	14
Item 4	3.8925	1.13695	.11790	5	4	23	25	36
Item 5	2.0000	1.39876	.14504	49	21	2	12	9
Item 6	3.0645	1.41273	.14649	18	16	20	20	19
Item 7	3.7849	1.28410	.13315	13	12	18	32	18
Item 8	3.3226	1.31183	.13603	12	21	24	22	14
Item 9	2.9462	1.21910	.12641	13	9	34	19	18
Item 10	3.2151	1.26705	.13139	8	11	24	28	22
Factor 2: Current memory capacity.								
Item 11	3.4839	1.22130	.12664	28	25	19	12	9
Item 12	2.4516	1.30647	.13547	29	25	19	12	8
Item 13	3.0860	1.36458	.14150	19	4	23	25	22
Item 14	2.4086	1.28737	.13349	23	28	22	15	5
Item 15	3.2903	1.41867	.14711	29	31	19	12	2
Item 16	2.4731	1.18497	.12288	26	27	19	12	9
Item 17	2.2151	1.09196	.11323	31	16	19	13	14
Item 18	2.4731	1.29036	.13380	26	27	19	12	9
Item 19	2.6022	1.45318	.15069	31	16	19	13	14
Item 20	2.4086	1.28737	.13349	29	25	19	12	8

After the pre-test, cognitive language activities activities were given to the students. Memory strategies like repetition, chunking, visualisation, and taking notes were taught to the participants. Chunking and Embroidery cognitive language activities was given to the participants as four sets total comprising eight activities (four chunking activities and four embroidery activities). Totally eight consecutive tests were conducted for twenty-five marks. The mean value of the first chunking activity was 13.00. However, the successive mean scores were 13.32, 13.87, 14.42, 15.03, 15.45, and 15.76. The mean value of the last consecutive test was 16.42. The mean difference between the first and last consecutive tests was 3.420, which was a considerable improvement.

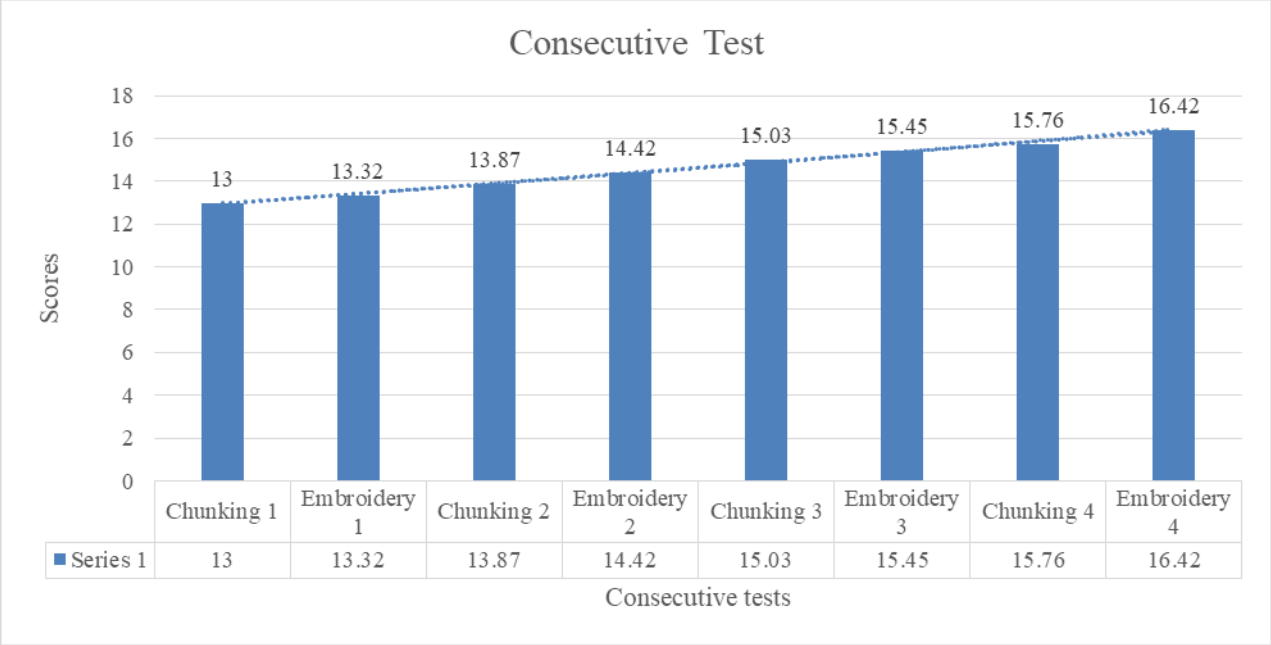

Figure 3 Consecutive Test Scores

After teaching the strategies and conducting the consecutive test, a post-test and post-questionnaire data were obtained from the participants. The post-test for twenty-five marks was conducted for the participants. The Wilcoxon signed-rank test was performed for the pre-test and post-test data, tabulated in table 3. The pre-test means the score was 12.00, whereas the post-test mean score was 20.1075. The standard deviation of the pre-test score was 2.22, and the post-test standard deviation value was 1.88508. There is a considerable difference between the mean scores of pre-test and post-test scores. The post-questionnaire was circulated after conducting the post-test. The post-questionnaire data were tabulated in table 4.

Table 3
Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
Post-test Score	93	20.1075	1.88508	17.00	24.00
Pre-test Score	93	12.0000	2.22266	9.00	16.00

Almost fifty participants have affirmed that their memory for names has deteriorated significantly in the past ten years. Nevertheless, 37% of the participants agreed that the older they get, the harder it is to remember and recall the information. After the eight-week intervention, individuals' perception of their memory increased. Nearly 40% of the participants affirmed that their memory for dates has remained strong in the past ten years. Almost 57% of the participants confirmed that they have become active again at retaining the information now as they used to remember ten years. Over 32% of the participants affirmed that they are good at remembering information for a short period but cannot retain the information long time. Almost 47% of the participants agreed that when they compare their memory level now and ten years ago, they have the same memory power in remembering the information related to titles of books, prose, movies, drama or plays. Over 43% of the participants disagreed with the statement that they misplace items more often now than when they were younger. They have affirmed that their knowledge about placing items was moreover similar when compared to their younger age. Over 38% of the participants disagreed that their memory has worsened in remembering information like appointments, news articles, and broadcasts over 10 years. They assert that their memory has been much similar for over ten years.

After the intervention, their perception of metamemory has significantly improved, which is evident in the current memory questionnaire. The second category discusses the learner's positive impact on their memory or metamemory perception. Over 38% of the participants affirmed that remembering the storyline or plots of short stories and fiction was easy due to the memory strategies they applied while doing cognitive language activities, like chunking and embroidery. Additionally, the participants confirmed that they could remember the read or heard

information precisely or specifically when applying the memory strategies like visualisation. Over 57% of the participants assert that they are so good at remembering information related to places, news magazines, tv shows, and recent day-to-day conversations due to the memory strategy of chunking or grouping the information into chunks. Almost 42% of participants affirmed that they find it very normal to remember factual information, trivia, birthday dates, titles of movies, books, and recipes due to memory strategies. As a result, it is concluded that memory strategies and cognitive language activities aided the learners in improving their metamemory and perception of metamemory.

Table 4
Descriptive and Frequency Analysis of Post-questionnaire

Items	Mean	Std.Dev	St. Error mean	Frequency				
Factor 1: Age-related changes in memory				1	2	3	4	5
Item 1	3.4731	1.36407	.14145	8	20	15	20	30
Item 2	3.0215	1.34309	.13927	15	21	20	21	16
Item 3	2.6129	1.14239	.11846	20	20	34	14	5
Item 4	2.6022	1.22598	.12713	23	19	30	14	7
Item 5	2.5269	1.65235	.17134	41	16	1	16	19
Item 6	2.7849	1.04100	.10795	13	16	49	8	7
Item 7	2.5914	1.37712	.14280	25	27	14	15	12
Item 8	2.7634	1.44009	.14933	24	21	17	15	16
Item 9	2.6667	1.35401	.14040	22	26	19	13	13
Item 10	3.1613	1.48390	.15387	22	16	13	14	28
Factor 2: Current memory capacity.								
Item 11	3.1075	1.57744	.16357	18	16	17	17	25
Item 12	3.5591	1.21996	.12650	9	4	32	22	26
Item 13	3.0430	1.21507	.12600	15	5	50	7	16
Item 14	3.1828	1.31005	.13585	12	16	28	17	20
Item 15	3.6344	1.38928	.14406	12	9	13	26	33
Item 16	3.4946	1.24781	.12939	8	14	17	32	22
Item 17	3.6882	1.28519	.13327	8	9	20	23	33
Item 18	3.3441	1.49270	.15479	16	12	21	12	32
Item 19	3.1935	1.43146	.14844	15	15	27	9	27
Item 20	3.1613	.95883	.09943	5	8	60	7	13

Pre-test and post-test data were analysed using Wilcoxon signed test, and the rank table was tabulated in table 5, where a means pre-test score lesser than post-test score, b means pre-test score greater than post-test score and c means pre-test score and post-test scores are equal. From the rank table it is evident that, all the 93 pre-test scores were lesser than post-test score. Hence it is concluded that there is a significant difference between the pre-test and post-test due to the intervention.

Table 5
Rank Table of pre-test and post-test scores

		N	Mean Rank	Sum of Ranks
Pre-test Score - Post-test Score	Negative Ranks	93[a]	47.00	4371.00
	Positive Ranks	0[b]	.00	.00
	Ties	0[c]		
	Total	93		

Test statistics table was tabulated in the table 6. The z value which is based on positive ranks was -8.383, which is lesser than -0.96, hence it is considered statistically appropriate and the two-tailed significance value of the pre-test and the post-test score was 0.000 (P=0.000<0.05), which is less than 0.05.

Table 6
Test Statistics

	Pre-test Score - Post-test Score
Z	-8.383[a]
Asymp. Sig. (2-tailed)	.000

As a result, it's possible to state that there is a significant difference between the memory pre-test scores and post-test scores. The null hypothesis was therefore rejected, and an alternate hypothesis was formulated. The alternate hypothesis was that There was a significant improvement in the participants' metamemory due to the intermediation of the cognitive language activities. The objective of the study is to improve and enhance the metamemory of the individuals who has two to three symptoms of psychosomatic illness through cognitive language activities. From the result of the data analysis, it is evident that cognitive language activities have a substantial impact in the learners metamemory. Hence, it is concluded that the participants showed significant

improvement in their metamemory or current memory status (MIA) through cognitive language activities.

DISCUSSION

The data results confirmed that individuals with psychosomatic conditions displayed two or three physical symptoms and low memory skills, as confirmed by the researchers (Metternich et al., 2009; Thayer, 2005; Ruesch, 1948; Baum et al., 1993). As confirmed by Lane et al. (2009), Baum et al. (1993) and Van den Bergh (1998), the present study also confirms that individuals with psychosomatic conditions displayed memory symptoms like memory loss, forgetfulness, repeating the same information and information loss. The individuals also displayed poor perception of the memory. In the present study, MIA was employed as the metamemory intervention questionnaire to analyse the metamemory and MIA questionnaire has significantly improved the individual's perception of memory as suggested by McDonough et al. (2020), McDougall et al. (2019), and McDougall et al. (2019). The study confirms that metamemory varies with age and confirmed that late adolescent displays symptoms of the psychosomatic condition. It lines with the report of the World Health Organisation, which asserts that one in seven adolescents has a psychosomatic condition (WHO,2021). From the results, cognitive language activities was found to be an effective activities in improving memory. It has also been confirmed by various researchers like Hick et al. (2005), Chapman and Hesketh (2001), and Gilmore et al. (2005). Through qualitative analysis, the present study concludes that memory strategies like chunking, visualisation, taking notes and keyword methods participants affirmed that these memory strategies had helped them to remember and retain information effectively. The same was confirmed by various researchers like Sastoque et al. (2019), Drigas et al. (2022) and Pressley et al. (1984). The individuals with psychosomatic symptoms should equip and develop effective coping strategies and memory strategies so that they prevent the stress, anxirty and depression as well as the memory decline.

CONCLUSION

The psychosomatic Symptom Questionnaire of Tamara Lacourt has significantly identified the psychosomatic symptoms. In the late adolescent age group, nearly 30-40% of the population displays more than two psychosomatic symptoms and 7% displays more than four to five psychosomatic symptoms. The pre-questionnaire data on metamemory displays that learner needs better awareness of metamemory and meta-attention. After the intervention, in the post-questionnaire, they indicated that their awareness about their memory had significantly increased. Many investigations have proved that cognitive language learning activities significantly impact the learner's memory, attention, cognition, and language comprehension. Many language practitioners employ cognitive language learning activities. The effectiveness of cognitive language learning activities is evident in the progressing scores of the consecutive test in the experimental group. The paired t-test have indicated a significant difference in the experimental groups' pre-test and post-test scores. In the experimental group, intervention methods like cognitive language learning activities and memory strategies have significantly improved the learners' metamemory. The students should develop the ability to employ different strategies based on the specific situation. The learners should negate the distractions while learning and equip themselves for the undistracted learning process.

The study's findings conclude that cognitive language activities, MIA and memory strategies aided the learners in improving their metamemory and individuals' perception of the memory. MIA provides insight into their memory, whereas cognitive language activities help individuals improve their memory. Learners who employ memory strategies while doing cognitive language significantly improve their memory level. Hence it is concluded that cognitive language activities, memory strategies, and MIA has improved the learners metamemory. The study is limited in analysing metamemory. Various studies could be done to analyse the other forms of metacognition, like meta-attention and meta-learning. The study is limited only to the Vellore district. Research could be carried out in other states and globally to identify the effectiveness of cognitive language activities in improving metamemory and other forms of metacognition.

DECLARATIONS

We encourage you to provide declaration section in the manuscript file. In this section following points should be included as relevant to your study: Please follow below order for Declarations:

i) **Ethics approval and consent to participate – Consent Obtained from the Participants**
ii) **Consent for publication- YES**
iii) **Competing/Conflict of interests Statement- None**
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v) **Authors' contributions- M.Monika(Research question, Hypothesis, drafting first draft)**
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